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Contents

EDITORIAL

On account of the world-wide interest in the personal health and use of plant based drugs, the research activities in the traditional drugs have considerably increased. Over the years, a large number of traditional drugs, mainly herbal, have been subjected to clinical, pharmacological, phytochemical and pharmaceutical studies in an effort to validate them and prove their medical efficacy and safety. All these investigations have yielded extensive and valuable findings and insights, and there is a need for wide exchange of this information among scientists engaged in the development of new drugs of natural origin.

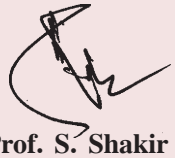
Unani system of Medicine, although originated in Greece, is one of the recognized systems of medicine of the country. Although, the Unani medicine have been in use for centuries and are known for their therapeutic efficacies, there is a need to scientifically establish their efficacy and safety in order to achieve global acceptance. Organized research work in this system was, therefore, a need of the hour. In post independent era, Central Council for Research in Unani Medicine, through its clinical, drug research, literary research, survey & cultivation of medicinal plants programme is contributing significantly for last three decades. *Vitiligo, Sinusitis, Filariasis, Eczema, Malaria, Infective Hepatitis, Asthma,* are some of the conditions where Unani therapies have earned recognition after scientific validation.

The Council has been publishing the peer reviewed *Hippocratic Journal of Unani Medicine* (HJUM), mainly to bring out fundamental and applied aspects of Unani Medicine. The journal also publishes recent advances in other related sciences and traditional medicines as well as different streams of medical sciences, which have bearing on validation and scientific interpretation of various concepts and strengths of Unani medicine.

In view of an overwhelming response, the journal earlier published twice a year, its periodicity has now been changed to quarterly w.e.f. January 2008 to accommodate more articles for quick dissemination of research data among scientific community. The journal has sufficient room for invited articles from luminaries of modern medicine and sciences as well as scholars of Unani medicine. The broad areas being covered include clinical research on single and compound Unani drugs, validation of regimental therapy, Clinical and experimental pharmacological studies, standardization of single and compound drugs, development of standard operating procedures, ethnobotanical studies, experimental studies on medicinal plants and development of agro-techniques thereof, and literary research on classics of Unani medicine. The journal is also open for studies on safety evaluation of Unani and other herbo-mineral drugs, nutraceuticals, cosmotherapeutics, aromatics, oral health, life style disorders, sports medicine etc. and such other newer areas which are the outcome of modern day living.

The current issue of this journal provides 16 original research and review papers in the areas of clinical research, drug standardization, pharmacology, ethnobotanical surveys and allied disciplines contributed by eminent scholars in their respective fields. It is hoped that data presented will contribute significantly in R&D sector of traditional drugs and prove to be an excellent exposition of current research efforts of scientists in this direction. Council acknowledges the authors for their contributions included in this issue and hope for their continued support in this endeavor. We wish to ensure the readers to bring out the future issues of the journal on time.

We at the CCRUM have been constantly striving to reach to higher standards and make HJUM the leading journal of Unani Medicine and related sciences. In this context, we thank our learned reviewers for their invaluable inputs in improving the manuscripts. We sincerely hope and trust that the mission can be accomplished with active partnership of quality-conscious individuals and institutions. Through these lines we seek your cooperation and support in materializing our dreams about the HJUM. In this regard, we request you for your as well as your colleagues' contributions for publication in and subscription to the journal. Further, we will appreciate if the journal is introduced far and wide. We would also welcome esteemed suggestions for achieving the highest standards of quality for the journal.



(Prof. S. Shakir Jamil)
Editor-in-Chief

The Effect of Unani Coded Drug UNIM-220(G) in Type II Diabetes Mellitus – A Clinical Study

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Abstract

UNIM-220(G) significantly lowered the biochemical parameter such as fasting (FF) glucose (19.0%) (P<0.01), post prandial (PP) glucose (18.0%) (P<0.01), serum cholesterol (10.0%) (P<0.01) blood urea (9.0%) (P<0.01), whereas significant increased in the levels of serum creatinine (9.0%) (P<0.01), serum glutamate pyruvate transaminase (SGPT) (15.0%) (P<0.01), and serum glutamate oxaloacetate transaminase (SGOT) (20.0%) (P<0.01), were observed when compared with pre-treatment to the after-treatment of the diabetic patients to this drug. However significant decrease was observed in the A/G ratio (14.0%) (P<0.01) when compared with pre-treatment to the after-treatment to this drug. Haematological studies had shown that a significant reduction in the level of erythrocyte sedimentation rate (ESR) (9.0%) (P<0.01) and eosinophil counts (26.0%) (P<0.01) were observed when compared with pre-treatment to the after-treatment values. Thus, the test Unani formulation is suggested to have anti-diabetic effect as well as hypolipidemic effect. Since, parameters of kidney and liver function are significantly elevated, though largely within normal limits, safety studies are warranted.

Keywords: Unani Medicine, Diabetes mellitus, Cholesterol, Triglycerides, Hypoglycemia, Hypolipidemia,

Introduction

World Health Organization (WHO) reports show that 32 million people had diabetes in 2000 (Wild *et al*., 2004). The International Diabetes Federation (IDF) estimates the total number of diabetic subjects to be around 40.9 million in India and this is further set to rise to 69.9 million by the year 2025 (Sicree *et al*., 2006). Diabetes is a heterogeneous common metabolic and endocrine disorder, characterized by chronic hyperglycemia and disturbance of carbohydrate, protein and fat metabolism, associated with absolute or relative deficiency of insulin secretion and/or insulin action (Bennet & Joslin, 1998). A long duration of metabolic disturbance can cause vascular damage, leading to both macro- and micro-vascular complication (Tong *et al*., 2004). An extensive range of oral anti-diabetic drugs for type-2 diabetes is now available. These main classes include agents that stimulate insulin secretion (sulphonylurea and rapid acting secretagogues), reduce hepatic glucose production (biguanides), delay digestion and absorption of intestinal carbohydrate (alpha-glucosidase inhibitors) or improve insulin action (thiazolidinediones) (Krentz & Bailey, 2005).

The modern drugs including insulin and oral hypoglycemic agents control the blood sugar level as long as they are regularly administered and also produce a number of undesirable side effects (Upadhaya *et al*., 1996; Reynolds & Martindale, 1997). Now attention is focused on herbal drugs including Unani formulation due to their

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versatile role in diabetes with no or negligible side effects and cost effectiveness, especially in treating Type-II Diabetes or NIDDM (Asima and Chandra, 2001; Gopalakrishnan and Solomon, 1992). Therefore, there is a need to search for effective and safe Unani drugs for the treatment of diabetes mellitus (DM). Keeping in view the above facts, the efficacy of Unani coded drug UNIM-220(G) was evaluated in the managements of diabetes mellitus.

Materials and Methods

UNIM-220(G) was obtained from Central Council for Research in Unani Medicine, New Delhi. The Study was carried out at Regional Research Institute of Unani Medicine (RRIUM), Aligarh. Eighty patients attending in the out patients departments (OPD) of either sex, age (25-65 yrs) were attended. Out of eighty patients only twenty five patients were screened out and the effect of Unani coded drug UNIM-220(G) was evaluated. UNIM-220(G) 500 mg granules were administered to each patient twice daily after meal, orally with water for a period of 180 days. All patients were advised to take diet containing high fiber with low or negligible sugar and light exercise (walking or cycling for 30 minutes) during the course of treatment.

Subject selection

Inclusion and exclusion criteria for selection of patients were based on American Diabetes Association (1997) and World Health Organization (1999) (Gabir *et al*., 2000).

Inclusion Criteria

1. In inclusion criteria the patients have fasting glucose level (FF ≥ 140 mg/dl) (12 hours) and post prandial glucose level (PP ≥ 200 mg/dl) after 1.30 hours after meals.
2. Patients have willing to participate will be included after written informed consent is obtained.
3. Patients have age of 25-65 years of either sex.

Exclusion Criteria

1. In exclusion criteria, patients with severe heart disease were excluded.
2. Patients with liver and kidney were excluded.
3. Patients with incurable cancer and severe diabetes were excluded.

Collection of blood serum

Blood samples were collected by puncturing the vein at each investigation. One ml. of blood with ethylene diamine tetra acetic acid (EDTA) was used for various haematological parameters and other 2.0-2.5 ml. of blood samples were allowed to

clot and serum was separated by centrifugation, which was used for various biochemical parameters. Biochemical and haematological investigations were carried out as follows.

Biochemical Analysis

Biochemical parameter carried out are as follows. Blood Sugar, Serum cholesterol, Serum Triglycerides, Blood Urea, Serum Creatinine, Serum Total Protein, Serum Albumin and Globulin, Serum Glutamate Pyruvate Transaminase (SGPT, E.C. 2.6.1.2) and Serum Glutamate Oxaloacetate Transaminase (SGOT, E.C. 2.6.1.1). The fasting and post prandial glucose level were included as a diagnostic parameter. The liver function test and kidney function test were also studied to evaluate the any possible toxicity of the formulation. Lipid profile was done to study the additional benefits.

Haematological Analysis

It includes Haemoglobin (Hb), Erythrocyte Sedimentation Rate (ESR), Red Blood Corpuscles (RBC), and Total Leucocytes Count (TLC), Differential Leucocytes Count (DLC): Polymorphs (Pol), Lymphocyte, Eosinophil Count, Monocyte and Basophils. It has already been demonstrated that insulin resistance is associated with increased red blood cell (RBC) and white blood cell (WBC) (Ellinger *et al*., 2006). Increased ESR, Hb%, Polymorphs, lymphocyte and eosinophil counts were found in metabolic syndrome in type 2 diabetic patients (Hording *et al*., 2002; Shim *et al*., 2006)

Drug, Dose and Mode of administration

Compound Unani formulation coded as UNIM-220(G) was administered as 500mg granules each twice daily, orally with water after meals.

Duration of treatment and follow-up

Duration of treatment of patients was 180 days. After registration of patients, base line observations were made before starting the treatment was carried out by investigating all the biochemical and haematological parameter.Peri-treatment follow-up (investigation at Ist (30th days), IInd (60th days), IIIrd (90th days), IVth (120th days) and Vth (150th days) time interval) observations were made in which fasting blood glucose and post-prandial blood glucose levels were determined. At the time of completion of treatment i.e. 180th days all the biochemical and haematological investigations were carried out.

Statistical Analysis

Data were analyzed statistically by one-way analysis of variance (ANOVA) followed by Dunnett's' test. The values were considered significant when the P-value was less than 0.01.

Results and Discussion

Biochemical Studies

Blood Glucose Level

UNIM-220(G) significantly lowered the biochemical parameter such as fasting (FF) glucose (19.0%) (P< 0.01), post prandial (PP) glucose (18.0%) (P< 0.01). In follow-up studies UNIM-220(G) causes a gradual reduction in fasting blood glucose in 30th days (17.0%) (P< 0.01), 60th days (18.0%) (P< 0.01), and 90th days (13.0%) (P< 0.01), as well as post prandial blood glucose level in 30th days (10.0%) (P< 0.01), 60th days (21.0%) (P< 0.01), and 90th days (15.0%) (P< 0.01), 120th days (12.0%) (P< 0.01) and 150th days (14.0%) (P< 0.01), when compared with pre-treatment testing to peri-treatment values (Table-1 & 2).

Table-1. Effect of Unani coded drug UNIM-220(G) on the level of blood glucose in diabetic patients.

Parameter → Group ↓	Sugar Level (mg/dl)	
	Fasting (FF) sugar	Post prandial sugar (PP)
Pre-treatment	139.69 ± 18.97	239.69 ± 28.17
After-Treatment (180th Days)	112.68 ± 8.27**	183.21 ± 17.93 **

**P< 0.01 (significant)

Table-2. Effect of Unani coded drug UNIM-220(G) on the blood glucose level of different follow-up in diabetic patients.

Group → Parameter ↓	Pre-Treatment	First Follow-up	Second Follow-up	Third Follow-up	Forth Follow-up	Fifth Follow-up
Blood Glucose Fasting (FF) (mg/dl)	139.69 ± 18.97	115.88 ± 6.83**	114.18 ± 8.36**	122.16 ± 17.45**	132.16 ± 18.31▪	133.81 ± 11.7▪
Blood Glucose Post prandial (PP) (mg/dl)	239.69 ± 28.17	215.06 ± 14.93**	189.62 ± 17.2 **	204.16 ± 22.05 **	211.99 ± 23.81**	206.06 ± 14.22 **

**P< 0.01 (significant) and [a]%P not being < 0.05

It may be due to the deficiency or less number of insulin receptor in diabetes mellitus type II. Even though the structure and function of b cells and the blood insulin level are normal.

Liver Function Tests

UNIM-220(G) causes significant increase in the level of Serum Glutamate Pyruvate Transaminase (SGPT) (15.0%) (P< 0.01), and Serum Glutamate Oxaloacetate Transaminase (SGOT) (20.0%) (P< 0.01) (Table-6) when compared with pre-treatment testing to after-treatment values. Increased level of SGPT and SGOT could relate to excessive accumulation of amino acids (glutamate and alanine) in the serum of diabetic animals as a result of amino acids mobilization from protein stores. These excessive amino acids are then converted to ketone bodies (á-keto-glutaric and pyruvate) for which the enzyme SGPT and SGOT are needed, leading to increased enzyme activity (Colev *et al.*, 1994).

Lipid Profile

UNIM-220(G) significantly reduced the level of serum cholesterol (10.0%) (P< 0.01) (Table-3), when compared with pre-treatment testing to after-treatment values. It is due to an increase lipolysis which causes the liver to increase glucose, serum cholesterol and triglycerides (Narasimha & Jeganathan, 2010).

Kidney Function Tests

UNIM-220(G) causes a significant decrease in the level of blood urea (9.0%) (P< 0.01) However, it causes a significant increase in the level of serum creatinine (9.0%) (P< 0.01) (Table-5), when compared with pre-treatment testing to after-treatment values. Raised plasma urea in Type 2 diabetic patient may be due to impaired function of the nephrons. Though plasma creatinine is more sensitive index of kidney function compared to plasma urea level (Blessing *et al.*, 2011).

Table-3. Effect of Unani coded drug UNIM-220(G) on the level of serum cholesterol, serum triglycerides in diabetic patients.

Parameter → Group ↓	Serum Cholesterol (mg/dl)	Serum Triglycerides (mg/dl)
Pre-treatment	190.82 ± 12.09	152.09 ± 15.33
After-treatment (180th Days)	172.39 ± 11.25**	149.59 ± 8.85**

**P< 0.01 (significant)

Serum Protein levels

UNIM-220(G) significantly reduced the A/G ratio (14.0%) (P< 0.01) (Table-4), when compared with pre-treatment to after-treatment values. It may be due to partial or deficiency of insulin receptor, the catabolism of proteins increases, protein synthesis stop and large quantities of amino acids are damped into the plasma. Excess amino acids are used either directly for energy or as substrates for gluconeogensis. This degradation of the amino acids also leads to enhanced urea excretion in the urine.

Haematological Studies

The present study has shown that there was a significant decrease in the Erythrocyte Sedimentation Rate (ESR) (9.0%) (P<0.01), Eosinophil Counts (28.0%) (P<0.01) (Table-7) when compared with pre-treatment to after-treatment values. The increase

Table-4. Effect of Unani coded drug UNIM-220(G) on the level of serum total protein, serum albumin, serum globulin and A/G ratio in diabetic patients.

Parameter → Group ↓	Serum Total Protein (gm/dl)	Serum Albumin (gm/dl)	Serum Globulin (gm/dl)	A/G Ratio
Pre-treatment	7.73 ± 0.34	4.44 ± 0.22	3.53 ± 0.26	1.48 ± 0.18
After-treatment (180th Days)	7.59 ± 0.26▪	4.24 ± 0.18▪	3.37 ± 0.27▪	1.28 ± 0.11**

▪ P not being< 0.05 and **P< 0.01 (significant)

Table-5. Effect of Unani coded drug UNIM-220(G) on the level of blood urea and serum creatinine in diabetic patients.

Group → Parameter ↓	Blood Urea (mg/dl)	Serum Creatinine (mg/dl)
Pre-treatment	30.06 ± 2.00	1.06 ± 0.04
After-treatment (180th Days)	27.92 ± 1.85**	1.16 ± 0.05**

**P< 0.01 (significant)

in pretreatment values may be due to severe infections such as foot infection, pulmonary infection and urinary tract infection in type-2 diabetic patients (Ljubic *et al*., 2005).

Further investigations are required to find out the mechanism. In conclusions, the present study indicates that Unani coded drug UNIM-220(G) exhibited hypoglycemic as well as hypolipidemic activity in type-II Diabetes Mellitus. Since, the test drug causes significant elevation of some parameters of liver and kidney function, safety studies are warranted.

Table 6. Effect of Unani coded drug UNIM-220(G) on the levels of SGPT and SGOT in diabetic patients.

Parameter → Group ↓	S.G.P.T. (IU/L)	S.G.O.T. (IU/L)
Pre-treatment	39.81 ± 2.85	33.67 ± 3.02
After-Treatment (180th Days)	43.16 ± 4.69**	40.34 ± 3.71**

**P< 0.01 (significant)

Table-7. Effect of Unani coded drug UNIM-220(G) on the level of the haemoglobin, E.S.R., R.B.C. counts, total leucocytes count (TLC) and differential leucocytes count (DLC) in diabetic patients.

Group → Parameter ↓	Haemo Globin (gm %)	E.S.R. Mm/hr	R.B.C. (10^6/ mm^3)	T.L.C. (10^3/ mm^3)	Differential leucocytes count (DLC)		
					Poly-morphs (%)	Lympho-cyte (%)	Eosino-phils (%)
Pre-treatment	13.23 ± 0.30	16.50 ± 4.21	4.43 ± 0.14	6.21 ± 0.39	66.50 ± 2.33	30.64 ± 2.33	2.71 ± 0.45
After-treatment (180th Days)	13.42 ± 0.23▪	15.00 ± 2.39**	4.34 ± 0.08▪	6.40 ± 0.42▪	69.43 ± 2.63▪	28.64 ± 2.46▪	2.0 ± 0.18**

**P< 0.01 (significant) and ▪ P not being < 0.05

Acknowledgement

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Therapeutic Evaluation of Itrifal-e-Shahatra and Roghan-e-Babchi in Case of Daa-us-Sadaf

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Abstract

Over the years, the effective treatment of psoriasis has eluded the researchers as well as its etiopathogenesis. Recently the advent of modern investigation procedures has thrown more light on the pathophysiology of this disease. A lot of therapeutic agents are evolved with the help of modern science and technology, but all these therapeutic agents have an extensive as well as exhaustive procedures and also hazardous at greater extent. Therefore evolving a new and effective therapy is always a challenge before us. Ours is a pilot clinical study on Unani Pharmacopoeal preparation which was used as systemic as well as local i.e. Itrifal-e-Shahatra and Roghan-e-Babchi. The improvement in clinical manifestation i.e. erythema was about 75%, burning sensation was 100%, and over all well-being and disfigurement was statistically significant. The results were quite encouraging on all modern parameters. The drugs were also noted for any adverse effect but it was almost devoid of side effect.

Keywords: Daa-us-Sadaf, Psoriasis, Musaffiyat, Itrifal-e-Shahatra, Roghan-e-Babchi.

Introduction

Although the description of Psoriasis (Daa-us-Sadaf) is not mentioned in ancient literature of Unani medicine with this classical name and definition. But few description regarding chronic skin disorder have a strong resemblance to psoriasis even in Egyptian papyrus(Hallman 2004). The eminent unani physicians described a condition which has strong resemblance with psoriasis and Tabri has given a vivid description of Daa-us-sadaf and its management (Razi, 1970; Kantoori 1889; Tabri, 1997). The modern unani physicians described the disease well with the name of Da-us-sadaf. After the discovery of ABO blood system in 20th century it became easy to study at genetic level and human HLA typing is considered a responsible for a particular disease including psoriasis. The disease has its world wide prevalence effecting about 2-3% population. Most commonly adults in 2nd and 4th decade of life are involved and males are slightly more prone. The winter season is also considered vulnerable for the disease presentation (Arnold, 1990; Bhel, 2000).

The exact etiology is not known so far, but several factors like humours, genetic predisposition, anxiety, mechanical damage, Koebner's phenomena and environmental factors are considered as triggering factor. The unani physicians considered it due to abnormal black bile (*Sauda-e-Ghair Tabai* and *Mirrah Sauda*). (Pasricha et al., 2006; Marks, 2003; Angarooni, 1311H; Antaki, 1317).

According to Ibn-e-Zahr hyper accumulation of abnormal sauda in skin tissue leads malfunctioning of the skin and as a result abnormal *khilt-e-sauda* gets retaining in

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it which leads the skin tissue becomes dead and converted into scales. (Ibn-e-Zahr, 1986).

As far as management is concerned the modern medical management is unable to provide satisfactory result or if there is any improvement with medication it is always at the cost of hazards with adverse effect on various body organs and system. Keeping in mind the above facts few formulations of Unani medicine were screened for such ailment, after that the present study was designed to evaluate the efficacy of Itrifal-e-Shahatra as systemic drug and Roghan-e-Babchi as tropical drugs in its management.

Methodology

The present clinical study that is a pilot study on 60 patients randomly selected from outdoor section of department of Moalijat, Ajmal Khan Tibbiya College Hospital, Aligarh Muslim University, Aligarh. The study period was extending from 2008 to 2010 and study duration was of 60 days. The follow up was carried out at 15th day, 30th day, 45th day and 60th day on the basis of history, clinical presentations, related examinations and routine investigations. Thus, the selection of the patients were totally based on inclusion and exclusion criteria (Roenigk et al 1990.). To evaluate any observable side effects the patients were minutely examined for any adverse symptom, presentation and effect. Also the liver function test and renal function test were carried out before and after treatment, because the route of elimination and site of metabolism of the drug is liver and kidney. Therefore, the toxicity may lie at this level if any. Skin biopsy was carried out only in selected cases. All the observations were tabulated and analysed on bio-statistical parameters.

Drugs its Composition and Dosage

Both Itrifal-e-Shahatra and Roghan-e-Babchi are a pharmacopoeal preparation and their composition are given below:

1. *Itrifal-e-Shahatra (6 gm twice a day)*

Shahatra	*Fumaria officinalis* Linn	50 gm
Post-e-Haleela Zard	*Terminalia chebula Retz*	50 gm
Post-e-Haleela Kabli	*Terminalia bellirica Roxb.*	30 gm
Post-e-Baleela	*Emblica officinalis*	20 gm
Amla	*Cassia angustifolia Linn*	50
Sana-e-Makki	*Rosa damascena Mill*	10 gm
Gul-e-Surkh	*Vitis vinifera Linn*	5 gm
Maweez Munaqqa		350 gm

2. *Roghan-e-Babchi (Twice a day)*

For local application

Observations

Table-1. Distribution of Patients According to Age and Sex

Age group	Sex		No. of Cases	% age
	Male No. of Cases	Female No. of Cases		
10-20	2	3	5	8.3
20-30	4	6	10	16.6
30-40	16	5	21	35.0
40-50	5	3	8	13.3
50-60	6	3	9	15.0
60-70	5	2	7	11.7
Total	38	22	60	100.00

Table-2. Distribution of Patients According to Psychological Status

Psychological status	No of cases	Percentage
Anxiety	22	36.7
Depression	5	8.3
Stable	33	55.0
Total	60	100.0

Table-3. Distribution of Patients According to Occupation

Occupation	No of cases	Percentage
Service	6	10.0
Business	10	16.7
Labour	32	53.3
Housewife	8	13.3
Student	4	6.7
Total	60	100.0

Table-4. Distribution of Patients According to Social Status

Social Status	No of Cases	Percentage
High	9	15
Middle	20	33.33
Lower	31	51.66
Total	60	100

Table-5. Distribution of Patients According to Temperament

Temperament	No of cases	Percentage
Damvi	10	16.7
Safravi	15	25.0
Balghami	8	13.3
Saudavi	27	45.0
Total	60	100.0

Table-6. Distribution of Patients According to Seasonal Variation

Seasonal variation	No of cases	Percentage
Aggravation in winter	39	65.0
Aggravation in summer	13	21.7
No seasonal variation	8	13.3
Total	60	100.0

Table-7. Distribution of Patients According to Personal Habits

Addiction	No of cases	Percentage
Smoking	16	26.7
Tobacco Chewing	12	20.0
Alcohol	3	5.0
No Addiction	29	48.3
Total	60	100.0

Table-8. Distribution of Patients According to Family History

Family history	No of cases	Percentage
Present	48	80.0
Absent	12	20.0
Total	60	100.0

Table-9. Distribution of Patients According to First Part of the Body Affected

Parts of the body affected	No of cases	Percentage
Scalp	10	16.7
Elbow	15	25.0
Forearm	6	10.0
Flanks	3	5.0
Knees	13	21.7
Legs	10	16.7
Ears	2	3.3
Penis	1	1.6
Total	60	100.0

Table-10. Efficacy of drug on Itching, Burning and Scaling in Psoriatic Cases

Clinical feature	Before treatment	After treatment									
		Response								No response	
		15 day		30 day		45 day		60 day		—	—
—	No	No	%	No	%	No	%	No	%	No	%
Itching	60	9	15	18	30	42	70	51	85	9	15
Burning	25	7	28	12	48	17	68	25	100	0	0.0
Scaling	60	15	25	30	50	39	65	54	90	6	10

Table-11. Efficacy of Drugs on New Eruptions and Woronoff Ring in Case of Psoriasis

Clinical feature	Before treatment	After treatment									
		Response								No response	
		15 day		30 day		45 day		60 day		—	—
—	No	No	%	No	%	No	%	No	%	No	%
New Eruptions	35	7	20	14	40	21	60	22	62.8	13	37.1
Woronoff Ring	0	9	15	18	30	30	50	42	70	18	30

Table-12. Efficacy of Drugs on Papule, Pustules and Plaque in Psoriatic Cases

Clinical feature	Before treatment	After treatment									
		Response								No response	
		15 day		30 day		45 day		60 day		—	—
—	No	No	%	No	%	No	%	NO	%	No	%
Papule	48	6	12.5	12	25	25	52	44	91.6	4	8.3
Pustule	4	0	0.0	0	0.0	1	25	2	50	2	50
Plaque	60	3	5	9	15	18	30	42	70	18	30

Table-13. Efficacy of Drugs on Auspitz Sign and Erythema in Psoriatic Cases

Clinical feature	Before treatment	After treatment									
		Response								No response	
		15 day		30 day		45 day		60 day		—	—
—	No	No	%	No	%	No	%	No	%	No	%
Auspitz Sign	60	17	28.3	33	55	41	68.3	48	80	12	20
Erythema	60	9	15	14	23.3	35	58.3	45	75	15	25

Table-14. Distribution of Patients According to Blood Group

Blood Group	No of cases	Percentage
A +ve	17	28.3
B +ve	23	38.3
AB +ve	11	18.3
O +ve	5	8.3
O –ve	4	6.7
Total	60	100.0

Table-15. Effects of Drugs on Serum Bilirubin, SGOT and SGPT.

Duration of Treatment	Before Treatment	After Treatment
Mean Serum Bilirubin	0.73 ± 0.1	0.75 ± 0.1
Mean SGOT	24.9 ± 2.2	24.8 ± 1.3
Mean SGPT	26.4 ± 2.6	26.3 ± 2.7

Table-16. Effects of Drugs on Blood Urea and Serum Creatinine.

Duration of Treatment	Before Treatment	After Treatment
Mean Blood Urea	27.9 ± 3.9	28.0 ± 3.8
Mean Serum Creatinine	0.75 ± 0.10	0.72 ± 0.09

Discussion

In present clinical study, 60 patients of psoriasis were clinically evaluated on Unani as well as Modern parameters. The patients were subjected for the study upto two months i.e. 60 days and follow up observations were recorded fortnightly.

As the incidence of the disease in general OPD was observed almost similar to the observations mentioned in authentic modern text, but with slightly increasing trends.

Out of 60 patients of psoriasis, about 63% patients were male which indicates higher incidence, which is in accordance with observations mentioned in dermatological texts but observation noted by Farber EM et al (1974) is contradictory. (Table 1).

There are also variations in incidence rate in different age groups, both in males and females, which could not be explained, but it was observed that in those cases where the disease was having early onset they were also having positive family history (Braun et al., 1991; Roenigk, 1993). (Table 1).

Psychological status was also observed keeping in mind that the disease have same aggravation due to anxiety neurosis and related disorders and in my observation about 37% cases were also having anxiety and about 8% cases were having depression. The presentation of the disease may itself be the reason for these psychosomatic problems and also a factor of aggravation and vice versa (Champion et al., 1998; Kaur et al., 1986; Moschella et al., 1992). (Table 2).

With reference to Table 3 labourers are more exposed for the disease, which is most probably due to the frequent trauma on exposed part. These observations are in accordance to the koebner's study for the incidence as well as prevalence of the psoriasis, in which the extensor surface of the body is more exposed with recurrent trauma, which will be more in labourers (Koebner, 1876; Roenigk, 1990).

The higher incidence of psoriasis was found in low socioeconomic class of the society. This finding is in consonance with the finding of Ghulam Jeelani who reported that Daa-us-sadaf is more common in lower class of the society (Jeelani, 1996) (Table 4).

The Unani parameters were given emphasis to evaluate the patients. For this, the assessment of temperament was done according to basic principles of Unani medicine (Ajnas-e-Asharah) and it was found that the disease has higher incidence i.e. 45% in melancholic temperament (Saudavi Mizaj) and 25% in bilious temperament (Safravi Mizaj), while the Sanguinous temperament (Damvi mizaj) and phelagmatic temperament (Balghami mizaj) were the least commonly affected. The pathogenesis of the disease mimics with the melancholic (Saudavi) derangement. The direct discussion of psoriasis is not mentioned in classical unani text but as per the discussion of modern unani physicians it was mentioned as Daa-us-sadaf and its presentation is like other chronic skin disorder with some peculiar diagnostic features, which are more or less similar to the presentation of the disease, caused by abnormal melancholic humour (Saudavi khilt) as well as abnormal bilious humour (Safravi khilt). This finding is in accordance with the description of Ibn-e-Hubal Baghdadi (1364H), Ibn-e-Sina (1906) and Ibn-e-Zahr (1986) who have discussed the pathophysiological aspect of the disease in detail and concluded that sauda is the most important cause for the genesis of psoriasis (Table 5).

The exact description of pathogenesis with the help of maping of HLA phenotypes and concept of temperament and humours are needs of the hour.

During the study it was observed that the disease has an aggravation in winter season in most of the patients i.e about 65%. The most probable reason for this is improper conditioning of skin due to least circulation on skin and hypoactivity of

sweat glands as the sweat has urea, which is hygroscopic and acts as an emollient in summer (Moschell, 1992) (Table 6).

The patients were divided into four groups according to personal habits. Most of the patients who attended the study were those who had no any addiction ie.29 (48.3%) cases, while the patients who had the history of addiction mostly were smoker ie.16 (26.7%). 12(20%) cases had the history of tobacco chewing, and only 3 (6.7%)cases were drunkards. (Table 7)

It was an important observation during the study that about 80% cases were having positive family history. Although it is not an infective disease, but it has autosomal transmission both vertically and horizontally in few individuals. Thus our observation again proves the observation mentioned in authentic text (Arnold, 1990; Boon, 2006) (Table 8).

Table 9 showing the distribution of lesions on body parts and in nutshell the extensor surface of the body is extensively involved at first. It again proves the koebner's phenomena as well as the common sites mentioned in various authentic texts (Koebner, 1876; Prasad, 1997).

The efficiency of drug both systemic as well as topical preparation were evaluated on presenting symptoms and associated signs at fortnightly for two months.

Scaling and itching were present in every patient in base line observations and there was subsequent relief in these symptoms on every follow up, and it was noted that the scaling and itching weres relieved at maximum extent that was 90% and 85% respectively. The said observable effect is most probably due to Roghan-e-Babchi containing psoralen and isopsoralen as chief ingredients effecting maximally to modulate the local immune response of the dermal epithelium (basal layer). Also the drug has known anti-psoriatic, keratoliytic and above all antipruritic effect (Khan, 1920; Lubhaya, 1977; Anonymous, 2006) (Table 10).

There are other constituents like petroleum, ether, terpinoid oil, fixed oil (raffinose) etc are acting as emollient to reduce the scaling, dryness and also the itching on applying locally.

Similarly the systemic compound drug Itrifal-e-Shahatra in general has blood purifying effect, expelling the melancholic and bilious rotten humour (Mushil-e-Sauda wa Safra), anti-pruritic, anti infective property and the ingredients specially Fumeria officinais Linn (shahatrah) Rosa damascena Mill (Gul-e-Surkh) Vitis vinifera (Maveez munaqqa) are playing the key role in relieving these symptoms (Khan, 1920).

The burning sensation was also relieved in 100% cases at the end of the study which was due to cumulative effect of Roghan-e-Babchi and Itrifal-e-Shahatra but the base oil in Roghan-e-Babchi, which was Roghan-e-Kunjud also has soothing effect on skin and therefore, the 100% suppression in burning is also contributed by the base oil itself, which needs comparative study again on this symptom

separately to explain its effect confidently in relieving the burning sensation (Nandkarni, 2003) (Table 10).

During the study a few patients i.e. about 53% reported about new eruptions but they were also relieved at the end of the study and 63% cases were improved along with other symptoms. It shows that the patients were benefited in term of their immunity (Table 11).

The presentation of the lesions were plaque in all 60 cases and papules in 48 cases and pustules were noted in only 4 cases in base line observations and they were relieved in 70% cases, 92% and 50% cases respectively at the end of study, which was also due to the combined and cumulative effect of local and systemic medication on presentation of disease (Table 12).

Over all effect of drug is most probably due to the known action of the ingredients like Fumeria officinalis (Shahatrah), Cassia angustifolia (Sana-e-Makki), Rosa damascena (Gul-e-Surkh), Vitis vinifera (Maweez munaqqa) as expelling the melancholic and bilious humour (mushil-e-sauda wa safra), blood purifier (musaffi-e-dam), mujaffif and special effect on various skin ailments (Nandkarni, 2003).

Relief in auspitz sign and woronoff ring were also due to the over all relief in symptoms like scaling, itching and plaquing etc. which was 80%, 70% respectively (Table 13).

The erythema was noted as most marked feature in all cases of psoriasis and it was found that about 75% cases were free from erythema at the end of the study, which is mainly due to the effect of Vitis vinifera (Maweez munaqqa), Emblica officinalis (Amla) and Rosa damascena (Gul-e-surkh) due to various sapponins, mucilages, tannins as well as various fixed and essential oils, present in it, but over all astringent (Qabiz), refrigerant (Mubarrid), Soothing (musakkin-e-dard), effect of Emblica officinalis (Amla), Rosa damascene (Gul-e-surkh), Vitis vinifera (Maweez munaqqa), Terminalia bellirica (Balela), Cassia angustifolia (Sana-e-makki) are the key ingredients present in our compound drug Itrifal-e-Shahatra (Ibn-e-Baitar, 1999) (Table 13).

All the 60 patients were divided into five groups according to their blood group viz. A+ve, B +ve, AB +ve, O +ve, O –ve. 28.3%, 38.3%, 18.3%, 8.3% and 6.7% cases were found respectively. (Table 14)

The local effect of babchi is also playing a key role in reducing the erythema along with other signs and symptoms due to the presence of various flavones and chalcones in it along with psoralen and isopsoralen, fixed oils, as well as essential oils as chief chemical constituents.

Keeping in mind any concomitant adverse effect of the treatment especially on liver and kidney, which is the main route for drug elimination hence exposed for toxicity, LFT (Liver function tests) and RFT (Renal function tests) were performed, which

remained normal before as well as after the study, which proves that our formulation is quite safe for liver and kidney (Table 15, 16).

The ancient classical literature is lacking about the clear-cut description of the disease psoriasis. Therefore, the exact pathophysiology is not present. But modern unani physicians and their description enlighten about the disease pattern and presentation with little description on pathophysiology aspect. But in our study, an attempt was made to elaborate the disease on temperament and humoural theory as the disease is caused by abnormal and rotten melancholic matter changing the immunological response of the skin and dermal epithelium (Basal layer) resulting in abnormal and uncontrolled keratin turnover.

The efficacy of drugs *Roghan-e-Babchi* as (topical) and *Itrifal-e-Shahatrah* as (systemic) is proving quite effective in relieving symptoms, recurrence as well as in its pathological conditions, both by clinical, histopathological as well as statistical parameters. Though the study has certain limitations at institutional level, therefore all the cases were not subjected for histopathlogical studies frequently. Therefore the study results may setup a new guideline as well as a new dimension for the study with larger sample size and with inter disciplinary approach with the help of modern pathologist, molecular biotechnologist, pharmacologist, as well as dermatologist to prove the efficacy before international fraternity, and if the drug is found effective, it must be incorporated as the treatment of psoriasis, which is having no clear-cut curative treatment plan so far.

During the study, there were no apparent adverse effects observed. Also the renal function tests and liver function tests were within normal range before as well as after the study, which also shows that the drug has no any adverse effect on liver, as well as on kidney, which are the main route for drug elimination from the body.

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Efficacy of Unani Coded Drug UNIM-044 in Vitiligo (Bars) Patients – A Clinical Study

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Abstract

Leucoderma, a Latin word, meaning "white skin" is caused by the destruction of melanocytes; the cells responsible for skin colour. Out of 27 patients studied, the results indicate that 2 patients showed 33 to 40% pigmentation, 13 patients showed 50 to 56 % pigmentation, 6 patients showed 65 to 85 % pigmentation, 3 patients showed 86 to 90 % pigmentation and 3 patients showed complete pigmentation affected on different parts of body. UNIM-044 significantly reduced the levels of Serum Total Protein and Serum Albumin; however a significant increase in the levels of Serum Globulin in different follow-up and A/G ratio were observed in IInd and IIIrd follow-up in Bars patients (Table-1). In haematological studies a significant decrease in the levels of Erythrocyte Sedimentation Rate (ESR) ($P<0.001$) and Total Leucocytes Counts (TLC) ($P<0.01$), however a significant increases in the levels of Lymphocyte Counts ($P<0.001$) and Eosinophil counts ($P<0.05$) (Ist, IIIrd and IVrth follow-up) (Table-2) were observed, when compared with pre-treatment to different follow-up in bars (vitiligo) patients. UNIM-044 significantly reduced the levels of Serum Glutamate Pyruvate Transaminase (SGPT) ($P<0.01$) and Serum Glutamate Oxaloacetate Transaminase (SGOT) ($P<0.01$) whereas a significant increases in the levels of Serum Alkaline Phosphatase enzyme, within normal level ($P<0.001$) (Table-3) were observed when compared with pre-treatment to the (IInd to VIth) follow-up. Thus test Unani formulation is suggested to have Anti-Vitiligo effect (As shown in Fig-1 photographs).

Keywords: Unani Medicine, Bars, SGPT, SGOT and Anti-Vitiligo.

Introduction

Bars (vitiligo) is an idiopathic achromia in which skin looses its colour and caused at the cellular level by the destruction of melanocytes; the cells responsible for skin color (Jasper *et al.,* 2009). There are many theories as to what may be the molecular mechanism responsible for causing Bras (Vitiligo). Researchers have suggested an auto-immunological (Alkhateeb *et al*., 2003), neurological (Dutt, A.K., 1984) or autocytotoxic origin (Bleehen *et al.,* 1968). The vitiligo is becoming a common social as well as dermatological problem which has affected 0.5 to 4.0% of the world's population and approximately 3.0% of the Indian population (Kim *et al*., 1990). Vitiligo can develop at any age but several studies report that 50 % of cases appear before the age of 20 (Halder and Nootheti; 2003). As for a possible hereditary link, approximately one third of cases report a family history (Das *et al*., 1985). The most commonly affected areas of the body are the sun-exposed tops of hands and face and hyper-pigmented areas of the body. People affected with vitiligo generally experience depression, dysthymia, sleep disturbances, suicidal attempts and anxiety

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(Ongenae *et. al*., 2006). Vitiligo can be confused with leprosy, which also causes loss of pigment, thus further stigmatizing patients (Porter *et al*., 1987).

Although, currently available modern anti-vitiligo drugs are effective in the treatment of Vitiligo (Bars) but also produce certain adverse side effects and have high cost (Najoo *et al*., 1998; Kwinter *et al*., 2007). Now attention is diverted to herbal and Unani formulations due to their versatile role in the treatment of Bars (Vitiligo) with no or negligible side effects and being cost effective. Keeping in view the above facts, the efficacy of Unani coded drug UNIM-044 was evaluated in the management of Bars (Vitiligo) at Regional Research Institute of Unani Medicine; Aligarh during the period from 2008-2010 and results are presented in this communication.

The serum total protein is included because some authors had reported that there might be increased auto-antibody formation (Brostol *et al*, 1969) and rise in gamma globulin fraction (Shraff *et al*., 1973). Haemogram is included to see whether there was any change in Hb%, RBC count, TLC, polymorphs, lymphocytes, eosinophil count and ESR. Some author had reported that decrease in ESR (Husain *et al*., 1991) and lower number of lymphocytes in the peripheral blood of vitiligo patients were also observed (Mahmoud *et al*., 2002). Liver function tests were studied for possible side effects. Post-treatment elevated alkaine phosphatase values are within normal limit and were correlated by Santhan and velou (1964).

Materials and Methods

Subjects Selection

UNIM-044 capsule and UNIM-044 cream were obtained from Central Council for Research in Unani Medicine, New Delhi. Seventy patients attending in the out patients department (OPD), Regional Research Institute of Unani Medicine (RRIUM), Aligarh of either sex, age (11-55 yrs) were screened to assess the different biochemical and haematological parameters. Out of seventy patients, twenty seven patients were selected for clinical trial. Criteria for selection of patients were based on inclusion and exclusion criteria. They were informed about the nature and objectives of trial and a written consent was obtained before enrolling them into the trial.

Inclusion Criteria

Patients suffering from Bars (Vitiligo) belonging to both sex and different age group (11-55 years) were selected for study. Pink, white and milky white patches on surfaces of skin, neither elevated nor depressed having no exudation or scaling and no itching with hyperpigmented margin was taken as Vitiligo patches without loss of sensitivity.

Exclusion Criteria

Pregnant mother and patients with hepato-renal, cardiac and pulmonary malfunction, patients on active vitiligo treatment with other drugs, subjects with other skin diseases such as Leprosy, Pityriasis and albinism, subjects with known allergies, subjects who were unwilling to come for regular follow-up for the entire duration of the study and non-cooperative patients were excluded.

Diet Restriction and Recommendation

Diet plays an important role according to the Unani System of Medicine. As Unani classics relate Bars as a phlegmatic disorder which is attributed to cold and wet, hence any food articles which produces coolness and moistness in the body qualities were strictly prohibited.

Restricted Food Articles

Articles which produce Balgham (Phlegm) are milk and milk products, lemon and lime, tamarind, orange/ citrus fruits, parsley, custard apple, guava, prunus, cashew nuts, melon, water melon, Chinese dates, sour tomatoes and amla e.t.c. and articles which are supposed to bring changes in blood and make blood impure (Fasad-ud-dam) are egg, fish, beef, brinjal and heavy and light mixed food was restricted.

Recommended Diet

Recommended food articles included Wheat, Indian Millet, Pulses, pure ghee obtained from butter, broad beans, French beans, Spinach, Bitter gourd, Onion, Beet root, Carrot, Chillies, Black pepper, Maize, Figs (fresh and dry), Almond, Walnut, Dates, Mango, Apricots, Grapes, Potatoes, Rice, Papaya, Turnip, Mutton, Bird's flesh. Finally the diet was prescribed according to the patients need.

Collection of blood serum

Blood samples were collected by puncturing the vein at each investigation. 1.0 ml of blood with ethylene diamine tetra acetic acid (EDTA) was used for various haematological parameters and other 2.0-2.5 ml of blood samples were allowed to clot and serum was separated by centrifugation, which was used for various biochemical parameters. Biochemical and haematological investigations were carried out as follows.

Biochemical analysis

Biochemical parameters carried out are as follows. Serum Total Protein, Serum Albumin and Serum Globulin, Serum Glutamate Pyruvate Transaminase (SGPT, E.C. 2.6.1.2) and Serum Glutamate Oxaloacetate Transaminase (SGOT, E.C. 2.6.1.1.), Serum Alkaline Phosphatase enzyme (ALP).

Haematological analysis

Haematological parameters include: Haemoglobin (Hb %), Erythrocyte Sedimentation Rate (ESR), Total Leucocytes Counts (TLC), Red Blood Corpuscles (RBC) and Differential Leucocytes Counts (DLC): Polymorphs, Lymphocyte and Eosinophil Counts.

Drug, Dose and mode of administration

Compound Unani formulation coded drug UNIM-044 capsule, two capsules each twice daily was given orally with water after meal to the patient.UNIM-044 cream was locally applied on affected area with exposure of early morning sun rays for 2-7 minutes daily.

Duration of treatment and follow-up

Duration of treatment of patients was 180 days. After registration of patients, a pre-treatment (0 days) and follow-up (30^{th} days, 60^{th} days, 90^{th} days, 120^{th} days, 150^{th} days and 180^{th}) observations were made by investigating Serum Glutamate Pyruvate Transaminase (SGPT), Serum Glutamate Oxaloacetate Transaminase (SGOT), Serum Alkaline Phosphatase enzyme (ALP), Serum Total Protein and Serum Albumin, Serum Globulin and A/G ratio were done in biochemical investigations and Haemoglobin (Hb %), Erythrocyte Sedimentation Rate (ESR), Total Leucocytes Counts (TLC), Red Blood Corpuscles (RBC) and Differential Leucocytes Counts (DLC): Polymorphs Lymphocyte and Eosinophil Counts were done in haematological investigations.

Statistical analysis

Data were analyzed statistically by one-way analysis of variance (ANOVA) followed by Dennett's' test. The values were considered significant when the P- value was less than 0.01.

Results and Discussion

Pigmentation response

At the end of treatment (VIth follow-up or 180^{th} days) 2 (7.4%) of 27 patients showed 33 to 40% pigmentation, 13 (48.14%) of 27 patients showed 50 to 56 % pigmentation, 6 (22.22%) of 27 patients showed 65 to 85 % pigmentation, 3 (11.11%) of 27 patients showed 86 to 90 % pigmentation and 3 (11.11%) of 27 patients showed complete pigmentation affected on the different parts of body in vitiligo patients.

Serum Proteins

UNIM-044 causes a significant reduction in the levels of Serum Total Protein 15.0% (P<0.001), 16.0% (P<0.001), 18.0% (P<0.001), 15.0% (P<0.001), 12.0% (P<0.001) and 13.0% (P<0.01), Serum Albumin 16.0% (P<0.001), 14.0% (P<0.01), 21.0% (P<0.001), 21.0% (P<0.001), 19.0% (P<0.001) and 18.0% (P<0.001) (Table-1), when compared with pre-treatment to the different (Ist to VIth) follow-up. A significant increase in the levels of Serum Globulin 43.0% (P<0.001), 48.0% (P<0.001), 34.0% (P<0.001), 51.0% (P<0.001), 63.0% (P<0.001) and 43.0% (P<0.001) and A/G ratio 30.0% (P<0.001) and 49.0% (P<0.001) (Table-1) were observed in IInd and IIIrd follow-up in Bars (Vitiligo) patients.

Haematological Studies

In haematological studies a significant decrease in the levels of Erythrocyte Sedimentation Rate (ESR) 59.0% (P<0.001), 65.0% (P<0.001), 58.0% (P<0.001) 45.0% (P<0.001), 46.0% (P<0.001) and 40.0% (P<0.001), Total Leucocytes Counts (TLC) 18.0% (P<0.01), 20.0% (P<0.01), 16.0% (P<0.01), 15.0% (P<0.01) and 13.0% (P<0.05) were observed in different follow-up. A significant increase in the levels of Lymphocyte Counts 41.0% (P<0.001), 18.0% (P<0.01), 20.0% (P<0.001), 20.0%

Table-1. Effect of Unani coded drug UNIM- 044 (Oral and local) on the level of Serum Total Protein, Serum Albumin, Serum Globulin and A / G ratio in Bars (Vitiligo) patients.

Group → Parameter ↓	0^{th} Day (Pre-treatment)	30^{th} Days (Ist follow-up)	60^{th} Days (IInd follow-up)	90^{th} Days (IIIrd follow-up)	120^{th} Days (IVrth follow-up)	150^{th} Days (Vth follow-up)	180^{th} Days (VIth follow-up)
Serum Total Protein (gm/dl)	7.73 ± 0.13	6.58 ±.012***	6.47 ±0.10***	6.32 ±0.17***	6.61 ±0.08***	6.84 ±0.36***	6.70 ± 0.10**
Serum Albumin (gm/dl)	4.50 ± 0.13	3.77 ±0.08***	3.85 ± 0.13**	3.55 ±0.05***	3.54 ±0.05***	3.65 ±0.08***	3.68 ±0.08***
Serum Globulin (gm/dl)	2.49 ±0.12	3.56 ±0.15***	3.68 ±0.24***	3.33 ±0.15***	3.75 ±0.13***	4.05 ±0.22***	3.56 ±0.12***
A/G Ratio	1.28 ± 0.07	1.36 ± 0.12▪	1.77 ±0.12***	1.91 ±0.14***	1.31 ± 0.07▪	1.24 ± 0.04▪	1.32 ± 0.05▪

**P<0.01 significant, ***P<0.001 highly significant and ▪ P not being <0.05

(P<0.05) and 20.0% (P<0.001) and eosinophil counts 20.0% (P<0.05), 23.0% (P<0.05) and 33.0 % (P<0.05) (In Ist, IIIrd and IVrth follow-up) (Table-2) were observed in different follow-up, when compared with pre-treatment to different follow-up in bars (vitiligo) patients.

Liver Function Tests

UNIM-044 significantly decrease the level of the Serum Glutamate Pyruvate Transaminase (SGPT) 21.0% (P<0.01), 22.0% (P<0.01), 24.0% (P<0.001), 32.0% (P<0.001), 29.0% (P<0.001) and 23.0% (P<0.001) and Serum Glutamate Oxaloacetate Transaminase level (SGOT) 15.0% (P<0.01), 20.0% (P<0.01), 25.0%

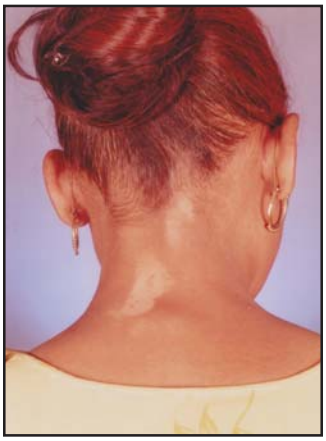
Table-2. Effect of Unani coded drug UNIM- 044 (Oral and local) on the levels of Haemoglobin (Hb %), Erythrocyte Sedimentation Rate (ESR), Total Leucocytes Counts (TLC), Red Blood Corpuscles (RBC) and Differential Leucocytes Counts (DLC): Polymorphs, Lymphocyte and Eosinophil Counts in Bars (Vitiligo) patients.

Group → Parameter ↓	0^{th} Day (Pre-treatment)	30^{th} Days (Ist follow-up)	60^{th} Days (IInd follow-up)	90^{th} Days (IIIrd follow-up)	120^{th} Days (IVrth follow-up)	150^{th} Days (Vth follow-up)	180^{th} Days (VIth follow-up)
Haemogloblin (gm %)	12.46 ± 0.24	12.24 ± 0.22▪	12.20 ± 0.27▪	12.28 ± 0.33▪	12.22 ± 0.28▪	12.84 ± 0.38▪	12.30 ± 0.63▪
ESR (mm /hr)	25.00 ± 1.26	10.20 ±1.41***	8.73 ±1.24***	10.60 ±1.44***	13.73 ±1.98***	13.53 ±1.35***	14.07 ±1.26***
R.B.C. (10^6 /mm^3)	4.01 ± 0.10	3.99 ± 0.10▪	3.80 ± 0.09▪	4.08 ± 0.10▪	4.03 ± 0.08▪	4.00 ± 0.11▪	3.88 ± 0.10▪
T.L.C. (10^3/mm^3)	6.74 ± 0.36	6.03 ± 0.28▪	5.54 ± 0.26**	5.41 ± 0.42**	5.65 ± 0.28**	5.85 ± 0.25*	5.74 ± 0.17**
Polymorphs (%)	62.85 ± 1.79	59.3 ± 2.61▪	66.2 ± 1.72▪	67.15 ± 1.67▪	65.20 ± 2.23▪	65.90 ± 1.65▪	65.66 ± 1.49▪
Lymphocyte Counts (%)	26.25 ± 0.89	36.95 ±2.42***	30.90 ±1.75**	29.90 ±1.50**	31.40 ± 2.05*	31.45 ±1.76***	31.45 ±1.40***
Eosinophil Counts (%)	2.55 ± 0.26	3.05 ± 0.39*	2.55 ± 0.28▪	3.15 ± 0.37*	3.40 ± 0.33*	2.50 ± 0.18▪	2.80 ± 0.30▪

*P<0.05 Significant, **P<0.01 significant, ***P<0.001 highly significant and ▪P not being <0.05

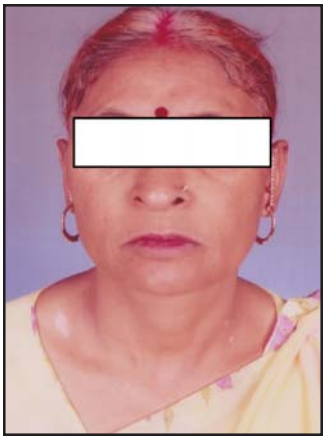
(P<0.001), 31.0% (P<0.001), 30.0% (P<0.001), 21.0% (P<0.001) were observed, when compared with pre-treatment to the different follow-up (Ist to VIth) (Table-3). A significant increase but within normal level of Serum Alkaline Phosphatase enzyme, 52.0% (P<0.001), 63.0% (P<0.001), 73.0% (P<0.001), 81.0% (P<0.001) and 88.0% (P<0.001) were observed when compared with pre-treatment to the different (IInd to VIth) follow-up (Table-3). In conclusion Thus test Unani formulation is suggested to (as shown in photograph fig-1) have anti-vitiligo effect in Vitiligo (Bars) patients. Further studies are warranted.

Fig-1. Photographs showing response to the Unani coded Drug UNIM-044 in Bars (Vitiligo) lesions.

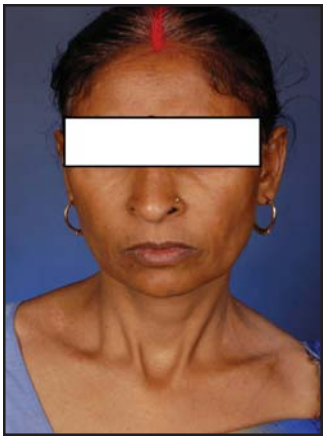


Pre-treatment

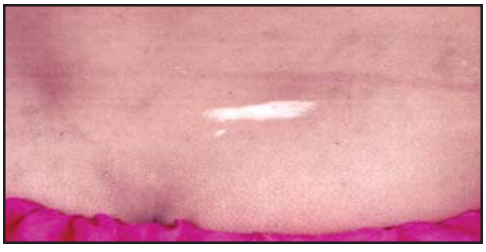
After-treatment (180 Days)



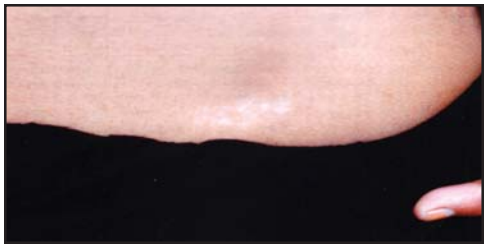
Pre-treatment



After-treatment (180 Days)



Pre-treatment



After-treatment (180 Days)

Table-3. Effect of Unani coded drug UNIM-044 (Oral and local) on the levels of SGPT, SGOT and Serum Alkaline Phosphatase in Bars (Vitiligo) patients.

Group → Parameter ↓	0th Day (Pre-treatment)	30th Days (Ist follow-up)	60th Days (IInd follow-up)	90th Days (IIIrd follow-up)	120th Days (IVrth follow-up)	150th Days (Vth follow-up)	180th Days (VIth follow-up)
SGPT (IU/L)	30.14 ± 1.71	23.74 ±1.42**	23.43 ±1.85**	22.84 ±0.86***	20.39 ±1.42***	21.20 ±1.32***	23.18 ±0.74***
SGOT (IU/L)	32.46 ± 1.57	27.45 ±1.32**	25.77 ±1.16**	24.35 ±1.76***	22.47 ±0.80***	22.74 ±1.35***	25.64 ±0.64***
Serum Alkaline Phosphatase (IU/L)	55.47 ±3.11	65.04 ±5.36▪	84.32 ±2.97***	90.49 ±3.69***	95.93 ±3.57***	100.35 ±4.61***	104.15 ±4.01***

**P<0.01 significant, ***P<0.001 highly significant and ▪P not being <0.05

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Study of Efficacy of Dalak (Massage) in the Treatment of Osteoarthritis (with and without Roghan-e-Surkh)

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Abstract

Massage is one of the most ancient therapeutic modality used to alleviate pain and reduce fatigue. In Unani system of medicine it is known as Dalak. The eminent Unani scholars described various types of massage in their text books. They also wrote the therapeutic importance of massage for the treatment of various diseases such as arthritis, sciatica, hemiplegia and facial paralysis etc. In Unani system of medicine different types of medicated oils are also used with the massage. The efficacy of massage has not been evaluated in the past so I decided to study the efficacy of Dalak (massage) in osteoarthritis (with and without Roghan-e-Surkh). The present study was conducted in Dr. MIJ Tibbia Unani Medical College, Mumbai during the year 2007. 60 patients of osteoarthritis were randomly selected and divided in to two groups, 30 in Group A (control group) and 30 in Group B (test group). The patients of Group A were massaged with Roghan-e-Surkh and patients of Group B were massaged without Roghan-e-Surkh. Vegetable oil (sesame oil) was used for the lubrication in Group B. After the completion of treatment significant reduction of symptoms was found in both the groups. It was observed that Massage with Roghan-e-Surkh is more effective than without it because Roghan-e-Surkh contains various ingredients which have analgesic and anti inflammatory properties. Massage is also effective without Roghan-e-Surkh because it reduces pain, produces heat, excretes barid madda (cold matter), relaxes muscles and reduces swelling.

Keywords: Massage, Dalak, Osteoarthritis, Roghan-e-Surkh.

Introduction

Massage is defined as the therapeutic manipulation of soft tissues of the body to alleviate pain and reduce fatigue (Harrison,1986). In Unani system of medicine it is called Dalak. Nafees (1934) defined the Dalak as a substitute of exercise because it provides the passive movement to the body.

Majoosi (1889) described following 9 elementry types of Dalak.

According to pressure

1) Dalak-e-Sulb: Hard friction strengthens the organs and makes them hard.

2) Dalak-e-Layyan: Soft friction makes the organ soft and relaxes the muscles.

3) Dalak-e- Mutadil: It is done with moderate pressure (Nafees,1934).

According to duration

4) Dalak-e-Kaseer: Friction which is done for long duration makes the body thin by dissolving the fluid of the body (Nafees,1934).

5) Dalak-e-Qaleel: Friction which is done for short duration produces heat in small quantity (Ibn Rushd,1980).

6) Dalak-e-Mutadil: Friction which is done for moderate duration makes the body fat and increases the mass of the muscles (Nafees,1934).

According to speed

7) Dalak-e-Saree: Friction which is done rapidly produces heat and dryness in the body. It makes the body hard.

8) Dalak-e-Batee: Friction which is done slowly produces heat in small quantity.

9) Dalak-e-Mutadil: Friction which is done with moderate speed produces heat and dryness in the body moderately and makes the body hard (Majoosi,1889).

After combination of these 9 elementry types, 27 compound types are formed (Majoosi,1889).

There are some other types of Dalak such as Dalak-e-Khashin, Dalak-e-Amlas, Dalak-e-Istedaad, Dalak-e-Isterdaad (Nafees,1934). Dalak-e-Khashin is done by rough hands or rough cloths. It draws the blood rapidly towards the organs and makes them red. Dalak-e-Amlas is done with soft hands or soft cloths. It draws blood towards the organ slowly. Dalak-e-Istedaad is done before the exercise to prepare the body for exercise. It helps in the elimination of toxins by liquefying them. Dalak-e-Isterdaad is done after the exercise to restore the energy of the body (Nafees,1934).

Massage relieves pain (Ibn Sina,1971; Feinstein, 1995; Thomas, 2002), produces heat (Ibn Sina,1992; Nair 1997a), helps in excretion of toxins (Ibn Rushd, 1980; Garg, 2002), excretes barid madda (cold matter) (Nafees, 1934), reduces swelling (Ibn Sina, 1971; Philip, 1989) and relaxes muscles (Ibn Rushd, 1980; Feinstein, 1995; Philip, 1989).

The modern massage consists of four basic strokes (I) Effleurage, (II) Kneading, (III) Percussion and (IV) Vibration (Feinstein, 1995; Thomas, 2002).

(I) *Effleurage:* It is a preparatory and concluding stroke of massage. It is non invasive because it puts no pressure on the organ. It consists of circling, friction, fanning and feathering strokes. It is performed by the palms of the hands (Stewart,1999). It relaxes the muscles and improves the circulation of superficial small blood vessels. It also mechanically aids in the drainage of venous blood and lymphatic fluid (Nair,1997b).

(II) *Kneading:* Kneading means to make dough. It consists of all the varieties of actions which a baker performs for kneading the dough (Nair, 1997b). It consists of petrissage, digital kneading, thumbing, picking-up, wringing, rolling and stretching strokes (Stewart,1999). It stimulates the vital activities of the part over which it is employed. The nerves, blood vessels, glands, cellular exchange and other processes

of the tissues are stimulated. It increases the blood supply of the area over which it is applied (Nair, 1997b).

(III) *Percussion:* Percussion consists of blows performed in different ways and with different degree of force (Nair, 1997c). It consists of cupping, beating and tapping strokes (Stewart, 1999). It has powerful excitant effect. It stimulates the nerve centre of the area on which it is employed (Nair, 1997c).

(IV) *Vibration:* It consists of fine vibratory or shaking movements which are employed by the masseur. It is applied on the extremities and head. It has stimulant action on the area over which it is employed. It dilates the blood vessels and increases the blood supply (Nair, 1997d).

Massage relieves the pain by interfering with pain signals' pathway to the brain, a process called "gate control theory". Massage stimulates the release of endorphin, morphin like substance that the body manufactures in the brain and spinal cord (Feinstein, 1995). Massage on the soft part above the joint relieves pain by emptying the lymph and blood vessels of the part (Nair 1997a). Massage relieves muscle tension and spasm. Experts suggest that tense muscles are usually deprived of oxygen because tightness reduces the blood circulation to the area. Massage increases the circulation bringing with it what the muscles need-oxygen and other form of nutrients. As a result muscles relax and pain decreases (Feinstein, 1995).

Osteoarthritis is a chronic disease of joints. It is a degenerative disorder which may cause disabilities in the old age persons. It is characterized by pain, tenderness, morning stiffness, some times swelling and decreased range of movement of the affected joint (Datey, 1979). It may lead to the disability. Pain is caused by venous engorgement of subchondral bone, accumulation of fluid in the joint and sinovitis (Andreoli,2004). Morning stiffness is caused by loss of joint lubrication, chronic oedema in periarticular structure and swelling of articular cartilage (Porter, 2003). Muscle spasm is responsible for decreased range of movement. Pain causes disuse of affected joint resulting in wasting of muscles (Warner, 1998).

Hkm. Wasim Ahmad Azmi called it iltehab-e-mafsalee azmee and classified it a type of wajaul mafasil muzmin (Chronic arthritis). As per Unani system of medicine chronic disease has barid mizaj (cold temperament) (Azmee,1997).

Roghan-e-Surkh is a Unani medicinal oil and contains various ingredients such as Ushna, Sandal Surkh, Habbul Ghurab, Dar-e-hald, Kaiphal, Narakchur, Haldi, Akh, Lehsun, Roghan-e-Sarsoon, Roghan-e-Rai, Roghan-e-darchini, Roghan-e-Laung and Roghan-e-Kunjad. It is useful for the treatment of arthritis, sciatica, gout, backache, paralysis, facial paralysis, trauma and swelling (Anonymous,1986). Most of its ingredients have har mizaj except Sandal Surkh and Dar-e-hald. Ushna, Habbul Ghurab, Lehsun and Haldi have muhallil (anti inflammatory) properties. Sandal Surkh, Dar-e-hald, Akh, Roghan-e-Sarsoon and Roghan-e-Laung have musakkin (analgesic) effects. Dar-e-hald, Akh and Roghan-e-Rai have both analgesic and anti inflammatory properties (Abdul, 1991; Sayyed, 2002).

Materials and Methods

The present study was conducted in Dr. MIJ Tibbia Unani Medical College, Mumbai in the year 2007. 60 patients suffering from osteoarthritis, of both sex and between the age of 40 to 80 years were included in this study. Their written consents were taken. They were randomly selected. Thorough examinations of the patients were done. X-ray of the affected joint was taken to confirm the diagnosis of osteoarthritis. RA test was done to exclude the patients having Rheumatoid Arthritis. The patients were divided into two groups, 30 in Group A (control group) and 30 in Group B (test group). The patients of Group A (control group) were massaged with Roghan-e-Surkh on the affected joint for 8-10 minutes for 14 days. Roghan-e-Surkh manufactured by Hamdard (wakf) was used for this purpose.The patients of Group B (test group) were massaged without Roghan-e-Surkh on the affected joint for 8-10 minutes for 14 days. Vegetable oil sesame oil was used in Group B for lubrication. In both the groups massage was done with moderate pressure and for moderate duration on the affected joint and its related muscles too. The direction of massage was from periphery towards the centre (centripetal friction).

Parameters of the Study

(1) Pain (2) Swelling (3) Morning stiffness (4) Tenderness (5)Decreased range of Movement

0-3 score was given as per the severity of parameter (0 for absent/normal and 3 for severest form of parameter)

The parameters were observed before the treatment (Baseline) and at the end of 1st week(Ist FU), 2nd week (IInd FU). One week after the completion of treatment, a follow-up (IIIrd FU) was done to note any changes in the parameters after the stoppage of treatment.

Before treatment and after treatment score was compared and analyzed by paired 't' test.

Observations

Table no. 1 shows the distribution of patients according to age. Mean age of the patients was 53.7. Most of the patients were between the age group of 41-50 (35% patients). Table no. 2 shows the distribution of patients as per sex. 31 (51.66%) male and 29 (48.33%) females were present in this study. Table no. 3 shows the distribution of patients according to joints affected by osteoaethritis. 35(58.3%) patients had osteoarthritis of knee joints, 4(6.6%) patients had osteoarthritis of cervical spine and 21(35%) patients had osteoarthritis of lumbosacral spine.

Side effects such as local reaction, itching were not found during the treatment.

Table 1. Distribution of patients according to age

Age	Group 'A' (control group)	Group 'B' (test group)	Total
41-50	10 (16.6%)	11 (18.3%)	21 (35%)
51-60	8 (13.3%)	8 (13.3%)	16 (26.6%)
61-70	6 (10%)	6 (10%)	12 (20%)
71-80	6 (10%)	5 (8.3%)	11 (18.3%)
Total	30 (50%)	30 (50%)	60 (100%)

Table 2. Distribution of patients according to Gender

Sex	Group 'A' (control group)	Group 'B' (test group)	Total
Male	16 (26.6%)	15 (25%)	31 (51.6%)
Female	14 (23.3%)	15 (25%)	29 (48.3%)
Total	30 (50%)	30 (50%)	60 (100%)

Table 3. Distribution of patients according to affected joints

Joint affected	Group 'A'(control group)	Group 'B'(test group)	Total
Knee	17 (28.3%)	18 (30%)	35 (58.3%)
Cerv. Spine	2 (3.3%)	2 (3.3%)	4 (6.6%)
Lumb. Spine	11 (18.3%)	10 (16.6%)	21 (35%)
Total	30 (50%)	30 (50%)	60 (100%)

Results and Discussion

After the completion of treatment significant reduction of symptoms was found in both the groups. Table no. 4 shows the comparison and changes of parameters between Group A (control group) and Group B (test group).

- Mean of the pain in group 'A' before the treatment was 2.3 and after the treatment it was 0.25. In group 'B' it was 2.25 before the treatment and 0.85 after the treatment.

Table 4. Changes and Comparison of parameters between Group 'A' (control group) and Group 'B' (test group)

Parameters		Baseline	Ist FU	IInd FU	IIIrd FU	Paired 't' test
Pain	Group 'A' (Mean±S.E.)	2.3 ±0.1277	1.45 ±0.1535	0.25 ±0.1428	0.25 ±0.1428	't'=15.158 P value is <0.0001 (extremely significant)
	Group 'B' (Mean±S.E.)	2.25 ±0.1230	1.7 ±0.1638	0.85 ±0.1666	0.85 ±0.1666	't'=10.466 P value is<0.0001 (extremely significant)
Swelling	Group 'A' (Mean±S.E.)	0.3 ±0.1277	0.3 ±0.1277	0.05 ±0.05000	0.05 ±0.05000	't'=2.517 P value is 0.0210 (significant)
	Group 'B' (Mean±S.E.)	0.25 ±0.1428	0.25 ±0.1428	0.15 ±0.08192	0.15 ±0.08192	't'=1.453 P value is 0.1625 (not significant)
Morning stiffness	Group 'A' (Mean±S.E.)	1.45 ±0.1352	0.8 ±0.1556	0.15 ±0.08192	0.15 ±0.08192	't'=2.517 P value is 0.0210 (significant)
	Group 'B' (Mean±S.E.)	1.55 ±0.1535	1.1 ±0.1906	0.45 ±0.1352	0.45 ±0.1352	't'=1.453 P value is 0.1625 (not significant)
Tenderness	Group 'A' (Mean±S.E.)	1.4 ±0.1338	0.7 ±0.1638	0.15 ±0.08192	0.15 ±0.08192	't'=12.583 P value is <0.0001 (extremely significant)
	Group 'B' (Mean±S.E.)	1.35 ±0.1313	1.0 ±0.1622	0.4 ±0.1338	0.4 ±0.1338	't'=19.00 P value is <0.0001 (extremely significant)
Decreased Range of movement	Group 'A' (Mean±S.E.)	1.3 ±0.1469	0.65 ±0.1313	0.15 ±0.08192	0.15 ±0.08192	't'=6.902 P value is <0.0001 (extremely significant)
	Group 'B' (Mean±S.E.)	1.35 ±0.1500	1.1 ±0.1762	0.45 ±0.1352	0.45 ±0.1352	't'=7.285 P value is <0.0001 (extremely significant)

- Mean of the swelling in group 'A' before the treatment was 0.3 and after the treatment it was 0.05. In group 'B' it was 0.5 before the treatment and 0.15 after the treatment.
- Mean of morning stiffness in group 'A' before the treatment was 1.45 and after the treatment it was 0.15. In group 'B' it was 1.55 and 0.45 after the treatment.
- Mean of tenderness in group 'A' before the treatment was 1.4 and after the treatment it was 0.15. In group 'B' it was 1.35 and 0.4 after the treatment.
- Mean of decreased range of movement in group 'A' before the treatment was 1.3 and the treatment it was 0.15. In group 'B' it was 1.35 before the treatment and 0.45 after the treatment.

It was found that Massage with Roghan-e-Surkh is more effective than without it because most of its ingredients have har mizaj (hot temperament). Some of them have musakkin (analgesic) and muhallil (anti inflammatory) effects. Massage is also effective without Roghan-e-Surkh because it reduces pain, produces heat, excretes barid madda (cold matter), relaxes muscles and reduces swelling. Relaxation of muscles also helps in restoration of normal range of the affected joint.

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Physical Growth & Nutritional Status of School Boys

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Abstract

Objective: The present study was conducted to assess the physical growth and nutritional status of school boys ranging in age from 4 to 12 years Hosahalli Bangalore. The main objective of the study was to obtain precise information on the prevalence of nutritional problems in the study population and identification of children who are at risk or in greatest need of assistance. Method: Physical growth was assessed using five standard anthropometric measurements viz Height, Weight, Head circumference, Chest circumference, Upper arm circumference. To assess the nutritional status Quetlet index, Weight deficit for age, Height deficit for age, upper arm deficit for age have been calculated using NCHS standards. Result: It has been observed that Grade I & Grade II malnutrition was prevalent among the study population. However grade III malnutrition was found only in a few boys. Conclusion: This average to poor nutritional status of the study population may be attributed to low dietary intake, low and middle socio economic status, uneducated or partially educated parents, and large family size etc.

Keywords: Physical growth, Nutritional status, Anthropometric measurements.

Introduction

The school going children are the most important segment of our society, Their physical growth and nutritional status is of most significance and presents a general health status of a community and nation as a whole. Good nutrition is also a determinant of healthy growth of mind and body. Several studies have been conducted on physical growth and nutritional status of children in different parts of the country as malnutrition continues to be a common social, and undoubtedly the biggest public health problem in our country today. (Balgir et al., Begum and Chaudhry, 1996; Bogin, 1988; Ghai, 2001).

Our country consists of diverse agro-climatic regions and ethnic multiplicities. Socio cultural practices, life style and eating habits vary not only between states but also between the districts with in a state. Rural India needs more attention as 98% of the geographical area of India and 72.9% of India's population occupy rural area spreading over six lakh villages. Updated profiles on physical growth and nutritional status of children is important for formulation and implementation of appropriate nutrition intervention strategies and policies not only at the state level but also at district and tehsil levels (Ghai, 2001). As per the report of national nutrition monitoring bureau and national institute of nutrition nearly 43.8% children suffers from moderate degree of protein energy malnutrition, 8.7% suffers from extreme degree of malnutrition and only 9.9% of the children are normal (Gomez et al., 1956). In India malnutrition is the direct cause of death of 500,000 children every year (Gulati et al., 2002).

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Young boys are very important section of our society as they are our future generation maker. In this period of rapid growth of a child if care is not taken, this influences the state of his health not only as a child but also through out life (Anonymous, 1989). Hence assessment of physical growth and nutritional status is most essential. The present study is an attempt in this regard to evaluate the physical growth and nutritional status of school going boys of Hosahalli Bangalore aged between 4-12 years.

Material and Method

The present study is a survey based cross sectional study, under taken to assess the physical growth and nutritional status in 4 to 12 years old school boys of Hosahalli Bangalore. Permission to conduct survey of school boys was obtained from school administration before starting the survey. The study was conducted for a period of six months from January 2005 to June 2005. Since the study population was small all boys of 4 to 12 years age group studying in four schools in Hosahalli area were targeted. The survey sample comprised 550 school boys. All the subjects were physically and mentally normal and did not suffer from any apparent illness at the time of data collection. It is ensured by history and clinical examination. Date of birth of each student was recorded from school register and was verified from the student. General information regarding their socio economic status, caste, religion, parent's education, occupation, family size, structure and income etc. was also recorded.

The data so collected were grouped into age groups of one year interval. A total of five anthropometric measurements ie body weight, height, head circumference, chest circumference, mid arm circumference were taken of each subject. All the measurements were taken with standard anthropometric instruments according to methods and techniques described by Weiner and Lourice (Anonymous, 1977). The measurements were recorded on each subject wearing minimum possible clothing and without any footwear.

For assessing nutritional status of the subjects, weight deficit for age, height deficit for age, upper arm deficit for age have been calculated. The subjects were divided into three levels of malnutrition besides normal ie grade I, grade II, grade III malnutrition. The study subjects were classified for weight deficit for age, height deficit for age and upper arm deficit for age according to Gomez (Anonymous, 1993) and Waterloo[10] classification of nutritional status of children respectively (Table I). Results were expressed as mean ±SD, Quetlet index.

Result

Mean and standard deviations for the values of height weight, head circumference, chest circumference and upper arm circumference of the study population were present in table II. All the absolute and circumferential body dimensions show a

Table-I. Classification of grades of malnutrition for weight deficit for age, height deficit for age, and upper arm deficit for age. According to Gomez and Waterloo, respectively.

Grades or types of malnutrition	Normal	Grade I	Grade II	Grade III
Weight for age	Above 90%	75-90%	60-75%	Below 60%
Height for age	Above 95%	90-95%	85-90%	Below 85%
Upper arm circumference for age	Above 90%	80-90%	70-80%	Below 70%

Table-II: Means and standard deviation of various Anthropometric measurements of school boys from 4 to 12 years age group.

Anthropometric measurement	4 yrs n=70	5 yrs n=70	6 yrs n=60	7 yrs n=60	8 yrs n=40	9 yrs n=20	10 yrs n=100	11 yrs n=80	12 yrs n=50
Weight (kg)	13 ±1.09	14.5 ±2.37	15.3 ±2.98	17.75 ±2.5	20.62 ±4.9	22 ±1.2	23.6 ±3.5	24.37 ±2.8	33.8 ±2.48
Height (cm)	97.8 ±3.92	99.4 ±1.2	110.4 ±4.37	114.36 ±3.5	118.4 ±3.15	121 ±5	124.24 ±6	127.17 ±5.1	142.24 ±4.5
Head circumference	47.4 ±1.6	47.57 ±2.15	47.6 ±1.6	48.0 ±3	48.25 ±1.5	49 ±1.3	49.24 ±1.5	49.7 ±0.9	51.2 ±2.68
Chest circumference	50.28 ±1.9	52.28 ±3.03	54.5 ±1.64	55.16 ±2.1	58 ±2.4	59.5 ±0.7	60.7 ±2.6	62 ±2.7	67.4 ±3.78
Mid arm circumference	14.07 ±0.8	14.14 ±0.69	14.66 ±0.41	15.5 ±0.54	16.25 ±1.7	16.5 ±0.7	16.70 ±1.17	16.87 ±1.2	19.2 ±1.09

gradual increase in mean values as age advances. Total gain in head circumference, chest circumference, upper arm circumference, weight, and height over the growth period of 4 to 12 years is 3.8 cm 17.12 cm, 5.13 cm, 20.8 kg, 44.44cm respectively.

Table III presents the age wise distribution of malnutrition among the school boys from 4 to 12 years of age as per weight deficit for age out of a total of 550 boys, only 86 (15.63%) were found normal. While 217 (39.45 %) were found suffering from grade I malnutrition, 224 (40.72%) from grade II and only 23 (4.18%) boys were severely malnourished ie grade III malnutrition. In the age group of 6 years percentage of normal boys was found highest and in the age group 4, 5 and 6 years no one suffers from severe malnutrition. In age groups 9, 6, 5, 7 years grade

Table-III. Malnutrition as per weight deficit for age among study population.

Age group (in years)	No. of boys	Normal		Grade I malnutrition		Grade II malnutrition		Grade III malnutrition	
		No	%	No	%	No	%	No	%
4	70	8	11.42	42	60	20	28.57	00	00
5	70	15	21.42	45	64.28	10	14.28	00	00
6	60	15	25	40	66.6	5	8.33	00	00
7	60	6	10	30	50	20	33.33	4	6.66
8	40	5	12.5	10	25	21	52.5	4	10
9	20	2	10	15	75	2	10	1	5
10	100	20	20	5	5	70	70	5	5
11	80	10	12.5	15	18.75	50	62.5	5	6.25
12	50	5	10	15	30	26	52	4	8
Total	550	86	15. 63	217	39.45	224	40.7	23	4.18

I malnutrition was prevalent and in the age group 10, 11, 8 years grade II malnutrition was found more prevalent.

Table IV presents the age wise distribution of malnutrition among school boys from 4 to 12 years of age as per height deficit for age. Among the study population 137 (24.9%) were found normal, 250 (45.45%) suffered from grade I malnutrition, 142 (25.81%) boys suffered from grade II malnutrition and only 21 (3.81%) were found severely malnourished. In the age group of 5 years the percentage of normal boys was found higher and in the age groups 6, 7, 8, 10, 11, 12 years no one suffers from severe malnutrition. 10 (14.2%) boys each in 4 and 5 years age group and 1 (5%) in 9 years age group were suffered from severe malnutrition.

Table V presents the extent of malnutrition as per upper arm circumference deficit for age. In present study among the study population 89 (16.18%) boys were normal, 286 (52%) boys were suffering from grade I malnutrition, 166 (30.18%) suffering from grade II malnutrition and only 9 (1.63%) were suffering from grade III malnutrition.

Table VI Presents extent of malnutrition as per Quetlet index, in the present study among the study population 280 (50.9 %) subjects were found normal, and 270 (49%) were severely malnourished.

Table-IV. Levels of malnutrition as per height deficit for age among study population.

Age group (in years)	No. of boys	Normal		Grade I malnutrition		Grade II malnutrition		Grade III malnutrition	
		No	%	No	%	No	%	No	%
4	70	20	28.5	10	14.2	30	42.85	10	14.2
5	70	40	57.2	00	00	20	28.5	10	14.2
6	60	18	30	36	60	6	10	00	00
7	60	6	10	48	80	6	10	00	00
8	40	4	10	32	80	4	10	00	00
9	20	1	5	12	60	6	30	1	5
10	100	20	20	50	50	30	30	00	00
11	80	18	22.5	42	52.5	20	25	00	00
12	50	10	20	20	40	20	40	00	00
Total	550	137	24.9	250	45.45	142	25.81	21	3.8

Table-V. Levels of malnutrition as per upper arm circumference deficit for age among study population.

Age group (in years)	No. of boys	Normal		Grade I malnutrition		Grade II malnutrition		Grade III malnutrition	
		No	%	No	%	No	%	No	%
4	70	5	7.14	42	60	20	28.57	3	4.28
5	70	5	7.14	49	70	16	22.85	00	00
6	60	5	8.33	45	75	10	16.66	00	00
7	60	9	15	30	50	21	35	00	00
8	40	4	10	26	65	10	25	00	00
9	20	3	15	11	55	6	30	00	00
10	100	35	35	32	32	30	30	3	3
11	80	8	10	40	50	30	37.5	2	2.5
12	50	15	30	11	22	23	46	2	2
Total	550	89	16.18	286	52	166	30.18	9	1.63

Table-VI. Quetlet index

Age group	No. of boys	Normal — Quetlet index 0.15—0.16		Severely malnourished Q.I. = 0.14 or less	
		No. of subjects	%	No. of subjects	%
4	70	20	28.5	50	71.4
5	70	30	42.8	40	57.1
6	60	20	33.33	40	66.6
7	60	10	16.6	50	83.3
8	40	30	75	10	25
9	20	10	50	10	50
10	100	50	50	50	50
11	80	60	75	20	25
12	50	50	100	00	00
Total	550	280	50.90	270	49

Discussion

In present study Quetlet index, weight deficit for age Height deficit for age upper arm circumference deficit for age have calculated using NCHS standards.[11,12,13] When the body weight deficit was evaluated against age, it was found that only 15.63% boys were normal, 39.45% were suffering from Grade I and 40.72% from Grade II Malnutrition and only 4.18% boys were found severely malnourished i.e. Grade III Malnutrition. Similarly height deficit for age also showed mild to moderate malnutrition. Only 24.9% subjects were found normal, 45.45% were found suffering from Grade I Malnutrition, 25.81% subjects from Grade II and 3.8% from Grade III Malnutrition and the study showed that in the age group of 6,7,8,10,11,12 years no one was found severely malnourished,When upper arm circumference deficit was evaluated against age it was found that only 16.85% subjects were normal, 52% were showed Grade I Malnutrition, 30.18% showed Grade II Malnutrition, and 1.63% showed Grade III Malnutrition. When Quetlet index was calculated 50.9% subjects were found normal and 49% were found severely malnourished. The present state of Malnutrition in school boys may probably be attributed to their low-middle socio-economic background, poor dietary intake due to poverty and lack of knowledge of the simplest fact of nutrition. Other factors which may be responsible for their poor nutritional status may be lower literacy status of head of family and other members, large family with high dependency rates, occupational status i.e. having jobs with low monthly income etc.

Conclusion

Height and weight are good indicators of physical growth. On comparison of mean height and weigh of study population with the mean height and weight of affluent Indian boys given by Agarwal K.N. et al showed slow physical growth of study subjects.

Similarly indicators of nutritional status viz Quetlet index, weight deficit for age, height deficit for age, upper arm circumference deficit for age showed mild to moderate malnutrition in majority of study subjects

The present state of malnutrition in school boys may be due to their low, middle, socio economic background, poor dietary intake due to lack of knowledge of the simplest facts of nutrition, low literacy status of the family, poor health care infrastructure, poor personal hygiene and poor Environmental sanitation etc.

For better growth and development emphasis must be given on health education, viability of health care infrastructure, personal hygiene, and Environmental sanitation etc which may be considered to have direct influence on physical growth and nutritional status of the child in the area,

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Scientific Evaluation of Psychomotor Performance in four Amzijah (Constitution) with the Help of Modern Psychological Tools

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Abstract

In the present study, psychomotor performance was assessed in eighty individuals comprising of twenty individuals from each constitution, viz. *Damwi Mizaj, Balghami Mizaj, Safrawi Mizaj* and *Saudawi Mizaj*. The psychomotor performance of the individuals of four Amzijah was evaluated with the help of Digit Letter Substitution Test. As the results revealed that the Damwi, Balghami and Safrawi individuals have shown nearly similar levels of psychomotor performance. But the Saudawi individuals showed a remarkably slow activity in their psychomotor performance.

Keywords: Psychomotor performance Mizaj, Temperament, constitution, Unani Medicine.

Introduction

The Unani system of Medicine is based on the humoral theory. It plays a pivotal role in determining the physiological and psychological status of the human individuals and in diagnosing different diseases and deciding their line of management according to the Mizaj or temperament of the individual concerned. The Greek scholars have described four types of Amzijah according to the dominance of the individual humour,viz. Sanguine (Damwi), Phlegmatic (Balghami), Bilious (Safrawi), and Melancholic (Saudawi) Amzijah (Ibn Sina, 1998).

The term Mizaj is derived from the Arabic word 'Imtezaj', that means intermixture or combination of elements (Zafar and Ahmed, 2003). According to Aziz the meaning of Mizaj is "habit, or mental attitude of the individual" (Aziz, 2002). Elias describes Mizaj as 'Temperament' (Elias, 1985) while, Dehlvi calls it 'Tabiyat' (Dehlvi, 1974). Ghulam Jeelani says that Mizaj is "temperament, temper, constitution or disposition" (Jeelani, 1983). He also says that Mizaj is a new state of a matter achieved after intermixing, or the combination of different Anasir (elements) that have different qualities.

As far as therapeutics is concerned in Unani Medicine, physicians keep into consideration, patient's Mizaj, emotions, behavior, habit and habitat, life style, religion, occupation, weather, environment, etc. Different psychological problems and psychiatric disorders are increasing day by day, and the main stream medicine is not very successful. Therefore, it becomes responsibility of the researchers of Unani system of Medicine, to re-investigate the virtues of this system, particularly Unani psychology and psychiatry. The present study is one of the steps in this direction, and this will certainly proved a scientific base to the concept of Mizaj, which would help to improve the line of treatment and pharmacotherapy of the psychiatric disorders those are prevalent world wide.

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However, mixed types of constitutions are also found, but those are different combinations of the four basic types of constitutions. But, one type of constitution always remains dominant, and its qualities are reflected by different signs and symptoms. Each constitution has its classical characteristics, by which it is distinguished from one another. When the Mizaj remains in an appropriate and stable state of equilibrium (homeostasis), it is called as Mizaj Mu'tadil (normal temperament), but when the equilibrium is disturbed or the proportion of the humors is abnormally changed, it is known as Mizaj Ghayr Mu'tadil (abnormal temperament), (Ibne Sina,1930; Ibn Rushd., 1984; Majoosi, A.I.A.,1889).

Methodology

The present study was carried out in the department of Kulliyat, MIJ Tibia College Mumbai during 2003-2005. The aim of the present study was first to determine the Mizaj of the human individuals, and then to make scientific evaluation of their Psychomotor Performance. The determination of Mizaj was done on the basis of ten parameters (Ajnas-e-Ashra); those were, viz. Malmas (Tactile sensation), Lahm wa shahm (Flesh and fat), Ash'ar (Hair of the body), Laun (Colour of the body), Kafiyat-e-infi'al (Quality of passiveness of organ), Hayiat-e-aza (Stature of organs), Naum-o-yaquzah (Sleep and wakefulness), Af'al-e-a'za (Bodily functions), Fuzlat-e-badan (Excreta of the body), Infi'alat-e-nafsaniyah (Psychological functions) described in the classical literature.

The selected individuals who's Mizaj was determined on the basis of above ten parameters were included in the study for assessment of psychomotor performance in four Amzijah with the help of Digit Letter Substitution Test (DLST).

Inclusion Criteria

1. The human individuals either male or female between the groups of 15-24 years were included in the study.
2. Only healthy individuals were included in the study.
3. The individuals willingly accepting to answer the questionnaire or to perform the related psychological tests were included in the study.

Exclusion Criteria

1. The individuals suffering from any illness, including mild to severe psychiatric disorders, or the individuals already taking anti-psychotic therapy were excluded from the study.
2. The married individuals were excluded from the study.
3. The individuals not willingly accepting to answer the questionnaire or to perform the related psychological tests were also excluded from the study.

Criteria for selection of Individuals

The first part of the study, i.e. "Determination of four types of Mizaj (Amzijah)", was carried out as general screening on 200 individuals. Out of them, total 80 individuals were selected on the basis of their strong characters of particular temperament. Above 75% positive findings of any particular temperament was considered as 'strong characters' for that particular temperament. Out of 80 individuals 20 individuals selected for each temperament, viz. *Damvi Mizaj, Balghami Mizaj, Safrawi Mizaj* and *Saudawi Mizaj*. They were further subjected to the test for Psychomotor Performance

Digit Letter Substitution Test (DLST)

This test was performed by the method of Natu and Agarwal (1995). In the present study, this test was carried out for the assessment of psychomotor performance in four Amzijah. As shown in Annexure, the worksheet consists of 3 parts.

A) Instructions and identification of the students.

B) The key, mentioning 6 target letters.

C) The working section.

The working section displays randomized digits arranged in row and columns. The individuals are asked to substitution as many target digit as possible in the specified time of 90 seconds. The letter substitution may be undertaken in a horizontal, vertical or randomized manner by selecting a particular key digit. The total number of substitution and wrong substitution are scored. Normally, 1-2 practice sessions are necessary to obtain a stable baseline "net score" which is obtained by deducting wrong substitution from the total cancellations attempted.

To avoid the effect of memory during repeated administration, parallel worksheets need to be prepared either by changing the digit-letters pairing in the key or by changing the sequence of digit randomly in the working section. The worksheet (Annexure) has 12 rows and 8 columns. In the specified time of 90 seconds, no individual is likely to complete the task. The net score for each individual was recorded.

Results and Discussion

The psychomotor performance of the individuals of four different Amzijah was assessed by Digital Letter Substitution Test. The final scores of Digital Letter Substitution Test were 57.45+12.35, (Damwi) 56.3+ 16.48, (Balghami) 56.95+11.50 (Safravi) and 41.1+10.79 in (Saudavi) Mizaj.

The psychomotor performance of the individuals of four Amzijah was evaluated with the help of Digit Letter Substitution Test. As the results revealed, that the Damwi,

Table-1. Distribution according to age group and Sex

Age	Damwi			Balghami			Safrawi			Saudawi		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total
15-19	5	8	13	3	12	15	3	11	14	2	2	4
20-24	2	5	7	1	4	5	4	2	6	10	6	16
Total	7	13	20	4	16	20	7	13	20	12	8	20

M: male; F: female

Table-2. Digit Letter Substitution Test scores in the four Amzija (Mean+S.D.)

No.	No. of Individuals	Mizaj	(Mean+S.D.)
1	20	Damwi	57.45+12.. 35
2	20	Balghami	56.3+16.48
3	20	Safrawi	56.95+11.50
4	20	Saudawi	41.1+10.79

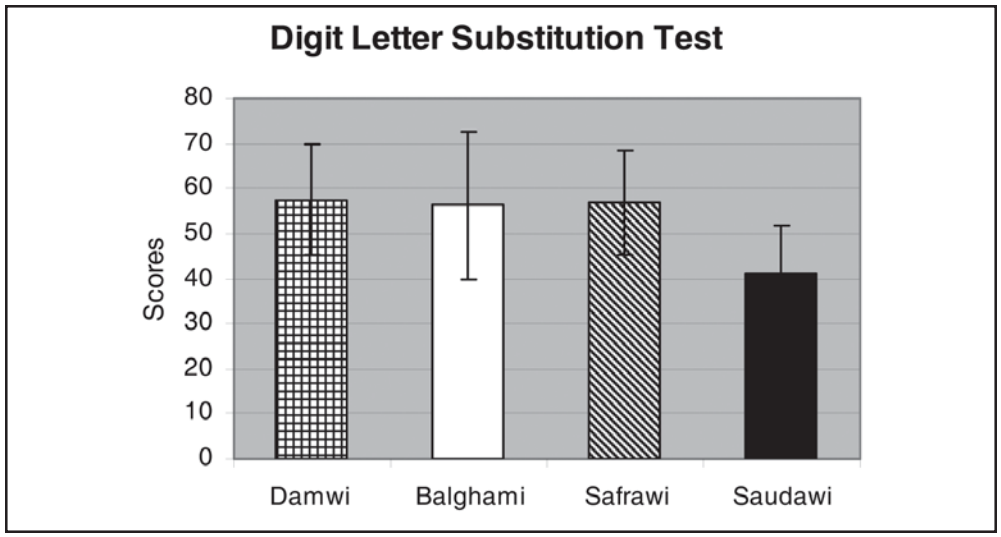

Fig. 1. Scores of Digit Letter Substitution Test in four Amzijah

Balghami and Safrawi individuals have shown nearly similar levels of psychomotor performance as described by the eminent Unani scholars Razi, Abu Bakar Mohammad Bin Zakarya (1980) in his book Kitbul-Mansoori and Ibn Rushd (1984) in Kitab-ul-Kulliyat. But the Saudawi individuals showed a remarkably slow activity in their psychomotor performance as described in the classical Unani books Kulliyat-e- Qanoon (Ibne Sina, 1935) and in Kamil-us-San'a (Majoosi, 1889).

Conclusion

Finally it can be concluded that the Damwi, Balghami and Safrawi individuals have shown nearly similar levels of psychomotor performance and the Safrawi Mizaj individuals revealed low psychomotor performance as described in the Unani classical books.

Module of Digit Letter Substitution Test

Regn. No. _____ Code No. _____ Date _____

Name _____ Age _____ Sex _____

Address _____

A. Instructions:

1. Substitute the digits with corresponding letter as per the given Key.
2. Substitute as many as possible within the given time.
3. Start and stop only when told.

B. Key:

1	2	3	4	5	6	7	8	9
L	H	Y	N	R	E	D	T	J

C. Working Section:

6	2	4	1	5	7	9	3	2	6	8	5
5	4	7	8	1	2	3	4	9	6	3	7
2	4	6	7	8	9	3	1	2	3	7	4
2	9	4	6	8	1	2	5	9	3	4	7
9	7	4	2	3	8	1	5	6	2	9	1
8	6	2	3	9	4	5	7	1	4	3	9
3	5	9	1	2	5	6	2	7	8	9	1
5	4	9	2	7	1	3	2	8	9	5	6

Total Attempted ……. Wrong Attempted ……. Net Score ……

Individual scores of Digit Letter Substitution Test

S.No.	Damwi	Balghami	Safrawi	Saudawi
1	53	67	75	42
2	47	74	48	27
3	69	26	70	59
4	64	28	71	38
5	45	58	41	69
6	45	86	52	49
7	49	73	51	44
8	80	47	50	34
9	72	65	58	32
10	31	39	57	41
11	62	52	86	31
12	79	68	61	37
13	47	62	43	40
14	50	83	53	47
15	58	50	51	48
16	59	62	53	44
17	60	47	51	31
18	53	45	62	29
19	55	51	44	51
20	68	43	62	29
Sum	1146	1126	1139	822

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A Clinical Study of the Unani Formulation UNIM-902 for Anti-Hypertensive Effect

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Abstract

UNIM-902 significantly reduced systolic (P<0.001) as well as diastolic (P<0.001) blood pressure and pulse rate (P<0.001)) per minute when compared with baseline-treatment to the after-treatment of this drug and is statistically highly significant (P<0.001). UNIM-902 significantly reduced the biochemical parameters such as serum cholesterol (P<0.01), serum triglycerides (P<0.05), serum glutamate pyruvate transaminase (SGPT) (P<0.01), serum glutamate oxaloacetate transaminase (SGOT) (P<0.01), whereas a significant increase in the level of serum alkaline phosphatase enzyme (P<0.01) level were observed, when compared with pre-treatment to the after-treatment values. A significant decrease in the level of the serum creatinine (P<0.05) (IIIrd follow-up) were observed. In haematological studies Unani coded drug UNIM-902 significantly reduced the erythrocyte sedimentation rate (ESR) (P<0.01) and total leucocyte counts (P<0.01). Thus, the test Unani formulation is suggested to have anti-hypertensive and hypolipidemic effect.

Keywords: Unani Medicine, Cholesterol, Triglycerides, Hypolipidemia, Hypertension

Introduction

Hypertension is high blood pressure (140/ 90 mmHg) that is above normal level (120/80 mmHg) consistently for more than about 6 months. Common symptoms of hypertension are headache, dizziness or vertigo, body and joint pain, general weakness e.t.c. Hypertension is one of the commonest disease with an estimated worldwide prevalence of 1.0 billion. Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India. Epidemiological studies show that there are 31.5 million hypertensive in rural and 34 million in urban populations in India (Gupta, 2004; Sixth J.N.C. report, 1997).

The modern anti-hypertensive drugs (diuretics, beta-adrenoceptor blocker, angiotensin-converting enzyme (ACE) inhibitors, angiotensin-II receptor antagonists, calcium-channel blockers, alpha blockers, renin inhibitors, vasodilators) undoubtedly, reduce high blood pressure, but also produce certain serious side effects, such as thiazide diuretics cause increased serum cholesterol level, impaired glucose tolerance, hyperuricaemia and hypokalaemia (Kumar & Clark, 2009). The World Health Organization (WHO) has estimated that most of world populations relies on “alternative plants” based medicines as their primary intervention (Kroll *et al.*, 2003). Therefore, there is a need to search for effective and safe drug for the treatment of hypertension among Traditional Medicines. Keeping in view the above facts, the efficacy of Unani coded drug UNIM-902 was evaluated in the management of hypertension.

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Materials and Methods

UNIM-902 was obtained from Central Council for Research in Unani Medicine, New Delhi. The Study was carried out at Regional Research Institute of Unani Medicine (RRIUM), Aligarh. Ninety patients attending in the out patients department (OPD), of both sex and age (25-65 yrs) was screened out. Out of ninety patients, twenty three patients were selected for clinical trial. UNIM-902, 500mg tablet each twice daily were given to hypertensive patients, orally with water for a period of 180 days, which included in trial group. All patients were advised to take low salt and low fat containing diet and light exercise (walking or cycling for 30 minutes) during the course of treatment.

Subject selection

Inclusion and exclusion criteria for selection of patients were based on the guidelines of World Health Organization (WHO)/ International Society of Hypertension (ISH) (1999).

Inclusion Criteria

1. In inclusion criteria, patients must have systolic blood pressure 140-159 mmHg and diastolic blood pressure 92-99 mmHg (grade-I).
2. Patients will have a diagnosis of hypertension (based on participant report).
3. Patients have consented to participation will be included.

Exclusion Criteria

1. Patients is in state of severe hypertension (blood pressure of > 180/120 mmHg) at the time of study were excluded.
2. Patients with hypertensive retinopathy and Type-I diabetes were excluded.
3. Pregnant or lactating females were excluded.
4. Patients with history of malignancy within past five years will be excluded.

Collection of blood serum

Blood samples were collected by puncturing the vein at each investigation. One ml. of blood with ethylene diamine tetra acetic acid (EDTA) was used for various haematological parameters and other 2.0-2.5 ml. of blood samples were allowed to clot and serum was separated by centrifugation, which was used for various biochemical parameters. Biochemical and haematological investigations were carried out as follows.

Biochemical Analysis

Biochemical parameters studied were as follows. Serum cholesterol, Serum triglycerides, Blood urea, Serum Creatinine, Serum Glutamate Pyruvate Transaminase (SGPT, E.C. 2.6.1.2), Serum Glutamate Oxaloacetate Transaminase (SGOT, E.C. 2.6.1.1) and Serum Alkaline Phosphatase (ALP). SGPT and SGOT are maximally present in liver. Increased activities of SGPT and SGOT are indicator of hepatocellular injury whereas SGOT is maximally present in heart tissue, so increased level of SGOT reflect heart tissue damage (Miura, 1992, Sjoden *et al*., 1990 had also reported that SGPT, SGOT and serum alkaline phosphatase level were higher in chronic hypertensive patient.

Increased level of blood urea depicts osmotic diuresis which leads loss of body fluids and electrolytes. Miura *et al*., (1994) had also reported that increased level of serum creatinine predicts hypertension.

Haematological Analysis

It include Haemoglobin (Hb) %, erythrocyte sedimentation rate (ESR), Red Blood Corpuscles (RBC) Count, Total Leucocytes Count (TLC), Differential Leucocytes Count (DLC). An increased in total leucocytes count (TLC), Polymorphs and erythrocyte sedimentation rate (ESR) may constitute an enhanced risk for organ injury in hypertensive rats (Schmid-Schonbein *et al.,* 1991; Schillaci *et al*., 2007). This may directly increase peripheral vascular resistance by impeding circulation through small blood vessels (Friedman *et al*., 1990). Lymphocyte and haemoglobin level were significantly lower in uncontrolled hypertension (Paul *et al*., 2008).

Drug, Dose and Mode of administration

Compound Unani formulation coded as UNIM-902, 500mg tablet twice daily was given to hypertensive patients, orally with water after meals.

Duration of treatment and follow-up

Duration of treatment of patients was 180 days. After registration of patients, base line (pre-treatment) observations were made before starting the treatment by investigating all the biochemical and haematological parameter. Peri-treatment was carried out at In Ist (30th days), IInd (60th days), IIIrd (90th days), IVth (120th days) and Vth (150th days) interval of testing, in which all biochemical and haematological parameters were carried out. At the time of completion of treatment i.e. 180 days all biochemical and haematological parameters were studied.

Statistical Analysis

Data were analyzed statistically by one-way analysis of variance (ANOVA) followed by Dunnett's' test. The values were considered significant when the P-value was less than 0.01.

Results and Discussion

Biochemical Studies

Blood pressure

The systolic and diastolic blood pressure were included as a diagnostic parameter, however lipid profile were studies as an additional benefits. Liver function tests and kidney function tests were studied for possible side effects. In Out Patients Department (OPD) studies UNIM-902 significantly reduced systolic blood pressure (From150.48 mm of Hg ± 2.44 to 130.48mm of Hg ± 13.29) (13.29%) (P<0.001), diastolic blood pressure (From 90.00 mm of Hg ± 1.35 to 77.14 mm of Hg ± 1.17) (14%) (P<0.001) and pulse rate (From 93.38 per minute ± 3.02 to 82.76 per minute ± 0.84) (11%) (P<0.001) (Table-1) when compared with baseline-treatment to the after-treatment of this drug.

Lipid Profile

The present study showed that UNIM-902 causes a significant reduction in the level of serum cholesterol (16.0 %) (P< 0.01) compared with pre-treatment (base-line treatment) to the after-treatment values. In Ist (30th days), IInd (60th days), IIIrd (90th days), IVth (120th days) and Vth (150th days) follow-up (Peri-treatment) studies, a significant reduction in the level of serum cholesterol (13 &12.0%) (90th & 150th days) (P<0.01) (Table-2 & 3), whereas a significant increase in the level of serum triglycerides (17.0, 10.0 & 11.0 %) (60th, 90th &120th days) (P<0.01) (Table-2 &3), were observed when compared with pre-treatment to the different follow-up (Peri-treatment).

Table-1. Effect of Unani coded drug UNIM-902 on the levels of systolic, diastolic blood pressure and pulse rate in hypertension patients.

Group → Parameter ↓	Pre-treatment	After- treatment (180th days)
Systolic Blood pressure (mmHg)	150.48 ± 2.44	130.48 ± 13.29***
Diastolic Blood pressure (mmHg)	90.00 ± 1.35	77.14 ± 1.17***
Pulse rate per minute	93.38 ± 3.02	82.76 ± 0.84***

*** P<0.001 (highly significant)

Table-2. Effect of Unani coded drug UNIM-902 on the level of serum cholesterol and serum triglycerides in hypertension patients.

Parameter → Group ↓	Serum cholesterol (mg/dl)	Serum triglycerides (mg/dl)
Pre-treatment	189.68 ± 11.22	126.04 ± 11.27
After treatment (180th days)	159.36 ± 8.73**	122.41 ± 10.68▪

**P< 0.01 (significant) and ▪P<not being 0.05

Table-3. Effect of Unani coded drug UNIM-902 on the level of serum cholesterol and serum triglycerides in hypertension patients.

Group → Parameter ↓ ment	Pre-treat-	30th Days	60th Days	90th Days	120th Days	150th Days
Serum cholesterol (mg/dl)	189.68 ±11.22	182.97 ±9.04▪	180.48 ±12.57▪	165.75 ±10.85**	179.89 ±9.41▪	166.89 ±7.55**
Serum triglycerides (mg/dl)	126.04 ±11.27	125.87 ±8.27▪	147.13 ±13.05**	138.05 ±10.79**	139.87 ±14.2**	120.12 ±8.11▪

**P< 0.01 (significant) and ▪P<not being 0.05

Table-4. Effect of Unani coded drug UNIM-902 on the level of blood urea and serum creatinine in hypertension patients.

Parameter → Group ↓	Blood urea (mg/dl)	Serum creatinine (mg/dl)
Pre-treatment	24.99 ±1.89	1.09 ±0.04
After treatment (180th days)	23.97 ±0.92▪	1.11 ±0.05▪

▪P<not being 0.05

Liver Function Tests

UNIM-902 causes a significant reduction in the level of Serum glutamate pyruvate transaminase (SGPT (13.0 %) (P< 0.01), serum glutamate oxaloacetate transaminase (SGOT) (20.0%) (P< 0.01) (Table-6 & 7), while a significant increased in the level of serum alkaline phosphatase enzyme (10.0 %) (P< 0.01) was observed when compared with pre-treatment to the after-treatment values. In Ist (30th days), IInd (60th days), IIIrd (90th days), Ivth (120th days) and Vth (150th days) follow-up studies a significant reduction were observed in the level of SGPT (9.0 % in both cases) (90th & 120th days) (P<0.01), and SGOT (12.0 &10.0 %) (60th & 150th days) (P<0.01), however, a significant increase in the level of serum alkaline phosphatase enzyme (10.0 &11.0 %) (90th &150th days) (P<0.01) (Table-6 & 7) were observed in different follow-up (Peri-treatment).

Table-5. Effect of Unani coded drug UNIM-902 on the level of blood urea and serum creatinine in hypertension patients.

Group → Parameter ↓	Pre-treatment	30th Days	60th Days	90th Days	120th Days	150th Days
Blood urea (mg/dl)	24.99 ±1.89	26.91 ±2.32**	25.43 ±1.89▪	24.57 ±1.89▪	25.14 ±2.15▪	27.24 ±2.56**
Serum creatinine (mg/dl)	1.09 ±0.04	1.06 ±0.06▪	1.15 ±0.05▪	0.98 ±0.06*	1.07 ±0.05▪	1.17 ±0.06▪

**P< 0.01 (significant), *P< 0.05 (significant) and ▪P< not being 0.05

Table-6. Effect of Unani coded drug UNIM-902 on the levels of serum SGPT, SGOT, and serum alkaline phosphatase enzymes in hypertension patients.

Parameter → Group ↓	SGPT (IU/L)	SGOT (IU/L)	Serum Alkaline phosphatase (IU/L)
Pre-treatment	33.71 ± 5.20	28.31 ± 3.12	93.81 ± 6.46
After treatment (180th days)	29.22 ± 3.08**	22.61 ± 2.61**	102.88 ± 6.24**

**P< 0.01(significant)

Kidney Function Tests

In follow-up (peri-treatment) studies a significant increase in the level of blood Urea (13.0 &15.0 %) (30th & 150th days) (P<0.01) were observed (table-4 & 5) in different follow-up studies (Peri-treatment). However, a significant reduction in the level of serum creatinine (11.0%) (P<0.05) (IIIrd follow-up) was observed when compared with pre-treatment to the follow-up value.

Table-7. Effect of Unani coded drug UNIM-902 on the levels serum SGPT, SGOT, and serum alkaline phosphatase enzymes in hypertension patients.

Group → Parameter ↓	Pre-treatment	30th Days	60th Days	90th Days	120th Days	150th Days
SGPT (IU/L)	33.71 ±5.20	31.78 ±4.40▪	30.61 ±3.13▪	29.06 ±2.97**	29.03 ±2.48**	31.58 ±3.79▪
SGOT (IU/L)	28.31 ±3.12	33.11 ±2.89▪	26.80 ±2.66**	28.46 ±2.27▪	29.60 ±2.88▪	27.16 ±2.05**
Serum Alkaline Phosphatase (IU/L)	93.81 ±6.46	93.12 ±6.35▪	97.67 ±5.12▪	102.86 ±5.76**	97.62 ±6.70▪	103.78 ±7.37**

**P< 0.01(significant) and ▪P< not being 0.05

Table-8. Effect of Unani coded drug UNIM-902 on the level of the haemoglobin, E.S.R., R.B.C. counts, total leucocytes count (T.L.C.) and differential leucocytes count (D.L.C.) in hypertension patients.

Parameter → Group ↓	Haemo Globin (gm %)	E.S.R. Mm/hr	R.B.C. (10^6/ mm^3)	T.L.C. (10^3/ mm^3)	Differential leucocytes count (DLC)		
					Poly-morphs (%)	Lympho-cyte (%)	Eosino-phils (%)
Pre-treatment	12.51 ± 0.67	24.05 ± 3.76	3.95 ± 0.07	6.15 ± 0.26	68.10 ± 1.68	28.48 ± 1.54	3.24 ± 0.42
After-treatment (180th days)	12.14 ±0.14▪	20.71 ± 1.59**	3.89 ± 0.07▪	5.53 ±0.26**	67.14 ±1.55▪	29.80 ±1.64▪	3.38 ±0.43▪

**P< 0.01(significant) and ▪P< not being 0.05

Haematological Study

In haematological studies the Unani coded drug UNIM-902 significantly reduced erythrocyte sedimentation rate (ESR) (14.0 %) ($P<0.01$), total leucocytes count (TLC) (10.0%) ($P< 0.01$) when compared with pre-treatment to the after treatment values (Table-8). Further investigations are required to find out the mechanism. In conclusions, the present study indicates that Unani coded drug UNIM-902 exhibited hypolipidemic activity in hypertension patients.

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Pharmacognostic Studies on the Rhizome of *Nardostachys grandiflora* DC.

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Abstract

Pharmacognostic studies on the rhizomes of *Nardostachys grandiflora* DC. has been carried out to lay down standards for the genuine drug. The diagnostic characters of dried rhizomes in microscopy are intact stele and interxylary cork forming concentric cylinders comprising vascular strands. Other parameters studied include physico-chemical constants, fluorescence behaviour, UV Spectrophotometry and Chromatography etc.

Keywords: *Nardostachys grandiflora* DC., Pharmacognosy, Drug Standardization.

Introduction

Nardostachys grandiflora DC. Syn. *N. jatamansi* auct. (Family - Valerianceae) has been held in great esteem as 'jatamansi' in Ayurveda and Sumbul-ut-Teeb in Unani System of Medicines. It is an official drug of Ayurveda, Unani and Indian Pharmacopoeia. The Jatamansi title of the drug is based on the external appearance of drug mentioned in the Ayurvedic treatises viz. Chark, Sushurta, Bhav Prakash, Vag Bhatta etc. It is an indigenous drug which has been mentioned by Dioscorides in his work. In modern medicine 'jatamansi' is treated as a good substitute for 'Valarian' (*Valeriana officinalis* Linn.). The drug is often adulterated with *Selinum vaginatum* of the family Umbelliferae (Watt, 1889-93; Srivastava, 1954; Mehra and Jolly, 1963; Anonymous, 1966, 1978; Chunekar, 1972; Anonymous, 1981). *Nardostachys grandiflora* DC. It is used as antiseptic , appetiser, aromatic, carminative, deobstruent, diuretic, emmenagogue, expectorant, nervine tonic, sedative to spinal cord, stimulant, tonic, tranquilizer and vermifuge. It is indicated in high blood pressure, cold and cough, colic, diabetes, diarrhoea, digestive and respiratory disorders, dysmenorrhoea, epilepsy, erysipelas, leprosy, nervous excitement and palpitation of heart (Kirtikar and Basu, 1933; Dymock *et al*., 1890-99; Anonymous, 1966).

Methodology

Drug samples were collected from different places with a view to find out any significant difference present within the same species. Hand cut sections of the rhizome were stained and mounted in Canada balsam for anatomical studies. Lignifications on smoothed cross-surface were studied with phloroglucinol-HCl. For studying powder, Jackson and Snowdon (1968) was followed. To determine physico-chemical constants, Indian Pharmacopoeia (Anonymous, 1966) was consulted and for fluorescence study schedules mentioned by Trease and Evans (1972) were followed. Colours were named by consulting Rayner (1970). Standard prescribed procedures for histochemical studies (Johanson, 1940; Youngken, 1951; Cromwell, 1955; Trease and Evans, 1978), organic group detection (Robinson, 1963), Elemental

quantitation (Khan *et al*., 1985), U.V. Spectrophotometry (Willard *et al*., 1965) and Chromatography (Shellard, 1968; Stahl, 1969; Smith and Feinberg, 1972) were adopted.

Systematics

Family: Valerianceae Batsch. Endl. Gen. 350, Lindl. Veg. Kingd. 697, Dufresne, Hist. Valer. 1811, DC. Mem. Valr. 1832, Gen. Pl. II: 151. FBI 3:204.

The family is spreaded over 13 genera and 400 species in Europe, Asia, Africa and America. In India family represented by 4 genera and 18 species which are confined between 1,320 m and 5,610 m in the Himalaya except 3 species that are endemic to mountains of Southern India.

Genus: – *Nardostachys* DC. Mem. Valer. 4t. 1,2; Prod. iv. 624, Gen. Pl. II: 153, FBI 3: 210.

The genus comprises two species. The Indian species is restricted in distribution in Himalaya.

N. jatamansi DC. Mem Valer. 7, t, Prodr. IV, 624, Royle III. 242-244, T 54, FBI 3: 211, Cat. Pl. Kum. 84.

N. *grandiflora* DC.

The plant is an erect perennial herb with a very distinctive and lingering smell. Rhizome long, stout, covered with fibers form the petioles of withered leaves. Stem more or less pubescent upward often glabrous below. Radical leaves elliptic, lanceolate or spathulate, glabrous or slightly pubescent narrowed into the petiole and longitudinally nerved.Cauline leaves 1 of 2 pairs long, sessile, oblong and subovate. Flowers in dense, heads borne in terminal, purple to whitish usually 1, 3 or 5 with pubscent bracts. Calyx coloured, 5 lobed, the lobes enlarging in fruit and becoming parpery. Corolla 5 in rounded lobes, somewhat hairy within as are the filaments below. Fruits obovate, flattened covered with ascending white hairs, crowned by the denata calyx teeth seeded, seed obovate and compressed (Figure 1).

Flowering and Fruiting: August - September, *Fruiting:* February - March.

Distribution: It is distributed in the alpine Himalayas belt at 11,000 to 15,000 ft. a.m.s.l. eastwards from Kumaon to Sikkim (Chopra *et al*., 1958; Anonymous, 1966a).

Observations

I. Organoleptic Characteristics

A. The drug consists of dried rhizomes which are brown in colour. The rhizomes are cylindrical and covered with brown fibers. The fibers are skeleton of leaf bases

Figure-1. Habit and Taxonomic Details of Drug Plant (*Nardostachys grandiflora* DC.). 1. Habit of plant, 2. Ovary in longitudinal section, 3. Fruit, 4. Stamen, 5. Corolla, 6. Corolla in longitudinal cut.

which are matted together forming a net which provide an appearance of tail of sable. The remains of older leaves are almost spitted into fibers. The rhizome is completely encircled by these fibrous remains of leaf bases which arise at the nodes of rhizome. The rhizomes are 5.0-12.0 cm long and 1.0-2.5 cm in diameter including the fibres. The scars or remains of adventitious roots are present on

rhizomes which are hidden by fibres. The naked rhizome has rough surface showing annulated nodes, scars of leaf bases, aerial shoots and adventitious roots. Rhizomes are sometimes dichotomously and laterally branched (Figure 2). It is easily breakable and fracture is splitting. It is strongly aromatic in odour and acrid in taste.

B. *Powdered Drug:* The powdered drug is dark brown in colour with strong aromatic odour and acrid taste.

II. Micro-morphological Charateristics

A. Transverse section of rhizome shows circular outline (Figure 3). The outer most tissue phellem, is composed of five to twelve layered somewhat irregular arranged quadrangular to polygonal suberised cells. Most of the cells of phellem are filled with yellowish globules of volatile oil. The phellem is followed by one to two layers of phellogen. The cells of phellogen consist of thin walled, tangentially elongated, rectangular to polyhedral cells (Figure 4A). The phelloderm is wide zone composed of about fifteen to twenty-five layers of thin walled circular to oval parenchymatous cells with conspicuous intercellular spaces and large number of schizo-lysogenous cavities in the middle region. The phelloderm region also consists of oleoresin cells which are bigger in size than the other cells of this (Figure 4B). Vascular bundles are open and collateral consisting of xylem and phloem tissues. Phloem comprise mainly of phloem parenchyma with small patches of sieve elements with companion cells. The fascicular cambium is continuous with interfasicular cambium and consist one to three layers of small rectangular parenchymatous cells. The xylem region consists of xylem parenchyma and vessels which are found scattered single or in radial rows of two to four elements (Figure 4C). The vessels are short showing scalarifoem, spiral and reticulate thickening on their walls and simple perforations.

Figure-2. *Nardostachys grandiflora* DC. – Macroscopical Feature of Drug (Dried Rhizome).

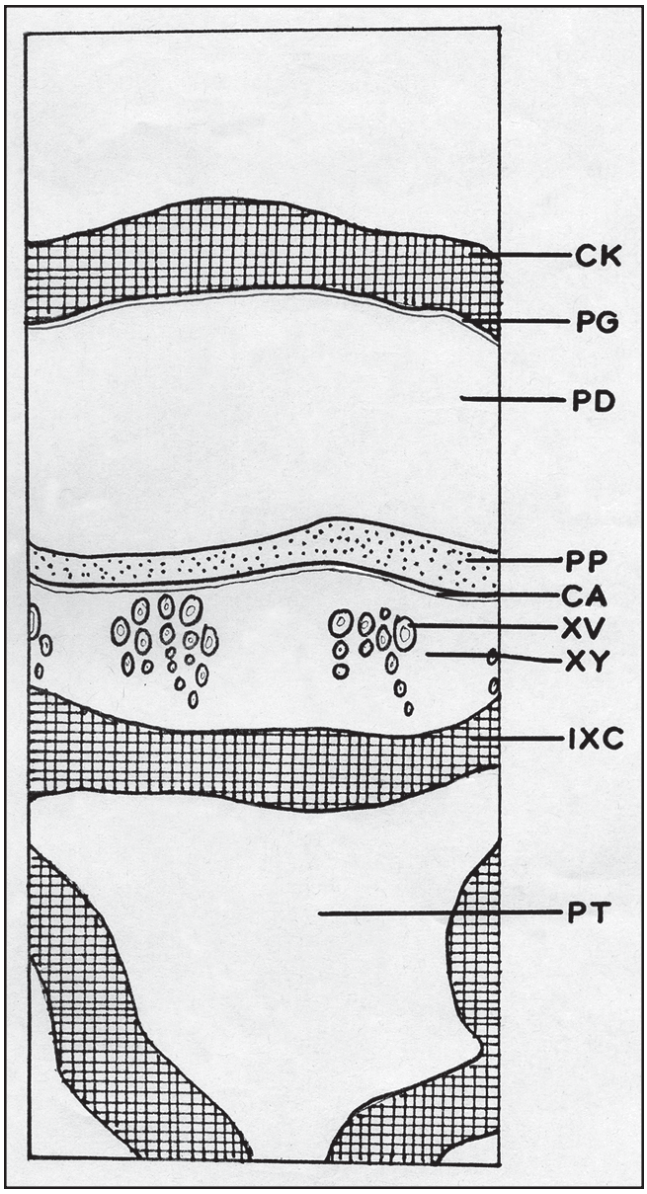

Figure-3. Diagrammatic Representation of Transection of Drug (Dried Rhizome of *Nardostachys grandiflora* DC.) 25 X

Abbreviations: CA-Cambium, CK-Phellem, IXC-Interxylary cork, PD-Phelloderm, PG-Phellogen, PP-Secondary Phloem, PT-Pith, XV-Xylem vessels, XY-Secondary Xylem.

The xylem region is followed by interxylary cork which is formed due to meristemisation of parenchymatous cells in the inner zone of xylem (Figure 4D). The interxylary cork forms a continuous flutted concentric ring which is compressed at various places on the periphery and appears as angular ring. The cells of interxylary cork are five to twelve layered radially elongated suberised and contain oil globules. In the more matured rhizome, the peripheral cells of the interxylary cork situated at the angular portions approach towards the innermost, layers of the

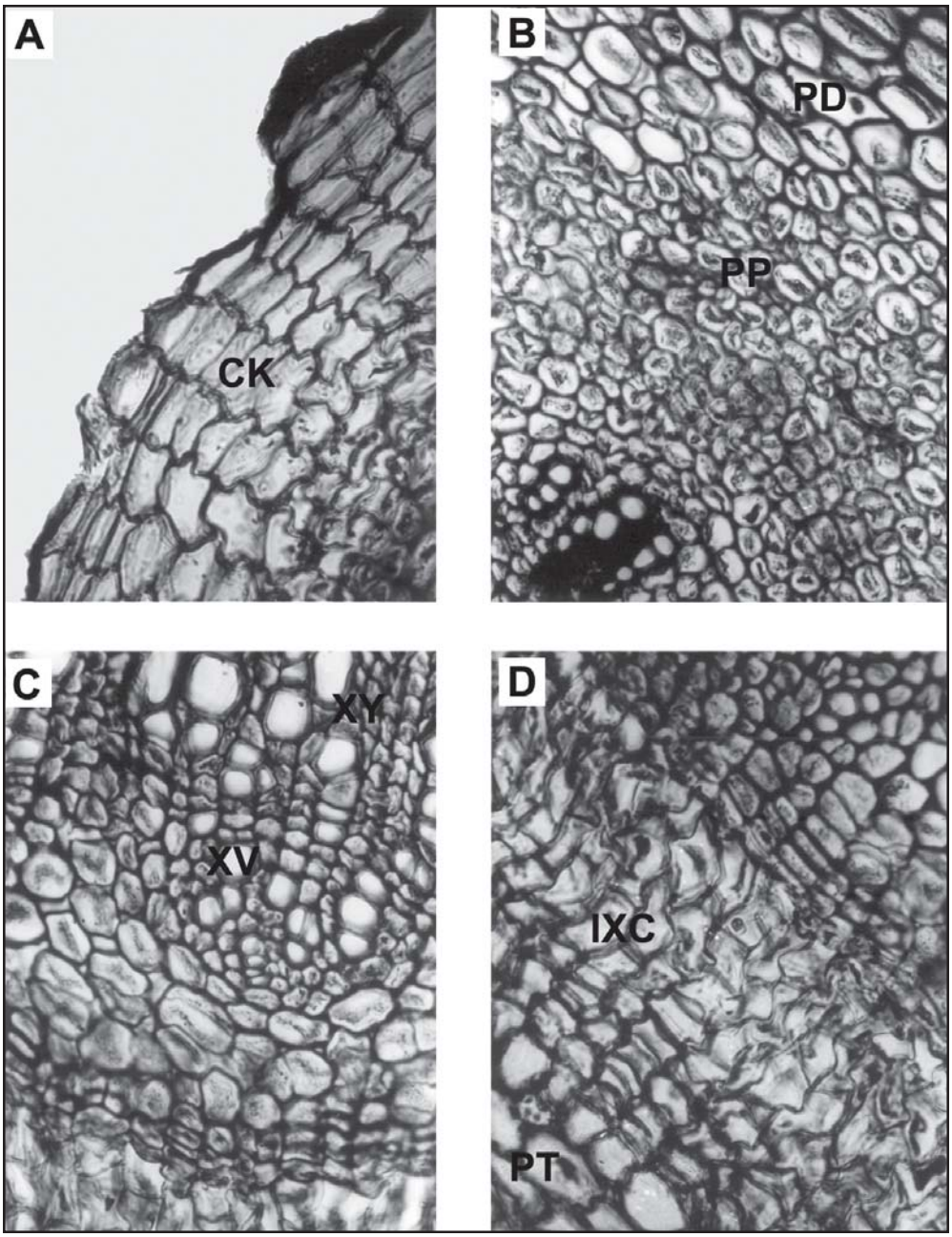

Figure-4. Photomicrographs of Transection of Drug (Dried Rhizome of *Nardostachys grandiflora* DC.).

A. Phellem, 1200 X.
B. Phelloderm and Secondary phloem, 1200 X.
C. Secondary xylem, 1200 X.
D. Interxylary cork and pith, 1200X.

Abbreviations: CK-Phellem, IXC-Interxylary cork, PD-Phelloderm, PP-Secondary Phloem, PT-Pith, XV-Xylem vessels, XY-Secondary xylem.

phellem of periderm encroaching the phelloderm. It resulted the fusion of interxylary cork with phellem and formation of five to six separate concentric cylinders. Each of the concentric cylinders in encircled by four to eight layers of amalgamated interxylary cork and phellem consisting of phelloderm and functional groups of phloem. Cambium and xylem tissues. In the more matured rhizomes more interxylary cork ring formation are found which takes place external to previously existing interxylary cork. These interxylary cork further inner connected and form several new concentric cylinders in rhizome. The medullary rays are collapsed due to the activity of interxylary cork during the formation of concentric cylinders. The rhizome in the centre is occupied by the large portion of parenchymatous pith cells but in the matured rhizome pith cells are mostly decayed and a hollow cavity is formed in the centre.

Microscopical measurements of individual cells of different tissues and cells contents in microns are given below (Table 1).

B. *Powdered Drug:* The powdered drug is composed of frequent fragments of phellem comprising thick walled cells containing yellowish oil globules, abundant thin walled parenchymatous cells of phelloderm and pith, occasional parenchymatous cells of phloem with small patches of sieve elements and fairly numerous fragments of interexlary cork. Vessels are fairly present and are usually fragmented. These are single or in small groups or associated with parenchymatous cells and have scalariform spiral or reticulate thickening.

III. Histochemistry

A. *Micro-Chemical Tests and Behaviour of specific reagents towards Plant/Drug Tissues:* Observations and results pertaining to micro-chemical tests and behaviour of specific reagent towards plant tissues are presented in Table-2.

Table-1. Dimensional data of Cellular elements in transactions and cell contents.

Sl.No.	Cellular Elements/Cell Contents	Measurements in microns
1.	Phellem cells	22.5-45.0x4.5-22.5
2.	Phellogen cells	12.0-38.6x2.5-17.8
3.	Phelloderm cells	27.0-46.2x13.5-28.5
4.	Phloem parenchyma cells	9.0-13.5x4.5-9.2
5.	Cambium cells	7.0-10.0x5.0-13.5
6.	Xylem vessels	9.0-45.0x13.5-32.5
7.	Interxylary cork cells	18.0-55.0x13.6-26.5
8.	Pith cells	36.0-63.8x54.2-22.5

Table-2. Micro-chemical Tests and behaviour of specific reagents towards plant tissues and cells contents.

Sl. No.	Reagent	Test for	Inference	Histological zone/ cell contents responded
1.	Dragendorff's reagent	Alkaloid	-	Not responded
2.	Marme's reagent	Alkaloid	-	Not responded
3.	Wagner's reagent	Alkaloid	-	Not responded
4.	Potassium hydroxide solution (5% w/v)	Anthocynin	-	Not responded
5.	Sulphuric acid (66% v/v)	Anthocynin	-	Not responded
6.	Acetic acid	Calcium oxalate	-	Not responded
7.	Potassium hydroxide solution (5% v/v) + Hydrochloric acid	Calcium oxalate	-	Not responded
8.	Sulphuric acid	Calcium oxalate	-	Not responded
9.	Kedde reagent	Cardiac glycoside	-	Not responded
10.	Iodine Solution followed by Sulphuric acid	Cellulose	+	All the parenchy-matous cells of phelloderm, phloem and pith
11.	Sudan III	Fixed oil and fats	-	Not Responded
12.	Chlor-zinc-Iodine Solution	Latex	-	Not Responded
13.	Aniline sulphate Solution followed by Sulphuric acid	Lignin	+	Few cells of phellem, phloem and xylem vessels
14.	Phloroglucinol HCl	Lignin	+	Same as above
15.	Lugol's solution	Protein	+	Cells of phelloderm, phloem and xylem
16.	Millon's reagent	Protein	+	Same as above
17.	Picric acid	Protein	+	Same as above
18.	Heating with KOH (5% w/v) + H_2SO_4	Suberin	+	Most of the cells of phellem and interxylary cork
19.	Sudan III	Suberin	+	Same as above
20.	Weak Iodine solution	Starch	-	Not Responded
21.	Potassium hydroxide solution (5% w/v)	Starch	-	Not Responded
22.	Sulphuric acid	Starch	-	Not Responded

Indications: '-' Absence and '+' presence of constituent.

B. *Organic Groups of Chemical Constituents:* The extracts of the drug were tested for presence of different organic groups and results are presented in Table-3.

IV. Identity, Purity & Strength

A. *Physico-Chemical Constants:* The analytical values in respect of physico-chemical constant of drug were established and results are reported in Table-4.

Table-3. Major Group of Organic Chemical Constituents of Drug.

Sl. No.	Organic Groups of Chemical Constituents	Reagents/Tests	Inference
1.	Alkaloid	Dragendorff's and Mayer's reagents	-
2.	Anthraquinone	Borntrager reaction	+
3.	Coumarin	Alcoholic potassium hydroxide	+
4.	Flavonoid	Shinoda reaction	+
5.	Glycoside	Mollisch's test	-
6.	Protein	Xanthoprotein test	+
7.	Resin	Ferric chloride regent	+
8.	Saponin	Libermann-Burchard reaction	-
9.	Steroid	Salkowski reaction	+
10.	Tannin	Gelation test	-

Table-4. Analytical Values of Physico-chemical Constants

Sl.No.	Physico-Chemical Constants	Analytical values
1.	Moisture content, % w/w	8.0
2.	pH	5.9
3.	Crude fibre, % w/w	16.1
4.	Total Ash, % w/w	10.4
5.	Acid insoluble ash, % w/w	5.7
6.	Alcohol soluble extractive % w/w	3.2
7.	Water soluble extractive % w/w	4.5
8.	Glycosides, % w/w	-

B. *Medicinal Inorganic Elements:* The quantitative data in respect of medicinal inorganic elements detected in drug are presented in Table-5.

V. Fluorescence & Spectroscopy

A. *Fluorescence Characteristic of Powdered drug under Ultra-Violet Light:* Powdered drug was screened for fluorescence characteristic with or without chemical treatment. The observations pertaining to their colour in daylight and under ultra-violet light were noticed and are presented in Table - 6.

B. *Ultra-Violet Spectroscopy:* The data related to Ultra-Violet Spectrophotometric characteristics as computed in Table-7.

VI. Chromatography

A. *Paper Chromatography:* The amino acids and free sugars were resoluted and detected by paper chromatographic techniques. The comparison of R_f values of reference standards of different amino acids and free sugars confirms the presence of –

(i) Amino Acids – DL-2-Amino-n-butyric acid, DL-Aspartic acid and DL- 3:4-Dihydroxyphenyl-alanine.
(ii) Free Sugars –D-Galactose, Raffinose and Sucrose.

B. *Thin-Layer Chromatography:* Best separation for TLC fingerprinting were obtained by using different layers and solvent systems. Inferences are shown in Table-8.

Table-5. Quantitative estimation of Medicinal Inorganic Elements.

Sl. No.	Physico-Chemical Constants	Analytical values Mg/g of ash
1.	Cadmium	0.0069
2.	Calcium	3.6110
3.	Copper	0.3720
4.	Iron	1.1191
5.	Magnesium	0.8912
6.	Manganese	0.0320
7.	Nickle	0.3910
8.	Potassium	11.0211
9.	Sodium	58.5700
10.	Zinc	0.1042

Table-6. Fluorescence Characteristic of Powdered Drug under Ultra-Violet Light.

Sl. No.	Treatments	Colour in day light	Nature of colour in fluorescence
1.	Powder as such	Dark Brown	Brown
2.	Powder with		
	Carbon tetra - chloride	Brown	Black
	Ethyl acetate	Light Yellow	Yellowish brown
	Hydrochloric acid	Golden Yellow	Greenish yellow
	Nitric acid + water	Deep Golden Yellow	Greenish yellow
	Sodium hydroxide + methanol	Golden Yellow	Yellow
	Sodium hydroxide + water	Light Golden Yellow	Greenish yellow
	Sulphuric acid + water	Yellowish	Yellow
	Buffer- pH 5	Colourless	Yellow tinge
	Buffer- pH 7	Light Brown	Brown
	Buffer- pH 9	Buff	Light greenish yellow

Table-7. Ultra-Violet Spectrophotometer characteristic of drugs.

Sl.No.	Specifications	Data
1.	Tincture dilution ml/ml	0.0046
2.	Maximum absorption peak	1.708, 1.679,0.858
3.	I Maxima at, nm	211, 224, 278

Table-8. TLC fingerprinting data

Sl.No.	Technical details	I	II
1.	Layer	Silica gel GF,	Silica gel GF
2.	Solvent system	Benzene acetone (9:1, v/v)	Benzene –ethyl acetate (4:1, v/v)
3.	No. of spots	08	07
4.	h Rf. Values of visualized spots	9.8,39.2, 46.0, 59.0, 69.0, 79.1, 84.2 and 93.0	7.5,13.3,35.0, 40.8, 72.5,79.2 and 91.7

Discussion

The pharmacognostical details of the *Nardostachys grandiflora* DC are provided by Datta and Mukherjee (1950), Mukherjee (1953), Anonymous (1955) and Mehra and Garg (1962). But all the finding of previous workers except those of Mehra and Garg (1962) are contradictory. It appears that Datta and Mukherjee (1950) did not describe the authentic *Nardostachys grandiflora* DC. but have described some other material which is letter on confirmed by Mehra and Jolly (1963) as *Selinum vaginatum* C.B. Clarke. The same descriptions have also been reproduce by Mukherjee (1953) and Anonymous (1955) in their respective works. The observation made by Mehra and Garg (1962) are in agreement with the present studies, but the details of the cellular elements are lacking in their work.

Acknowledgement

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Microscopic Characteristics of Some Herbal Drugs for their Identification in Powdered Formulations (*Sufoof*) of Unani Classical Medicines

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Abstract

Sufoof – the fine powdered forms of classical compound formulations are the herbal preparations made up of plant, animal and mineral origin drugs and used against number of health disorders in Unani System of Medicine. However, the issue of quality, safety and efficacy of these formulations remain always of great concern while considering the genuineness and presence or absence of ingredients in them. Though there are various standard pharmacognostic and chemical methods for checking the identity and quality of ingredients included in the herbal formulations, but the microscopic examination is one of the simple and inexpensive methods of quality testing useful for confirming the genuineness and presence of plant ingredients in the powdered herbal preparations. The present communication highlights diagnostic powder microscopic characters of some herbal drugs used in *Sufoof* formulations which can be a useful guide for checking the genuineness and presence absence of these ingredients in the above unani formulations.

Keywords: Herbal drug, powder microscopy, quality control, *Sufoof*

Introduction

Plant species belonging to similar or different genera and families of plants, exhibit some common and distinct morphological and histological characters. Distinct microscopic characters serve as diagnostic key for their identification. Further, the types of tissues/ergastic contents and their characteristic organization/presence or absence in different plants/plant parts also vary considerably and useful for their identification. As most of the herbal drug preparations are mainly made up of plant ingredients, this characteristic organization/presence or absence of tissue and ergastic contents play a key role in checking the identity of these ingredient and genuineness of compound herbal formulations.

Sufoof – the fine powder forms of classical compound formulations are herbal preparations made of plant, animal and mineral origin drugs used against number of health disorders in Unani System of Medicine. However, the quality, safety and efficacy of these preparations remain always an issue of great concern while considering the genuineness and presence or absence of ingredients in them. There are various standard pharmacognostic (macro/microscopic evaluation) and chemical methods (TLC, HPTLC) of quality testing of herbal preparations and identification of ingredients and each has its own significance. Though, the chemical methods, such as TLC are frequently used for identification of many plant materials in the formulations, but the microscopic evaluation of powdered herbal preparations have its own advantage over chemical methods, in checking the presence or absence of plant ingredients in these formulations in addition to confirming their identification.

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The microscopic examination of herbal drugs is a simple and inexpensive method of quality testing parameter and it truly helps in establishing the presence of absence of plant ingredients in the compound formulations. By microscopical examination it is possible to detect all the ingredients from the typical characteristics. For example *Piper longum* fruit can be distinguish from that of *P. chebula* by the presence of a flattened orange-red seed coat and by the absence of peripheral small brachysclereids, large endocarpal brachysclereids, elongated seed coat cells etc. it can be distinguished from the *P. nigrum* by the absence of several layers of peripheral brachysclereids, asymmetrically thickened endocarp sclereids, followed by several flattened cell-layers, yellow pigment cells in kernel. By microscopic method one can also detect any deviation from the official formulation and not declared on the label.

The present communication provide diagnostic powder microscopic characteristics of some most commonly used plant ingredients/drugs in *Sufoof* formulations viz. Kishniz, Hulba, Badiyan, Filfil Siyah, Filfil Daraz, Zanjabeel, Zard Chob, Amla, Halela and Jamun (Figure 1, 2) and it is hoped that present studies can be used as guide for identification of these drugs as well as checking their presence in compound *Sufoof* formulations.

Figure 1. Dried drugs. Scale = 1cm

Figure 2. Dried drugs. Scale = 1cm

Material and Methods

The plant material of the drugs selected for present study (Table 1) was procured from the market of Khari Baoli, Delhi, India and authenticated by complying the macroscopical characteristics of these drugs with that of standard reference drug samples available in the museum-cum-herbarium of the Pharmacopoeial Laboratory for Indian Medicine, Ghaziabad, India. To study the powder microscopy, the drugs were first washed under running tap water to remove any dust or soil particles and then air dried for few days at room temperature or in shade. The dried drugs were then powered and pass through 120 µm sieve. The fine powder obtained through sieve 120 µm was then subjected to various histo-chemical tests and the temporary mounts of powder prepared and observed under light microscope (Johansen, 1940; Youngken, 1951). The voucher specimens for the drugs studied have been deposited in the herbarium-cum-museum of Pharmacopoeial Laboratory for Indian Medicine, Ghaziabad, India.

Results

The powder microscopy of herbal drugs selected for present study (Table-1) was carried out and the characteristics cellular elements and ergastic contents observed in these drugs are listed in Table 2, which can serve as diagnostic key for the identification of these drugs in *Sufoof* formulations.

Table-1. Plant drugs used in Sufoof formulations

S. No.	Drug Name	Botanical Name & Family	Part Used	Important Sufoof Formulations (Anoymous, 1981)
1.	Kishniz	*Coriandrum sativum* L. Family : Apiaceae	Fruit	Sufoof-e-Kishneez Zuroo-e-Gaozaban
2.	Hulba	*Trigonella-foenum-graecum* L. Family : Apiaceae	Fruit	—
3.	Badiyan	*Foeniculum vulgare* Mill. Family : Apiaceae	Fruit	Sufoof-e-Tabkheer
4.	Filfil Daraz	*Piper longum* L. Family : Piperaceae	Fruit	Sufoof-e-Hazim Kalan Sufoof-e-Qaranful
5.	Filfil Siyah	*Piper nigrum* L. Family : Piperaceae	Fruit	Sufoof Chutki Sufoof-e-Hazim Sufoof-e-Mus-hil Sunoon-e-Mukhrij-e-Rutubat Sunoon-e -Mustahkam-e-Dandan
6.	Zanjabeel	*Zingiber officinale* Rosc. Family : Zingiberaceae	Rhizome	Sufoof-e-Mus-hil
7.	Zard Chob	*Curcuma longa* L. Family : Zingiberaceae	Rhizome	Sunoon-e-Zard
8.	Amla	*Emblica officinalis* Gaertn. Family : Euphorbaceae	Pericarp	Sufoof-e-Amla
9.	Halela	*Terminalia chebula* Retz. Family : Combretaceae	Pericarp	Sufoof Chutki Sufoof-e-Muqliyasa
10.	Jamun	*Syzygium cumini* (L.) Skeels. Family : Myrtaceae	Seed	—

Conclusion

Although chemical methods of quality testing such as TLC, HPTLC are frequently used for detecting and identifying most of plant materials in the herbal preparations, but the microscopic evaluation method of confirming the presence or absence of the drugs of plant origin in the compound formulations has advantage over chemical

Table-2. Diagnostic powder microscopic characteristics of some herbal drugs used in Sufoof formulations

S. No.	Botanical Name	Diagnostic Characters		
		Cellular elements	Ergastic Contents	
			Starch Grains	Calcium Oxalate Crystals
1.	*Coriandrum sativum* L.	– Fragment of polygonal epicarp cells in surface view with stoma and calcium oxalate prisms in some of the cells – Groups of fusiform and rectangular sclereids from mesocarp with underlying endocarp cells in surface view – Fragments of thick-walled, polygonal endosperm cells containing microrosette crystals of calcium oxalate – Fragments of vittae	–	Microrosette, Prismatic
2.	*Trigonella foenum-graecum* L.	– Fragments of thick-walled, polygonal cells of testa in surface view – Palisade-like cells from seed coat in surface view – Bearer cells in surface view – Fragments of endosperm cells in surface view – Fragments of cotyledons in transectional view	–	–
3.	*Foeniculum vulgare* Mill.	– Epicarp cells in surface view alongwith stoma and calcium oxalate prism in some of the cells – Rectangular sclereids from mesocarp – Fragments of thick-walled endosperm cells containing microrosette crystals of calcium oxalate	–	Prismatic & microrosette

Table-2. *(contd.)*

S. No.	Botanical Name	Diagnostic Characters		
		Cellular elements	Ergastic Contents	
			Starch Grains	Calcium Oxalate Crystals
		– Testa in surface view – Reticulate parenchyma from mesocarp – Vessel with reticulate thickenings – Fragments of a vittae with overlying thick-walled cells of mesocarp in surface view		
4.	*Piper longum* L.	– Sclereids from mesocarp with adhering epicarp containing pigment and calcium oxalate crystals in surface view – Perisperm cells densely packed with masses of starch granules – Spindle-shaped stone cells with wide lumen – Cells of the endocarp in surface view with underlying pigment layer and hyaline layer of testa – Endosperm cells	Simple and compound having 2-7 components, round to oval, measuring 3-14 µm in diameter	Prismatic
5.	*Piper nigrum* L.	– Epicarp cells in surface view containing pigment and calcium oxalate crystals – Polygonal cells of endocarp with associated pigment layer of testa in surface view – Perisperm cells containing starch granules and oil cells – Isodiametric or squarish, thick-walled stone cells from testa	Oval to round, 5-11 µm	Small prismatic

Table-2. *(contd.)*

S. No.	Botanical Name	Diagnostic Characters		
		Cellular elements	Ergastic Contents	
			Starch Grains	Calcium Oxalate Crystals
6.	*Zingiber officinale* Rosc.	– Abundant simple, ovoid starch grains – Fragment of parenchyma with adherent oleo-resin cells – Vessels with reticulate thickenings – Long septate fibers with dentate walls	Oval to elliptical, crescent-shaped, simple or 2-3 compound with distinct hilum, measuring 5-25 µm	–
7.	*Curcuma longa* L.	– Fragments of pale brown cork cells in surface view – Parenchymatous cells filled with starch and yellow colouring matter – Large vessels with spiral and scalariform thickenings – Simple, oval to oblong starch grains – Polygonal or elongated epidermal cells with stomata and a cicatrices in surface view	Simple, oval to oblong, 4-15 µm in diameter	–
8.	*Emblica officinalis* Gaertn.	– Fragments of polygonal epicarp cells with silica bodies in surface view – Fragments of parenchyma with corner thickenings – Small stone cells – Minute crystals of calcium oxalate – Simple starch grains, oval or rounded, measuring 7-28 µm in diameter	Simple, oval, rounded & 7-28 µm in diameter	Minute Prismatic

Table-2. *(contd.)*

S. No.	Botanical Name	Diagnostic Characters		
		Cellular elements	Ergastic Contents	
			Starch Grains	Calcium Oxalate Crystals
9.	*Terminalia chebula* Retz.	– Fragments of thick-walled epicarp cells in surface view with beaded walls – Parenchyma cells containing starch grains – Thin cross walls, long fibers with blunt or pegged tips – Stone cells – Crystals of calcium oxalate	Simple, rounded or oval, 2-7 µ in diameter	Prismatic
10.	*Syzygium cumini* (L.) Skeels.	– Fragments of parenchymatous cells – Endocarp cells – Fragments of polygonal endosperm cells – Stone cells – Simple, oval or rounded starch grains measuring 7-28 µm in diameter	Simple, oval or rounded, 7-28 µm in diameter	

methods as the later is simple and inexpensive. In addition, the microscopic evaluation of herbal preparation is also helpful to detect any deviation from the official formulation and not declared on the label.

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Potent Herbal Materials in Manufacturing of Unani Drugs

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Abstract

Plants as basic raw material are predominantly used in the preparation of traditional medicine. Safety and efficiency of herbal preparations are directly depended on the quality of medicinal plant materials used in their formulations. A large number of factors and practices used to procure material, either collected from wild or cultivated, are mainly responsible for their efficacy. These factors and practices have been given full consideration and described in the literature of Unani System of Medicine. Such techniques have been reviewed and discussed with future strategy in this communication.

Key Words: Potent drugs, Herbal medicine, Raw material, Unani system of medicine.

Introduction

Despite remarkable progress in laboratory drug development at present, the earth's flora, minerals and fauna are still the most important source for potential drug (Kaul, 1997). The compound drugs of Unani medicine are mainly prepared with plant drugs besides of animal and mineral origin. During the centuries that have gone by, the metria medica of the indigenous system of medicine has been extensive and heterogeneous (Chopra et al., 1956). India officially recognizes over 3000 plant species for their medicinal values. It is generally estimated that over 6000 plants in India are used in traditional, folk, and herbal medicine (Dubey, 2004; Seth and Sharma, 2004). During the last few decades there is a renewal of interest in natural plant products as these are biologically more compatible with human system and comparatively less toxic than synthetic (Kaul, 1997). If the genuine and potent raw material to be used in a medicine and the stage by stage process of manufacturing are standardized, the final product namely, the compound drug can be expected to confirm to uniform standard and potent (Anonymous, 1981).

Since remote past it has been the practice that beside proper identification of the drug, several other factors like drug collection from specific region, method of collection, grading, drying, packing and storage as well as shelf life which keep and maintain the efficacy of raw materials along with characters of potent drug have been described (Ali, 1979; Anonymous, 1987, 1992, 1997, 2002; Azmi, 1995; Hasan, 1894; Ibn-e-Baitar, 1985; Ibn-e-Sina, 1882; Kabeeruddin, 2007; Kaul, 1997; Lateef, 2002; Najmulghani, 1914; Qasmi, 2002; Singh and Hashmi, 2003). Therefore, these factors have been reviewed and re-stressed here.

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Description

Proper identification of medicinal plants is highly essential because different plant species might have different constituents. The efficiency variation may be detected in similar species of different areas. Therefore, some medicinal plants of a specific geographical area are more potent than the same species of other areas. This matter has been pointed out in the literature (Ali, 1979; Hasan, 1894; Ibn-e-Baitar, 1985; Kabeeruddin, 2007; Qasmi, 2002). Some of these examples are Izkhar-e-Makki (*Cymbopogon jawarancusa* Schutt.), Sana-e-Makki (*Cassia angustifolia* Vahl.) and Mur-e-Makki (*Commiphora myrrha* (Nees) Engl.) of Macca; Chobchini (*Smilax china* L.), Darchini (*Cinnamomum zeylanicum* Blume) and Unnab (*Zizyphus jujuba* L.) of China; Asgand (*Withania somnifera* (L.) Dunal) of Nagor; Zafran (*Crocus sativus* L.) of Spain; Darmana Turki (*Artemesia meritima* L.) of Turkey and Kabab-e-Khandan (*Zanthoxylum alatum* Roxb.) of Sudan are more potent than of other areas. Moreover, Atrilal (*Ammi majus* L.) grown at Aligarh was found to have much less of xanthotoxin than grown at Jammu and Lucknow. Similarly, Sandal Safaid (*Santalum album* L.) and Sandal Surkh (*Pterocarpus santalinus* L.) of Mysore have more essential oil than same plant species growing in other parts of the country (Taiyab, 1989).

Plant drugs are either collected from wild sources or cultivated. Continuous illegal and unscientific labor-oriented collection from forest areas is causing depletion of medicinal plants. More than 150 plant species have been categorized as endangered. Therefore, scientists all over the world are encouraging cultivation of medicinal plants (Anonymous, 2002; Kaul, 1979). Underground parts are storage organs for the plants and accumulate active principles during summer months. Therefore, root and rhizomes of perennials are usually gathered after 2-3 years of growth. Generally, the roots of annual plants are not collected. This applies to majority of medicinal plants collected from the wild. However, in cultivation, the roots or rhizome are harvested as per requirement and presence of active constituents. Tubers, corns and bulbs are collected at the end of flowering or fruiting when the entire aerial portion shows signs of senescence. Leaves are gathered throughout the growing period. Young leaves are considered to be of highest quality as far as their active principle is concerned. Whole herb is collected with flower-bearing stems just before or at the beginning of the flowering stage. Flowers or whole inflorescence are gathered at the beginning of flowering period. Full bloom flowers are not suitable for drug market. Fruits and seeds are collected when mature. Bark is advised to collect either in spring, when the tree and shrubs begin to bud, or in autumn after they have shed their leaves. The flow of sap is to be considered maximum at these times and bark readily detaches from the wood (Hasan, 1894; Kaul, 1997; Najmulghani, 1914).

The matter does not end here, consequences of the conservation, in particular drying, grading, storage etc. play an important role in regard to efficacy of a drug. Most often the use of fresh plant is not possible. Plants contain a large amount of

water on an average, variation being in different parts of the plant. Removal of water below 10% is necessary to restrict enzyme reaction. Unless the enzymes are destroyed by a heat process or chemical degradation, the catabolic process will continue after the collection, leading to a breakdown of many important constituents particularly if the constituents are glycosides or esters. For example Sumbul-ut-teeb (*Valeriana officinalis*), which is often used as a sedative and tranquillizer, may loose activity if its active valiportriates disintegrate into inactive valtrate and free valerianic acid due to enzymatic action. Similarly, herbs containing volatile oil, may also be affected by incorrect drying and storage and alter the desired medicinal property (Taiyab, 1989).

The drug should be stored properly in dry and cool places taking every precaution to safe the material from insect, damage and moulds. The potency of drug plants is dependent upon processing procedures adopted after collection from the wild source and harvested from cultivated sources (Kaul, 1997). The container and its cover must not interact physically or chemically with the substance which it holds so as to alter the strength, quality or purity of the substance. If interaction is unavoidable, the alteration must not be so great as to bring the substance below formulary requirements. A tightly well closed container must protect the contents from contamination, moisture, extraneous solids, deliquescence or evaporation (Anonymous, 1981).

Shelf life is an important parameter for both single and compound drugs. It means that how much long time the drug maintain its potency. Flowers, leaves, fruits, shoot, root, stem bark, seeds and even the whole plant have medicinal value and different shelf life. The Unani physicians have described a general principle that a crude drug is said to be potent if the material maintain its physical appearance, color, smell, taste and weight (Azmi, 1995). On keen observation and experience, many workers have described the age of the different parts of the plant during which it may be used as a potent medicine. For example: the flowers maintain good quality within six month and after that they gradually loose their efficacy but may be use up to one year. Generally the shelf life of leaves, fruits, shoot and bark is one year but in some cases utilization of many fruits is recommended only during their season. Root and seeds are said to be use within one to two years. However, the roots of some plant species remain potent for many years. The age of resins and gums is two to three years while the shelf life of milky juice and oils varies from one to several years (Azmi, 1995; Latif, 2002; Qasmi, 2001).

The factors and practices used in the procurement of important Unani medicinal plants along with their shelf life as per good storage practices (GSP) have been reported (Anonymous, 1987, 1997, 2002; Singh and Hashmi, 2003). Some of them are given below:

Aamla (*Emblica officinalis* Gaertn): Best harvesting time of Aamla fruit is February when the fruits have maximum ascorbic acid content. Harvested fruits made into different grades depending up on the size. The shelf life of fruit is 1 year.

Asgand (*Withania somnifera* (L.) Dunal): Root is harvested during January to March at 150 to 180 days after sowing. The maturity of crop is judged by drying out of leaves and yellow red berries. The entire plant is uprooted for roots, which are separated from aerial parts by cutting the stem 1-2 cm above the crown. The roots are then either cut transversely into small pieces (7 to 10 cm) or dried as it in the sun. The dried roots have to be further cleaned, trimmed and graded. The shelf life of root is 1½ years.

Atees (*Aconitum heterophyllum* Wall. ex Royle): Harvesting of root is recommended after the completion of reproductive phase and maturation of seeds during October-November. After completion of reproductive phase at any altitude, plants become mature for harvest and yield good percentage of active content (Atisine). Plants raised from tuber cuttings completed their vegetative and reproductive phase within three years. The harvesting period for this species is 3-4 years. The shelf life of root is 2 years.

Asl-us-soos (*Glycyrrhiza glabra* L.): The crop is harvested in winter season i.e. November or December to obtain root of high glycyrrhizic acid. At harvest, the roots contain 50-60% moisture and should be dried in the Sun for 2-3 days and then in shade for next 10-12 days. The dry roots should possess not more than 10% water when they are ready to be stored in polythene-lined bags. The roots are cut into pieces of convenient size and sorted into grades, based on thickness. The shelf life of root is 2 years.

Filfil Daraz (*Piper longum* L.): The vines start bearing spikes six months of plantation. The spikes thus will be ready for harvest after two months since formation of spikes. When the spikes are fully grown but unripe, these are gathered. If left, they ripe and their pungency are lost to a great extent. Harvested spikes are repeatedly exposed in the Sun for 4-5 days until they are perfectly dry. The dried spikes have to be stored in moisture proof container. Thicker parts of lower stem and root are cut and dried. There are three grades of the root. The grade I consist of thick roots and underground stem marketed at higher price and potent than grade II & III, which comprises of their thin roots, stem or broken fragments. The shelf life of fruits and root is 2 years.

Asrol (*Rauvolfia serpentina* Benth.): Harvesting of root is done during early autumn season at about 18 months of age. At this stage, the root contains maximum concentration of total alkaloids and maximum root yield. After digging, the roots are cleaned, washed and cut into 12 to 15 cm pieces for convenience in drying and storage. The dried roots possess up to 8 to 10 percent of moisture. The dried roots are stored in polythene lined gunny bags in cool dry place to protect it from mould. The shelf life of root is 2 years.

Sana (*Cassia angustifolia* L.): Sana plant produces foliage containing higher sennosides between 50-90 days depending upon the total plant growth. A second picking is taken at 90-100 days and the third picking between 130-150 days when

the entire plants are removed so that harvested material includes both leaves and pods together. The harvested crop should be spread over open field area in a thin layer to reduce its moisture. Further drying is done in well ventilated drying sheds. It takes about 10-12 days to dry. The produce is baled under hydraulic pressure and wrapped in gunny bags. The shelf life of leave is 1½ years.

Satawar (*Asparagus racemosus* Willd.): The roots are harvested after 40 month in winter. The roots are dug-out, collected and cleaned. The roots are peeled off with the help of sharp knife immediately after harvesting. It is observed that in case the roots are not peeled off within a few days, it is a bit difficult to remove the skin as such. In such a condition the roots are kept in boiling water for about 10 minutes, followed by cold water treatment to facilitate peeling. After removing the skin, it is cut transversely into small pieces and dried in shade. The shelf life of root is 1½ years.

Baobarang (*Embelia ribes* Burm.f.): Harvesting is done after two years. Generally fruiting starts in August-September after 2 years of plantation and fruit rips during November to January. The fruits are collected, dried in shade and stored in clean porous Jute-bags. The shelf life of fruit is 2 years.

Discussion and Conclusion

Traditional herbal medicines have been increasingly used worldwide during the last few decades. Unfortunately, the number of reports of patients experiencing negative health consequences caused by the use of herbal medicine has also been increasing. Analysis and studies have revealed a variety of reasons for such problems. One of the major causes of reported adverse event is directly to quality of herbal medicines, including raw medicinal plant materials. It has therefore been recognized that insufficient attention has been paid to the quality assurance and control of herbal medicines (WHO, 2003). Proper collection and cultivation of medicinal plants and the following process of drying, grading, packaging, transportation and storage along with other factors should be well planned and scientific. As well as the drug should be fresh and incorporated within their shelf life. However, the work on these lines is in progress but needs special attention to take further steps to fix the scientific standard of all these factors for each and every drug and their shelf life on scientific basis.

The subject of good quality of traditional drug is massively wide and deep. It starts from the raw material to finished product. WHO has developed a series of technical guidelines relating to the quality control of traditional or herbal medicines such as good agricultural and collection practices (GACP) for medicinal plants, good manufacturing practices (GMP) for pharmaceutical products and herbal drug standardization for crude drugs material and finished product etc. (Schmidt et al., 2004; Shrikumar et al., 2006; WHO, 1996, 2003) should be followed in conjunction

with existing knowledge for quality assurance along with conservation and sustainable utilization of natural resources of medicinal plants.

For the promotion and acceptance of Unani medicine globally, there is an urgent need to prepare detail monograph on each and every medicinal plants and to fix Standard Operational Procedure (SOP) for the manufacturing of Unani drugs in the light of recent scientific studies along with their proper implementations. So, that the advantages of Unani System of Medicine with respect to their safety and efficacy might be utilized for the benefit of mankind.

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Medicinal Plants Diversity in the Amangarh Forests of Bijnor District, Uttar Pradesh

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Abstract

Based on an ethnobotanical survey, the present paper outlines the varied and rich medicinal plant wealth of Amangarh and adjacent forest areas of Social Forestry Division Bijnor, Uttar Pradesh. It also lists 41 plant species that are commonly used by the indigenous communities of the area as folk drugs for treatment of various diseases and conditions of humans and cattle.

Keywords: Ethnbotanical survey, Medicinal plants, Folk medicine, Amangarh, Bijnor, Uttar Pradesh.

Introduction

Amangarh forest range forms a part of Uttar Pradesh's Social Forestry Division Bijnor (29° 02¢-29° 58¢ N latitude and 77° 58¢- 78° 56¢ E longitude). It is spread over an area of 80 km^2 and situated in proximity to outer hill terrain of Garhwal (Fig. 1). Bordering the famed Corbett National Park, this range is seen as extension and important buffer to the Corbett Tiger Reserve of Uttarakhand. The entire area is plain intersected by many perennial as well as seasonal rivers and streams. Due to diversified topography, variable climatic and soil condition, the area is endowed with a variety of vegetation. The forests mainly consist of tropical moist and dry deciduous types. Generally, these are found in Tarai belt. There are numerous settlements of Vangujjars (a forest dwelling tribe) in Amangarh. Some other cultural groups like Ghosi, Nepali, Pahari and Rai Sikh are also found in and around this forest range.

In spite of rich flora and cultural diversity, no ethnobotanical survey has been previously conducted in the area. As far as ethnobotanical studies with regard to medicinal plants of Bijnor district are concerned the only attempts are those of Khan (2002), Maheshwari and Singh (1984). Therefore, the survey team of Regional Research Institute of Unani Medicine (RRIUM), Aligarh recently conducted an ethnobotanical survey in this region. The main objective of this field study, besides collecting folk medicinal claims prevalent among the indigenous communities, was to prepare an inventory of existing medicinal plants especially those used in Unani medicine. In this communication, medicinal plants occurring in Amangarh and its nearby place are listed. Besides, several species having ethnomedicinal importance in the area have also been brought to light.

Methodology

Fieldwork was carried out in October and November 2010. In order to collect information on availability and distribution of medicinal plants, extensive field surveys

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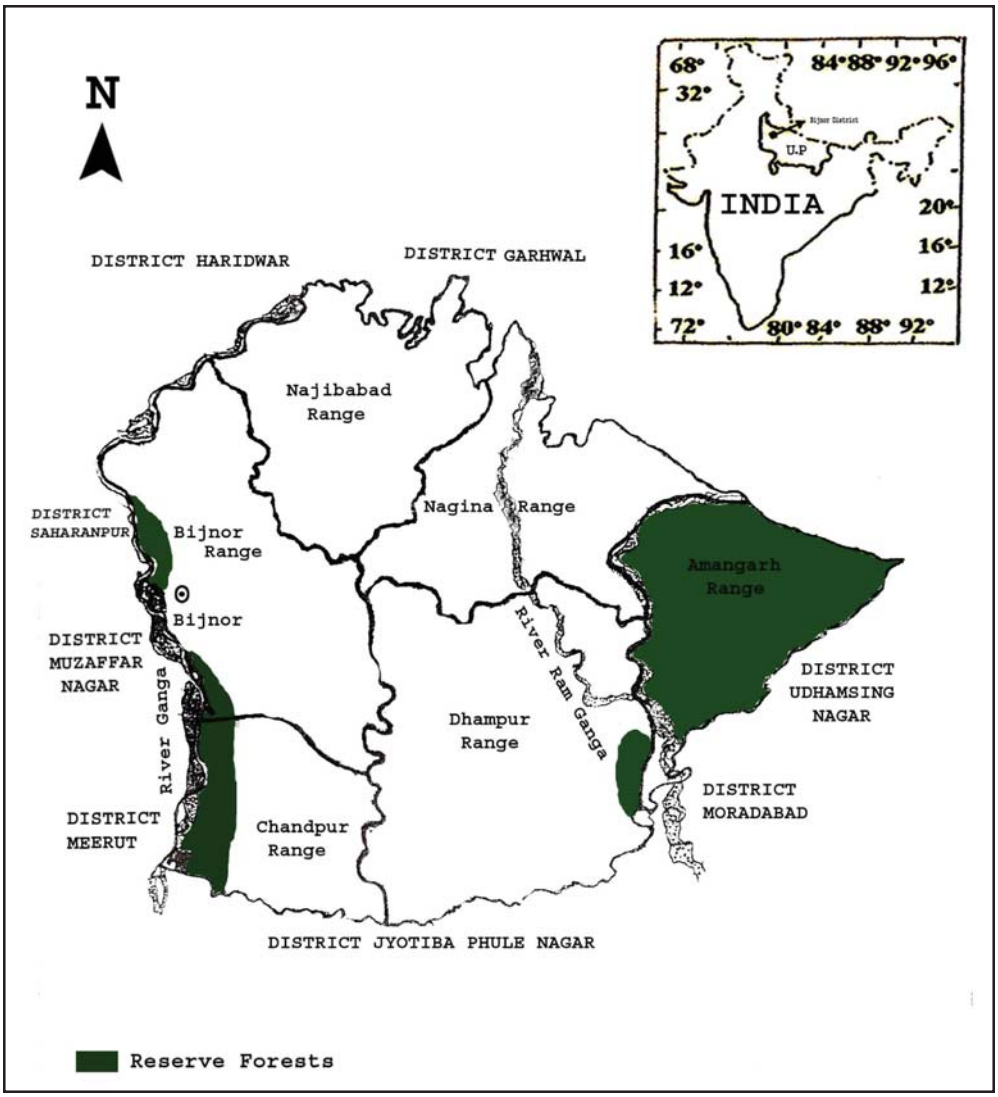

Figure 1. Map showing the area surveyed in District Bijnor, Uttar Pradesh.

were conducted in all the forests of the study area i.e. Amangarh, Makonia, Lalpuri, Rehar, Jaspur moja, Jhirna, Jhullo, Kothiro, Nabigarh, Nangal, Laldhang and Kheripur. Small patches of the reserve forests found in adjoining forest ranges of the division viz. Reni of Dhampur; Rawli, Jahanabad, Qadarpur Jaswant of Bijnor; Datiyana, Rehmanpur and Salempur of Chandpur were also explored.

In the course of fieldwork, a number of tribal settlements were visited and information on medicinal uses of local plants was collected from traditional healers and other elderly people through interviews. Data on the local name of the plant, medicinal use(s), part used, other ingredients added (if any), method of preparation, mode of administration were recorded for each claim. All the plants were identified with the help of the floras of Hooker (1872-1897), Duthie, (1903-1922) and Pant (1986). In some cases botanical identify was finally confirmed by matching them in the herbarium of FRI, Dehradun (DD). Voucher specimens were prepared and deposited

in the Herbarium of the Survey of Medicinal Plants Unit, RRIUM, Aligarh (U.P.), India.

Results and Discussion

A total of 215 taxa of medicinal plants were collected and identified during the present survey. Out of these 120 have therapeutic importance in Unani medicine as evident from available literature (Hasan 1894; Ibn-e-Baitar, 1985; Ibn-e-Sina, 1882; Ibn-e-Nafees, 2007; Najmulghani, 1914; Qasmi, 2001; Rafiquddin, 1985) and reported in the present work (Table 1). Medicinal plants listed herein belong to 105 genera and 59 families of angiosperms (112 cotyledons and 8 monocotyledons). These species are found growing as trees, shrubs, herbs and climbers in different habitats like forests, grasslands, marshes, wastelands and cultivated fields. The majority of these plants are wild, although a few are cultivated e.g. *Abelmoschus moschatus*, *Curcuma longa*, *Mangifera indica*, *Momordica charantia*, *Sesamum orientale*. *Trapa natans*. Some are weeds in waste places or near cultivated fields and villages. These included *Abutilon indicum*, *Adhatoda zeylanica*, *Calotropis gigantea*, *Cannabis sativa*, *Cardiospermum halicacabum*, *Centella asiatica*, *Cyperus rotundus*, *Eclipta alba*, *Mucuna pruriens*, *Ocimum basilicum*, *Operculina turpethum. Plumbago zeylanica*, *Solanum nigrum*, *Sphaeranthus indicus, Tephrosia purpurea*, *Vitex negundo*, *Withania somnifera*. A number of species is indigenous in this collection. However, many exotic taxa that are planted or naturalized in the area have also been included such as *Acacia nilotica*, A*lbizia lebbeck*, *Alstonia scholaris*, *Annona sqamosa, Anthocephalus chinensis*, *Ficus carica*, *Hibiscus rosa-sinensis*, *Lawsonia inermis*, *Melia azedarach*, *Morus alba*, *Physalis minima, Punica granatum*, *Ricinus communis*, *Santalum album*, *Tamarindus indica*, *Terminalia arjuna*.

In the course of present exploration, it was found that indigenous people have much passion for medicinal plants. Almost every villager knows a few remedies for routine maladies of both humans and cattle, but the traditional healers possesses good knowledge of the healing properties of local plants, acquired in the course of their long experience and association with the forests. During the fieldwork, we gathered information on folk medicinal uses of 41 plant species. The uses are mostly related to dental and gastrointestinal disorders, jaundice, kidney stones, skin affections, spermatorrhoea and a few ailments of domestic animals. Some of the most prevalently used taxa are *Achyranthes aspera, Aegle marmelos, Azadirachta indica, Boerhavia diffusa, Leucas cephalotes, Sida cordata, Butea monosperma, Elephantopus scaber, Euphorbia hirta, Holarrhena pubescence, Litsea glutinosa, Terminalia chebula, Tinospora cordifolia*. Data on folk medicinal uses of plants are summarized in Table 2. The plants are arranged in alphabetical order by their botanical names. Each entry gives the correct botanical name with family, prevalent local name, voucher specimen number, part used, claimed medicinal uses and mode of administration.

Table-1. Unani medicinal plants found growing in the Amangarh and adjacent forest areas.

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
1.	*Abelmoschus moschatus* Medic. (Malvaceae)	Chuklai (L), Mushkdana (U)	Undershrub[b]	Seeds- hysteria, dyspepsia, indigestion.
2.	*Abrus precatorius* L. (Fabaceae)	Lallari, Chontli (L), Chashm-e-Kharosh (U)	Climber[c]	Seeds- skin, ophthalmic and brain diseases, worm infestation, sexual debility.
3.	*Abutilon indicum* (L.) Sweet (Malvaceae)	Kanghi (L, U)	Undershrub[c]	Leaves- piles, gonorrhoea, tonsillitis, pyrexia. Seeds- sexual debility, odontalgia, spermatorrhoea.
4.	*Acacia catechu* (L.f.) Willd. (Mimosaceae)	Khair (L), Kath (U)	Tree[a]	Extract of heartwood- diarrhea, stomatitis, syphilis, jaundice.
5.	*Acacia nilotica* (L.) Willd. ex Del (Mimosaceae)	Babool (L), Mughilan, Kikar (U)	Tree[b]	Gum- cough, sore throat, spermatorrhoea.
6.	*Achyranthes aspera* L. (Amaranthaceae)	Apamarga (L), Khar-e-Wazguna (U)	Herb[c]	Herb- dropsy, piles, boils, scabies, pityriasis nigra.
7.	*Adhatoda zeylanica* Medic. (Acanthaceae)	Bansa (L), Arusa (U)	Shrub[c]	Leaves- cough, asthma, boils, phthisis, odontalgia. Root- cough, asthma, spermatorrhoea, jaundice.
8.	*Aegle marmelos* (L.) Corr. (Rutaceae)	Bel (L), Balgiri (U)	Tree[a]	Pulp of fruit- chronic dysentery and diarrhea.
9.	*Aerva lanata* (L.) A. Juss. ex Schult. (Amaranthaceae)	Safed Ballar (L), Bus-heributi (U),	Herb[c]	Plant- enlargement of prostrate gland, albumenuria, painless hematuria, vasicular calculus.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
10.	*Alangium salvifolium* (L.f.) Wang. (Alangiaceae)	Koli(L), Ankol(U)	Tree[a]	Fruits- abdominal pain, worm infestation, epilepsy, infantile epilepsy, piles, syphilis.
11.	*Albizia lebbeck* (L.) Willd. (Mimosaceae)	Siras(L, U)	Tree[a]	Seeds- attenuated semen, premature ejaculation, vitiligo.
12.	*Alstonia scholaris* (L.) R.Br. (Apocynaceae)	Kashim(U)	Tree[b]	Root- dropsy, paralysis, sciatica.
13.	*Amaranthus spinosus* L. (Amaranthaceae)	Chileri(L), Kateeli Chaulai(U)	Herb[c]	Root- gonorrhea, burning micturition, worm infestation, cough, abdominal pain. Leaves- skin diseases.
14.	*Annona squamosa* L. (Annonaceae)	Sharifa(L, U)	Shrub[b]	Fruits- sexual debility, palpitation, weakness of heart.
15.	*Anogeissus latifolius* (Roxb. ex DC.) Bedd. (Combretaceae)	Bankli(L), Gul-e-Dhawa (U)	Tree[a]	Flowers- dysentery, diarrhea, leucorrhoea, haemorrhage, menorrhagia.
16.	*Anthocephalus chinensis* (Lam.) A. Rich. ex Walp. (Rubiaceae)	Kadam(L, U)	Tree[b]	Bark- phlegmatic and bile diseases. Flowers- weakness of brain.
17.	*Argemone mexicana* L. (Papaveraceae)	Roos(L), Satyanasi(U)	Herb[c]	Shoot - syphilis, leprosy, vitiligo, eczema, scabies. Seed oil- scabies, eczema, boils. Leaves- scabies.
18.	*Artocarpus heterophyllus* Lam. (Moraceae)	Barhal(L), Kathal(U)	Tree[b]	Fruits- sexual debility, premature ejaculation. Seeds-sexual debility.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
19.	*Azadirachta indica* A. Juss. (Meliaceae)	Neem(L, U)	Tree[a]	Leaves, flowers and oil - skin diseases Bark, berries and seeds -worm infestation, amenorrhea, piles.
20.	*Barringtonia acutangula* (L.) Gaertn. (Barringtoniaceae)	Samandarphal (U)	Tree[b]	Fruits- worm infestation, spermatorrhoea, abdominal pain, infantile bronchopneumonia, night blindness.
21.	*Basella rubra* L. (Basellaceae)	Poi(L,U)	Climber[c]	Herb- sedative, inspissate to semen, retenentive of semen, normalize humours, adipogenous.
22.	*Boerhavia diffusa* L. (Nyctaginaceae)	Bichhkhapra (L), Handakuku(U)	Herb[c]	Root- jaundice, cough, asthma, renal calculus, anemia.
23.	*Bombax ceiba* L. (Bombacaceae)	Simbal(L), Sainbhal(U)	Tree[a]	Gum- chronic dysentery, malaena, haemoptysis, menorrhagia, leucorrhoea, spermatorrhoea.
24.	*Buchanania lanzan* Spreng. (Anacardiaceae)	Chiroli, Piyal(L), Chironji(U)	Tree[a]	Kernel- sexual debility, general debility, skin diseases.
25.	*Butea monosperma* (Lam.) Taub. (Fabaceae)	Dhak (L, U)	Tree[a]	Flowers- orchitis, uteritis, cystitis, gonorrhea, spermatorrhoea. Gum-sexual debility, premature ejaculation, spermatorrhoea, leucorrhoea, diarrhea.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
26.	*Caesalpinia bonduc* (L.) Roxb. (Caesalpiniaceae)	Karjua(L), Karanjwa(U)	Climber[c]	Seeds- dropsy, orchitis, arthritis, intermittent and chronic fever, asthma, colic, piles, scabies.
27.	*Calotropis gigantea* (L.) R.Br. (Asclepiadaceae)	Ankhra(L), Aak(U)	Shrub[c]	Root bark- chronic dysentery. Flowers- cold, cough, asthma, indigestion. Latex- ringworm, piles, scabies, eczema, alopecia.
28.	*Cannabis sativa* L. (Cannabinaceae)	Bhang(L), Qinnab(U)	Shrub[c]	Leaves- chronic migraine, headache, insomnia, pyrexia, orchitis.
29.	*Cardiospermum halicacabum* L. (Sapindaceae)	Habb-ul-Qilqil (U)	Climber[c]	Seeds- sexual debility, general debility, anemia, spermatorrhea, premature ejaculation.
30.	*Careya arborea* Roxb. (Barringtoniaceae)	Kumbhi(L), Baikumb(U)	Tree[a]	Fruits- stomachache in children due to flatulence, weakness of stomach.
31.	*Carissa congesta* Wight (Apocynaceae)	Jangli karonda(L), Karondah(U)	Shrub[a]	Ripe fruits- diarrhea, vomiting, stomachache.
32.	*Cassia fistula* L. (Caesalpiniaceae)	Amaltas(L, U)	Tree[a]	Pulp of fruit- cough, asthma, constipation, tonsillitis, pharyngitis, diphtheria.
33.	*Cassia occidentalis* L. (Caesalpiniaceae)	Kasondi(L, U)	Herb[c]	Leaves- pyrexia, constipation, arthralgia, gout, skin diseases.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
34.	*Cassia tora* L. (Caesalpiniaceae)	Pamar(L), Panwar(U)	Herb[c]	Seeds- skin diseases, eczema, leprosy, vitiligo, itching.
35.	*Catunaregam spinosa* (Thunb.) Tiruv. (Rubiaceae)	Mendu(L), Mayeenphal (U)	Shrub[a]	Fruits- paralysis, facial paralysis, cough, leprosy, asthma, boils.
36.	*Celastrus paniculatus* Willd. (Celastraceae)	Malkangni (L, U)	Climber[a]	Seeds- weakness of memory and joint pain. Oil of seeds- lumbago, sciatica, paralysis, sexual debility.
37.	*Centella asiatica* (L.) Urban (Apiaceae)	Barmi(L), Brahmi(U)	Herb[a]	Plant- weakness of memory, nerve and brain, dementia, headache, hysteria.
38.	*Chenopodium album* L. (Chenopodiaceae)	Bathua(L, U)	Herb[c]	Plant- worm infestation, hepatitis, dropsy, jaundice.
39.	*Cleome viscosa* L. (Cleomaceae)	Hulhul(L), Bantakalan(U)	Herb[c]	Leaves- earache, bleeding piles, colic. Seeds- spermatorrhea.
40.	*Coccinia grandis* (L.) J.O. Voight (Cucurbitaceae)	Kanduri(L), Kundru(U)	Climber[c]	Fruits- obesity, premature ejaculation, bilious diseases.
41.	*Cordia dichotoma* Forst. f. (Boraginaceae)	Lisora, Reetha(L), Sapistan(U)	Tree[a]	Fruits- sore throat, catarrh, coryza, cough, burning micturition, spermatorrhoea.
42.	*Curculigo orchioides* Gaertn. (Hypoxidaceae)	Kali musli(L), Musli Siyah(U)	Herb[a]	Root- attenuated semen, spermatorrhoea, leucorrhoea, diarrhea, sexual debility.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
43.	*Curcuma longa* L. (Zingiberaceae)	Haldi(L), Zard Chob(U)	Herb[b]	Rhizome- ulcers, sprain, trauma, asthenopia, conjunctivitis, trachoma, opacity, skin diseases, cough, asthma, catarrh.
44.	*Cuscuta reflexa* Roxb. (Cuscutaceae)	Amarbel(L), Kasoos(U)	Climber[c]	Seeds- nerve and brain diseases, epilepsy, melancholia, facial paralysis, arthralgia, skin diseases.
45.	*Cynodon dactylon* (L.) Pers. (Poaceae)	Doob(L, U)	Herb[c]	Root- polydipsia, scabies, inflammation, stomatitis, epistaxis.
46.	*Cyperus rotundus* L. (Cyperaceae)	Motha(L), Sad Kufi(U)	Herb[c]	Root- weakness of heart and brain, palpitation, paralysis, diarrhea, dysentery, vomiting, jaundice.
47.	*Dalbergia sissoo* Roxb. (Fabaceae)	Shisham (L, U)	Tree[a]	Wood- syphilis, leprosy, scabies, boils, vitiligo, worm infestation.
48.	*Datura fastuosa* L. (Solanaceae)	Dhatura(L), Dhatura Siyah(U)	Herb[c]	Leaves- whooping cough, joint pain, mastitis, piles, leprosy, boils. Fruits- boils, furunculosis. Seeds- common cold, catarrh, epilepsy, insomnia, spermatorrhoea.
49.	*Dendrocalamus strictus* (Roxb.) Nees (Poaceae)	Bans(L, U)	Shrub[a]	Silicious matter- weakness of heart, palpitation, diarrhea, vomiting, spermatorrhoea.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
50.	*Eclipta alba* (L.) Hassk. (Asteraceae)	Bhangra(U)	Herb[c]	Plant- asthenopia, sexual debility, leprosy, skin diseases, spleenic diseases, conjunctivitis.
51.	*Euphorbia hirta* L. (Euphorbiaceae)	Dudhi(L), Dudhi Kalan(U)	Herb[c]	Plant- cough, catarrh, common cold, asthma, bronchitis.
52.	*Euphorbia thymifolia* L. (Euphorbiaceae)	Lalghans(L), Dudhi Khurd(U)	Herb[c]	Herb-stimulant, aphrodisiac, vermifuge, laxative.
53.	*Feronia limonia* (L.) Swingle (Rutaceae)	Kaith(L), Kabid (U)	Tree[a]	Fruit-Diarrhoea, dysentery, piles, palpitation, cardiac weakness, indigestion.
54.	*Ficus benghalensis* L. (Moraceae)	Bar(L), Bargad(U)	Tree[a]	Milky juice- diarrhea, dysentery, piles, spermatorrhoea, premature ejaculation, sexual debility. Bark- diarrhea, dysentery.
55.	*Ficus carica* L. (Moraceae)	Anjeer(L), Teen(U)	Shrub[a]	Fruits- constipation, asthma, cough, epilepsy.
56.	*Ficus hispida* L.f. (Moraceae)	Kemri(L), Anjeer-e-Dashti(U)	Tree[a]	Fruits- constipation, milk deficiency, ring worm, vitiligo, wart, cervical adenitis.
57.	*Ficus racemosa* L. (Moraceae)	Gular(L), Jamiz(U)	Tree[a]	Fruits- dry cough, chest pain, renal pain, spleenic pain, haemoptysis, worm infestation, conjunctivitis.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
58.	*Ficus religiosa* L. (Moraceae)	Pipal(L, U)	Tree[a]	Bark- gingivitis, stomatitis, chronic gonorrhoea, burning micturition, leucorrhea. Leaves- boil.
59.	*Fumaria indica* (Haussk) Pugsley (Fumariaceae)	Shatra(L,U)	Herb[c]	Plant- blood purifier, diuretic, laxative.
60.	*Helicteres isora* L. (Sterculiaceae)	Kapasi(L), Marorphali(U)	Shrub[a]	Fruits- amoebic dysentery, colic, paralysis, facial paralysis, stomachache, worm infestation.
61.	*Hemidesmus indicus* (L.) R.Br. (Asclepiadaceae)	Dudhi(L), Ushba(U)	Climber[a]	Root- inflammation, flatulence in the stomach, skin diseases, leprosy, arthritis, sciatica, piles, asthma.
62.	*Hibiscus rosa-sinensis* L. (Malvaceae)	Gurhal(L,U)	Shrub[b]	Flowers- palpitation, cardiac weakness, spermatorrhoea, phobia, mania, cystitis, gonorrhea.
63.	*Holarrhena pubescens* (Buch. Ham.) Wall. ex G. Don (Apocynaceae)	Kura(L), Inderjo Talkh(U)	Tree[a]	Bark- flatulence in the stomach, worm infestation, indigestion, dysentery, menorrhagia, spermatorrhoea. Seeds- dysentery, diarrhea, pyrexia, piles.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
64.	*Hygrophila auriculata* (Schum.) Heine (Acanthaceae)	Talmakhana (L, U)	Herb[c]	Seeds- spermatorrhoea, premature ejaculation, excessive nocturnal emission, attenuated semen, ascites, joint pain.
65.	*Ipomoea nil* (L.) Roth (Convolvulaceae)	Habb-ul-Neel(U)	Climber[c]	Seeds- pityriasis alba, vitiligo, worm infestation.
66.	*Lawsonia inermis* L. (Lythraceae)	Mehndi(L), Hina(U)	Shrub[b]	Leaves- headache, migraine, uteritis, stomatitis, ulcer of mouth.
67.	*Leucas cephalotes* (Koen. ex Roth) Spreng. (Lamiaceae)	Guma(L), Gumma(U)	Herb[c]	Plant- chronic fever, cough, asthma, worm infestation.
68.	*Litsea glutinosa* (Lour.) C.B. Robinson (Lauraceae)	Meda(L), Maidalakri(U)	Tree[a]	Bark- trauma, bone fracture, joint pain, diarrhea, dysentery, menorrhagia, sciatica, gout.
69.	*Madhuca longifolia* (Koenig) MacBride (Sapotaceae)	Mahua(L), Gulchakan(U)	Tree[a]	Flowers- phlegmatic diseases, putrefaction of blood, asthma.
70.	*Mallotus philippinensis* (Lam.) Muell.-Arg. (Euphorbiaceae)	Rohini(L), Kamila(U)	Tree[a]	Red powder from the ripe fruits- worm infestation, ear discharge, ulcers, scabies, boils, furunculosis.
71.	*Mangifera indica* L. (Anacardiaceae)	Aam(L, U)	Tree[b]	Unripe fruits- spermatorrhea, sun stroke. Ripe fruits- palpitation, piles, colic, cough.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
72.	*Martynia annua* L. (Martyniaceae)	Bichhua(L), Kalabichua(U)	Herb[c]	Leaves- vitiligo, paralysis, bells palsy.
73.	*Melia azedarach* L. (Meliaceae)	Bakain(L, U)	Tree[a]	Leaves- leprosy, scrofula, scabies. Bark- worm infestation, amenorrhoea, dysmenorrhoea, piles, constipation, pityriasis.
74.	*Mimosa pudica* L. (Mimosaceae)	Chhui-mui(U)	Undershrub[c]	Leaves- renal and vesical calculus. Root- fistula, leprosy, syphilis, worm infestation.
75.	*Mimusops elengi* L. (Sapotaceae)	Molsari(L, U)	Tree[b]	Fruits and seeds- attenuated semen. Juice of flowers- cardiac weakness.
76.	*Momordica charantia* L. (Cucurbitaceae)	Janglikarela(L), Karaila(U)	Climber[b]	Fruits- arthritis, gout, dropsy, worm infestation, pyrexia, spermatorrhoea. Leaves- renal and vesical calculus.
77.	*Moringa oleifera* Lam. (Moringaceae)	Sirojna(L), Sahajana(U)	Tree[a]	Leaves- gonorrhoea, phlegmatic headache. Gum- odontalgia.
78.	*Morus alba* L. (Moraceae)	Desi Shahtoot(L), Toot Safaid(U)	Shrub[a]	Fruits- throat pain, diphtheria.
79.	*Mucuna pruriens* (L.) DC. (Fabaceae)	Konch(L, U)	Climber[c]	Seeds- sexual debility, spermatorrhoea, premature ejaculation, attenuated semen, cough and piles.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
80.	*Nymphaeaceae pubescens* Willd. (Nymhaceae)	Kamal(L), Nilophar(U)	Herb[b]	Flowers-exhilarant, brain and cardiac tonic, ant thirst, subside heat.
81.	*Ocimum basilicum* L. (Lamiaceae)	Tulsa(L), Badrooj(U)	Herb[c]	Leaves and seeds- cardiac weakness, palpitation, melancholic psychosis, dysentery.
82.	*Ocimum sanctum* L. (Lamiaceae)	Tulsi(L), Raihan(U)	Herb[b]	Seeds- dysentery, cough, premature ejaculation. Leaves- pyrexia, inflammation, gastric disorders and coughs.
83.	*Operculina turpethum* (L.) Manso (Convolvulaceae)	Turbud(U)	Climber[a]	Root- constipation, paralysis, bells palsy, cough and sciatica.
84.	*Phoenix sylvestris* (L.) Roxb. (Arecaceae)	Khajoor(L, U)	Tree[a]	Fruits- phlegmatic diseases, renal pain, renal and vesical calculus, sexual debility.
85.	*Phyla nodiflora* (L.) Greene (Verbenaceae)	Bukunbuti(U)	Herb[c]	Plant and leaves- blood purifier, coctive.
86.	*Phyllanthus emblica* L. (Euphorbiaceae)	Amla(L, U)	Tree[a]	Fruits- diarrhea, dysentery, haemorrhage, jaundice, dyspepsia.
87.	*Phyllanthus fraternus* Webster (Euphorbiaceae)	Sanai(L), Bhui Aamla(U)	Herb[c]	Plant- diarrhea, haemorrhage, dysentery.
88.	*Physalis minima* L. (Solanaceae)	Rasbhari(L), Kaknaj(U)	Herb[c]	Fruits- renal and vesical diseases, jaundice, hepatitis.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
89.	*Plumbago zeylanica* L. (Plumbaginaceae)	Shitraj Safed(U)	Undershrub[c]	Root-exhilarant, nerve tonic, pruritic, deobstruent, digestive.
90.	*Pongamia pinnata* (L.) Pierre (Fabaceae)	Karanj(L, U)	Tree[b]	Seeds- asthma, weakness of intestine, whooping cough.
91.	*Pterospermum acerifolium* Willd. (Sterculiaceae)	Kanak champa(L), Machkand(U)	Tree[b]	Flowers- headache, vomiting, cough, bleeding piles.
92.	*Pueraria tuberosa* (Roxb. ex Willd.) DC. (Fabaceae)	Bidarikand, Siral(L), Bidari Kand(U)	Climber[a]	Root- obesity, sexual debility, general debility, indigestion in children.
93.	*Punica granatum* L. (Punicaceae)	Anar(L, U)	Shrub[b]	Seeds- vomiting, polydipsia, jaundice, urticaria, chronic diarrhea. Root and stem bark- worm infestation. Rind of fruit- diarrhea.
94.	*Rauvolfia serpentina* (L.) Benth. ex Kurz (Apocynaceae)	Sarpgandha(L) Asrol(U)	Herb[a]	Root- insomnia, melancholia, hypertension, epilepsy, hysteria.
95.	*Ricinus communis* L. (Euphorbiaceae)	Arand(L), Bedanjeer(U)	Shrub[c]	Oil of seeds- colic, constipation, dysentery, worm infestation, asthenopia, joint pain, lumbago.
96.	*Santalum album* L. (Santalaceae)	Chandan(L), Sandal Safed(U),	Tree[b]	Wood-exhilarant, sedative, expectorant, stomachic, cardiac tonic, astringent.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
97.	*Sesamum orientale* L. (Pedaliaceae)	Til(L), Kunjad(U)	Herb[b]	Seeds- piles, cough, sexual debility. Oil of seeds- otalgia, ulcer of ear, trauma, burn.
98.	*Shorea robusta* Gaertn. (Dipterocarpaceae)	Sal(L, U)	Tree[a]	Resin- ulcers, inflammation, epilepsy, asthma, dropsy, scabies.
99.	*Sida cordata* (Burm. f.) Borassum (Malvaceae)	Kharenti(L), Fareed Buti(U)	Herb[c]	Plant-pyrexia, abdominal pain, bone fracture, sexual debility.
100.	*Solanum anguivi* Lam. (Solanaceae)	Kantkari(L), Oshturghar(U)	Herb[c]	Root- diarrhea, arthritis, scrofula, spermatorrhoea.
101.	*Solanum nigrum* L. (Solanaceae)	Bhamolan(L), Mako(U)	Herb[c]	Leaves and fruits- inflammation of liver, stomach, spleen, intestine, uterus, throat and tonsil; otalgia, jaundice.
102.	*Solanum virginianum* L. (Solanaceae)	Kateli(L), Katai Khurd(U)	Herb[c]	Plant- leprosy, syphilis, arthritis. Fruits- whooping cough, asthma, phlegmatic fever. Leaves- epilepsy, hysteria.
103.	*Sphaeranthus indicus* L. (Asteraceae)	Ghundi(L), Gul-e-Mundi (U)	Herb[c]	Flowers-blood purifier, vision improving, tonic for principal organs.
104.	*Streblus asper* Lour. (Moraceae)	Dayya(L), Sihore(U)	Tree[a]	Bark- putrefaction of blood, diarrhea with blood, fever.
105.	*Syzygium cumini* (L.) Skeels (Myrtaceae)	Jaman (L, U)	Tree[a]	Bark and kernel of fruits- bleeding gums, gingivitis, diarrhea, diabetes. Fruits- diarrhea, diabetes.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
106.	*Tamarindus indica* L. (Caesalpiniaceae)	Imli(L), Tamar-e-Hindi (U)	Tree[b]	Fruits- nausea, vomiting, palpitation, polydipsia, diphtheria, stomatitis. Kernel of seeds- spermatorrhea, excessive nocturnal emission, attenuated semen.
107.	*Tephrosia purpurea* (L.) Pers. (Fabaceae)	Jhinjru(L), Sarphoka(U)	Herb[c]	Plant- cough, asthma, liver, spleen, kidney and urinary bladder diseases, boils.
108.	*Terminalia arjuna* (Roxb. ex DC.) W.&A. (Combretaceae)	Arjun(L, U)	Tree[b]	Bark- palpitation, pericarditis, endocarditis, chest pain, diarrhea, spermatorrhoea, enteritis.
109.	*Terminalia bellirica* (Gaertn.) Roxb. (Combretaceae)	Bahera(L), Balela(U)	Tree[a]	Fruits- diarrhea, cough, asthma, asthenopia, putrefaction of blood, bile and black bile.
110.	*Terminalia chebula* (Gaertn.) Retz. (Combretaceae)	Har(L), Halela(U)	Tree[a]	Unripe fruits- colic, palpitation, leprosy, piles. Half ripe fruits- spleenic pain, gastric pain, piles, palpitation, melancholia. Ripe fruits- melancholia, bells palsy, leprosy, piles.
111.	*Tinospora cordifolia* (Willd.) Miers ex Hook. f.& Thoms. (Menispermaceae)	Gilobel(L), Gilo(U)	Climber[c]	Stem- hyperpyrexia, tubercular fever, scabies, boils furunculosis, syphilis, gonorrhoea, arthritis, chronic diarrhea.

Table-1. *(Contd.)*

S. No.	Botanical name & Family	Vernacular name	Habit & Habitat	Chief medicinal use(s)
112.	*Toona ciliata* Roem. (Meliaceae)	Tun(L, U)	Tree[a]	Bark- skin diseases, pyrexia. Flowers- amenorrhoea.
113.	*Trapa natans* L. (Trapaceae)	Singhara(L, U)	Herb[b]	Fruits- sexual debility, spermatorrhoea, attenuated semen, sore throat.
114.	*Vetiveria zizanioides* (L.) Nash(Poaceae)	Khas(L,U)	Herb[a]	Root- stomachic, tonic for heart and brain, retentive of semen, bile and blood sedative, exhilarant.
115.	*Vitex negundo* L. (Verbenaceae)	Mahala(L), Sambhalu(U)	Shrub[c]	Leaves- worm infestation, throat pain, stomatitis, uteritis, orchitis.
116.	*Withania somnifera* (L.) Dunal (Solanaceae)	Asgaand(L), Asgandh(U)	Shrub[c]	Root- general debility, sexual debility, dementia, arthritis, neurasthenia, leucorrhoea.
117.	*Woodfordia fruticosa* (L.) Kurz (Lythraceae)	Masoori(L), Dhawa(U)	Shrub[a]	Flowers- dysentery, diarrhea, haemorrhage, leucorrhoea, menorrhagia, bleeding piles, prolapse rectum.
118.	*Zingiber officinalis* Rosc. (Zingiberaceae)	Adrak(L,U)		Rhizome- appetizer, digestive, carminative, memory tonic, laxative
119.	*Zizyphus mauritiana* Lam. (Rhamnaceae)	Beri (L), Ber(U)	Tree[a]	Fruits- diarrhea.
120.	*Zizyphus nummularia* (Burm. f.) W. & A. (Rhamnaceae)	Jharber(L), Jharberi(U)	Shrub[a]	Leaves- scabies, boils, arthritis, laryngitis, bleeding gums.

L = Local name; U= Unani/Tibbi name

a = Forest species; b= Cultivated/Planted; c= Weed

Table-2. Plants with folk medicinal uses.

Botanical name with family, local name and voucher specimen no.	Part used	Use(s)	Mode of administration
Abrus precatorius L. (Fabaceae), Chontli, *ZAA8987*	Root	Cough	Fresh piece of the root is chewed.
Acacia nilotica (L.) Willd. ex Del. (Mimosaceae), Kikar, *ZAA9014*	Stem bark	Hoof rots in cattle	Decoction is used to wash the hoofs.
Acyranthes aspera L.(Amaranthaceae), Apamarga, *ZAA8869*	Whole plant, tender twig	Lizard bite, pyorrhea	Paste is applied locally and given orally for lizard bite. Tender twig is used as toothbrush in pyorrhea.
Ageratum conyzoides L.(Asteraceae), Sarenda, *ZAA9009*	Leaves	Cut and wounds	Juice is applied locally to stop the bleeding.
Azadirachta indica A. Juss.(Meliaceae), Neem, *ZAA9868*	Leaves	Fungal infection of toes	An ointment of dried leaves is prepared in coconut oil and applied locally.
Blumea lacera (Burm.f.) DC. (Asteraceae), Kukarchhindi, *ZAA9017*	Leaves	Pneumonia	Juice is given orally.
Boerhavia diffusa L. (Nyctaginaceae), Bichkhapra, *ZAA8937*	Leaves	Jaundice	Juice is given orally.
Bombax ceiba L. (Bombacaceae), Simbal, *ZAA9056*	Tuberous root of seedling	Spermatorr-hoea	Powder is taken with water.
Butea monosperma (Lam.) Taub. (Fabaceae), Dhak, *ZAA8987*	Flowers, Stem bark	Anuria, Sensitive teeth	Flower paste is put on abdomen as poultice for anuria. Fresh stem bark chewed daily at bedtime for sensitive teeth.

Table-2. *(Contd.)*

Botanical name with family, local name and voucher specimen no.	Part used	Use(s)	Mode of administration
Calotropis gigantea (L.) R.Br. (Asclepiadaceae), Ankhra, *ZAA8997*	Latex	Diabetes	Two drops of fresh latex are taken with cow's milk daily.
Centella asiatica (L.) Urban (Apiaceae), Barmi, *ZAA9038*	Leaves	General weakness	Paste is given orally.
Citrullus lanatus (Thunb.) Mats. & Nakai (Cucurbitaceae), Tarbooz, *ZAA s.n.*	Leaves	Wounds of cattle	Juice is applied locally.
Cuscuta reflexa Roxb. (Cuscutaceae), Amarbel, *ZAA8955*	Whole plant	Flatulence	Paste is given orally.
Datura fastuosa L. (Solanaceae), Dhatura, *ZAA8954*	Leaves	For habitual drinking	Two raw leaves are taken daily.
Diospyros cordifolia Roxb. (Ebenaceae), Kerukha and Basendu, *ZAA9052*	Fruit	Cracked heel	An ointment of fruit pulp is prepared in mustard oil and applied locally.
Elephantopus scaber L. (Asteraceae), Pattharchata, *ZAA8870*	Whole plant	Renal calculus	Past is given orally.
Euphorbia hirta L. (Euphrbiaceae), Dudhi, *ZAA8853*	Leaves	Burning micturition	Paste is given orally.
Euphorbia thymifolia L. (Euphrbiaceae), Lalghans, *ZAA9013*	Aerial parts	Diarrhea and dysentery	Paste is given orally.
Gardenia turgida Roxb. (Rubiacea), Thanella, *ZAA8965*	Fruit	Mastitis	Paste is applied locally.
Heliotropium supinum L. (Boraginaceae), *ZAA9012*	Whole plant	Leucorrhoea	Infusion is given orally.

Table-2. *(Contd.)*

Botanical name with family, local name and voucher specimen no.	Part used	Use(s)	Mode of administration
Holarrhena pubescence (Buch.-Ham.) Wall. ex G. Don (Apocynaceae), Kura, *ZAA8883*	Seeds	Irregular menses	Decoction is given orally.
Holoptelea integrifolia (Roxb.) Planch. (Ulmaceae), Papri, *ZAA9053*	Leaf	Ringworm	Sap is applied locally.
Indigophera linifolia (L.f.) Retz. (Fabaceae), Bandkhol, *ZAA9014*	Whole plant	Anorexia in cases of cattle	Paste is given with fodder.
Leucas cephalotes (Koen. ex Roth) Spreng. (Lamiaceae), Gumma buti, *ZAA8918*	Leaves	Postnatal infection of uterus	Decoction is given orally.
Litsea glutinosa (Lour.) C.B. Robinson (Lauraceae), Meda, *ZAA8849*	Stem bark	Muscular pain	Paste is applied locally.
Madhuca indica J.F. Gmelin (Sapotaceae), Mahua, *ZAA8861*	Leaves	Sores on shoulder of oxen caused by yoke	Paste is applied locally.
Merremia emarginata (Burm. f) Hall. f. (Convolvulaceae), Kira Ghans, *ZAA9015*	Stem	Wounds infested with worms in cases of cattle	A long piece of stem is mixed with four tender culms of 'kans' (*Saccharum spontaneum* L.) to make a rope and tied on horns, neck of suffering cattle.
Oxalis corniculata L. (Oxalidaceae), Chukha, *ZAA9010*	Aerial parts	Dysentery	Paste is given orally.

Table-2. *(Contd.)*

Botanical name with family, local name and voucher specimen no.	Part used	Use(s)	Mode of administration
Phoenix sylvestris Roxb. (Arecaceae), Khajoor, *ZAA8981*	Root suckers	pyorrhea	Aqueous decoction of the suckers, root of 'jharberi' (*Z. nummularia*), 'ankhra' (*C. gigantea*), bark of 'kikar' and 'jaman' (*S. cumini*) is used to gargle.
Phyllanthus fraternus Webster (Euphorbaceae), Sanai, *ZAA8845*	Aerial parts	Jaundice	Juice is given orally.
Pilostigma malabarica (Roxb.) Benth. (Caesalpinaceae), Khatua, *ZAA8894*	Leaf	Polydipsia	Fresh leaf is chewed.
Shorea robusta Gaertn. f. (Dipterocarpaceae), Sal, *ZAA8882*	Gum-resin	Dysentery	Powder is taken with water.
Sida cordata (Burm.f.) Borssum (Malvaceae), Shahsoota, *ZAA9009*	Leaves	Sperma-torrhea	Paste is given orally.
Spilanthus clava DC. (Asteraceae), Churraint, *ZAA8948*	Whole plant	Common fever of cattle	Paste of the plant is mixed with leaves of 'ghundiya' (*Gomphrena celosiodes* Mart.) and given with fodder.
Streblus asper Lour. (Moraceae), Dayya, *ZAA9056*	Latex	Loosening of teeth	Fresh latex is applied locally.
Syzygium cumini (L.) Skeels (Myrtaceae), Jaman, *ZAA8986*	Stem bark	Bleeding gums	Decoction is used as gargle.

Table-2. *(Contd.)*

Botanical name with family, local name and voucher specimen no.	Part used	Use(s)	Mode of administration
Terminalia chebula (Gaertn.) Retz. (Combretaceae), Har, *ZAA8849*	Fruit	Constipation	Soup of the pulp is taken.
Tinospora cordifolia (Willd.) Miers (Menispermaceae), Gilobel, *ZAA8990*	Stem-bits	Common fever	Decoction is given orally.
Tridax procumbens L. (Asteraceae), Chhuimui, *ZAA7016*	Aerial parts	Internal septic in cases of buffaloes and cows.	Fresh plants are fed.
Vitex negundo L. (Verbenaceae), Mahala, *ZAA9037*	Leaves	Furunculosis	Paste is applied locally.
Zizyphus nummularia (Burm. f.) Wight & Arn. (Rhamnaceae), J*harberi*, *ZAA9024*	Root	Pyorrhea	Decoction is gargled.

The forests of the area are the main habitat of the medicinal plants. The encroachment of forest land for expansion of agriculture, dwellings and other developmental activities has reduced the space for forests to spread naturally. Moreover, various adverse factors such as recurring forest fire, soil erosion, excessive grazing, drought, invasion of some foreign weed species, introduction of new crops of trees, heavy extraction of natural resources, etc. have modified and influenced the natural forests in many places. Due to unsustainable harvesting practices and disturbance in vital habitat, some of the important medicinal plants which were quite common earlier either have become rare or have completely disappeared in the area. The prominent among them are *Acorus calamus*, *Asparagus racemosus, Drimia indica, Gloriosa superba, Helminthostachys zeylanica, Piper longum, Pterocarpus marsupium, Rauvolfia serpentina, Semicarpus anacardium*, etc. It is predicted that population of some more medicinal plants especially the forest species may become reduce in the area if habitat detoriation and over exploitation of natural resources continue to occur. There is therefore the urgent need of the hour is to conserve the biological diversity and protect these natural habitats.

This study can help for sustainable utilization, development and conservation of natural medicinal plant wealth of this region. Moreover, information on folk medicine which represents a contribution on our existing traditional knowledge of rich herbal heritage of Bijnor district of western Uttar Pradesh would be useful to provide access to researchers in search of new plant-based pharmaceuticals.

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Ethnobotanical Survey of Araku Valley of Paderu Forest Division of Andhra Pradesh

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Abstract

Based on an ethnopharmacological survey of Araku valley Paderu Forest Division of Andhra Pradesh conducted during Janurary, 2011, the paper presents some 42 contemporary folk recipes comprising 42 taxa of folk medicinal plants used by various tribes e.g. Bagatta, Dulia, Gadaba, Konda-Dora, Khond, Kulia, Mukka-Dora, Porja and Valmiki for the treatment of various common ailments. Botanical name, family, local name, Unani name, field book number, part(s) used, name of the diseases against which used and mode of administration are given for each recipe discussed. The information provided will help to discover new drugs of natural origin for many of the diseases, and conditions, thus far, incurable in modern medicine.

Keywords: Tribal medicine, Araku valley, Ethnopharmacological survey.

Introduction

As a result of modern civilization and rapid developmental activities the valuable knowledge of traditional folk medicine is rapidly getting lost through destruction of natural habitats. Priority measures may therefore be adopted to document this knowledge on uses of plants in medicine from the unexplored areas particularly those unhabited by tribals and rural population. Numerous ethnopharmacological studies aimed at identifying new pharmaceutical products have, therefore been initiated in recent past in Inida and abroad and ethnobotany has become a recognized tool in search for new bio-dynamic compounds of therapeutic value (Anonymous, 2001). Present study is based on this rationale.

An ethnopharmacological survey of Araku valley of Paderu forest division of Andhra Pradesh provided first- hand information on folk medicinal uses of plants for treatment of various diseases and conditions. The area from which data were derived is situated in North latitudes 17°5° to 18°35° and between east Longitudes of 82°17' and 83°1'. The areas explored included Araku valley, Anantagiri, Sukuru, Chintapalli, Sunkkari metta, Pedda bargulu, Gasaba and Paraseda. (Fig. 1).

The study presents 42 folk medicinal species used by the tribals and other ethnic groups for various ailments for the mankind such as Jaundice, diabetes, health tonic, skin diseases, body pains and rheumatic arthritis. The area has not been investigated exhaustively earlier in this direction except for some sporadic reports on medicinal uses of plants. (Vijay kumar & Pullaiah, 1998; Nagaraju & Rao, 1989, 1990; Hemadri and Rao, 1983, 1984; Hemadri *et al.,* 1987, 1988; Balaji Rao *et al.,* 1995; Gupta *et al.,* 1997, 2003, 2005, 2007, 2009 & 2010; Vedavatty, 1998; Kapoor and Kapoor, 1973; Jain, 1981; Khan, 1953; Pullaiah and Yashoda, 1989; Vedavathy

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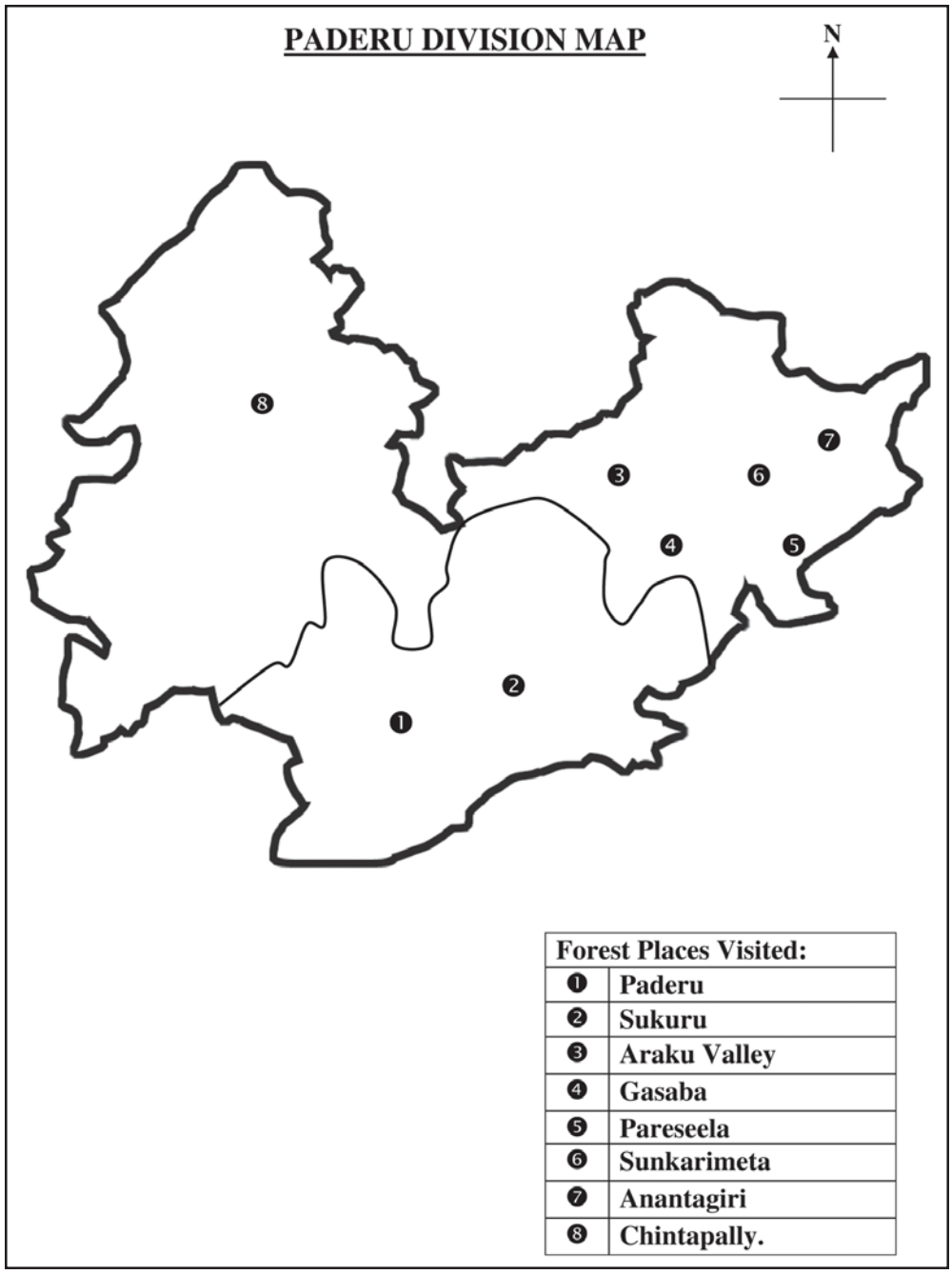

Fig. 1. Study area

and Mrudual, 1995; Vedavathy and Rao, 1992, 1995; and Singh and Khan, 1990).

Methodology

An ethnobotanical survey of Araku valley of Paderu forest division was conducted during January 2011 with a view to study the medicinal herbs of the area and also

record the folk wisdom of tribals known as Bagatta, Dulia, Gadaba, Konda-dora, Khond, Kulia, Mukka-dora, Porja and Valmiki for the treatment of various ailments. The data on folk medicinal uses of plants were collected form the well reputed herbalists (medicine men) through their direct field interviews who also accompanied the survey team in the field to help identify the folk plants and also from the tribals who have long been prescribing the folk medicines to locals for treatment of various common and chronic diseases. Information about the efficacy of the herb was also recorded. Botanical specimens of all folk drugs were collected, identified, and voucher specimens prepared and deposited in the herbarium of Survey of Medicinal Plants Unit, Central Research Institute of Unani Medicine, Hyderabad, for future reference and study. Ingredients and adjuvant drugs in a particular recipe have been recorded by their local names in field and scientifically identified at the institute.

Enumeration of folk medicinal species

The medicinal plants used as folk medicine in the study area are arranged in alphabetical order. Each entry gives the information: Plant's scientific name with family (in bracket), Field book no; Local name(s), Unani name (wherever available), Part(s) used, disease and condition, and method of usage, in sequence;

Acacia leucophloea Willd. (Mimosaceae); CRI 10,000; Tellatumu; Safed-kikar; Stembark; Cough & cold; Decoction of the stem bark is used for cough and cold.

Acacia nilotica (Linn.) Willd. (Mimosaceae); CRI 9980; Nallatuma; Babul; leaves; Redness of the eyes; A paste of babul leaves can be applied on the eyes before going to sleep at night, which lessens the itching, watering and redness of eyes.

Acorus calamus Linn. (Araceae); CRI 9991; Vasa; Bach; roots; Diarrhoea and dysentery; Decoction of the root's powder is given for diarrhoea and dysentery.

Alangium salvifolium (L.f.) Wang. (Alangiaceae); CRI 10,010; Ankolamu; Akola; Fruits and leaves; conjunctivitis & dog bite; 2-3 fruits are swallowed daily to prevent infection and leaf juice is given to drink as an antidote for the bite of mad dog.

Aloe vera Tourn. Ex.Linn. (Liliaceae); CRI 9985; china-Kalabanda; Ghegwar; Pulp of the plant; Wounds and ulcers; Plant's pulp cure ulcers, wounds, burns, colic and good for skin diseases.

Azadiracta indica A. Juss (Meliaceae); CRI 9955; Vepa; Neem; Leaves; Boils and eczema; A poultice of neem leaves is effective for boils and eczema.

Bambusa arundinacea Willd. (Poaceae); CRI 9975; Bongu-Veduru; Bans; Ash of the tree; cough cold and fevers; Ash of the Bamboo is given for cough, cold and fevers.

Boswellia serrata Roxb. (Burseraceae); CRI 10,011; Parangisambrani; Luban; stem bark; stomach ulcer; 2-3 teaspoon full of stem bark powder is given early morning with honey gives a very good relief for stomach ulcers.

Anacardium occidentale Linn. (Kaju)

Bixa orellana Linn. (Latkan.sendori)

Coffea arabica Linn. (Coffee plant)

Mallotus phillippiensis Muell- Arg (Kamela)

Caesalpinia crista Linn. (Caesalpiniaceae); CRI 10,012; Gachchakaya; Gajaga; seeds; stomach pain; seed's and dried rhizome of sonth are taken in equal proportion and powdered by adding a pinch of rock salt, 2-3 tablets prepared and given to the patient for a day to cure the stomach pain.

Calendula officinalis Linn. (Asteraceae); CRI 9981; Marigold; Zergul; Flowers; Eye problems; Marigold is taken as a cold infusion for washing eyes and relaxes the stressed eyes and watering eyes due to over heat of the body.

Calophyllum inophyllum Linn. (Clausiaceae); CRI 10,013; Pouna; Sultan champa; Fruits; Toothache; Dried fruit is fried and powdered by adding a pinch of salt and applied to the gums and used as toothpowder.

Carica papaya Linn. (Caricaceae); CRI 9957; Boppayi; Papaya; Fruits; skin care; Mesh one or two teaspoons of ripe papaya fruit and apply on the face. Keep it for 15 minutes then wash with the water, the enzyme present in the fruit helps to remove dry and dead cells on the skin.

Cinnamomum zeylanicum Breyn. (Lauraceae); CRI 9988; Dalchini; Dalchini; Bark of the stem; cough, cold and fevers. Stem bark powder is given with hot water which is useful for cough, cold and fevers.

Piper nigrum Linn. (Kalimirch)

Syzygium jambos (Linn.) Alston (Gulabjamun)

Woodfordia fruiticosa Kurz. (Gule dhawa)

Coriandrum sativum Linn. (Apiaceae); CRI 9959; Dhaniyalu; Dhania; Seeds; Conjuctivitis; A decoction prepared from coriander seeds can be used as an eye wash for people with conjunctivitis reduction and burning & swellings of the eyes.

Curcuma aromatica Salisb. (Zingiberaceae); CRI 9945; Kasturi-pasupu; Jangli-Haldi; Rhizome; skin diseases; Root's paste is used for skin complaints, inflammations and wounds.

Curcuma zedoaria Rosc. (Zingiberaceae); CRI 10,001; Kachoram; Kapur-Kachuria; Rhizomes; head ache and skin diseases; Rhizome's powder is used for head ache and also for the care of chronic skin diseases.

Dodonea viscosa Linn. (Sapindaceae); CRI 9977; Bandedu; Jangli-Anar; Leaves & stem bark; for gout & rheumatism; Decoction of the leaves and stem bark is given for gout and rheumatism.

Helicteres isora Linn. (Sterculiaceae); CRI 9979; Nuliti; Marorphali; Fruits; stomach pain; Fruit's powder is given for children's stomach pain and intestinal complaints such as colic & diarrhoea and chronic dysentery.

Survey team collecting folk medicines used by the tribals

Hemidesmus indicus R.Br. (Asclepiadaceae); CRI 9990; Sugandhipala; Ushba; Roots; Blood purifier; Decoction of the root's powder is given as blood purifier.

Leonotis nepetaefolia R.Br. (Lamiaceae); CRI 10,014; Ranabheri; Hejurchai; Leaves; diarrhoea; Juice extracted from the cooked leaves mixed with Piper longum L. (root's powder) is given 2 spoonful in 2 hours duration.

Mangifera indica Linn. (Anarcardiaceae); CRI 9958; Mamidi; Aam; Seed's pulp; Dandruff; The powder of mango seed's pulp and Harad are made into paste with cow's milk and applied the scalp to get off dandruff.

Mucuna pruriens (Linn.) DC. (Fabaceae); CRI 10,002 ; Dulagondi ; Kaunch; Seeds; Aphrodisiac; seed's powder is used as tonic and aphrodisiac also.

Petroselinum crispum (Mill.) Airy shaw. (Apiaceae); CRI 9982; Achu-mooda; parsley; leaves & roots; Diseases of eyes; the raw juice of the parsley leaves and roots is effective for eye care problems such as corneal ulcers, cataract, weakness of eye's and conjunctivitis.

Pinus roxburghii Sarg. (Pinaceae); CRI 9983; Chir; Chir; Stem bark; Cough & Phlegm from lungs; Stembark's decoction is used to reduce fevers as well as cough. It is very effective in bringing up phlegm and mucus from the lungs.

Polygonum barbatum Linn. (Polygonaceae); CRI 9994; Niru-ganneru; Bekh-Unjubaz; Root; Kidney problems & Ulcers. Root's powder is given as diuretic, cures kidney functions & also cures ulcers.

Pterocarpus santalinus Linn. f. (Fabaceae); CRI 9984; Rakta-gandhamu; sandal-surkh; stem wood; Glow of the face & ulcers in the stomach; paste of the red sandal wood is used for complexion & glow of the face; Half a glass of heart wood decoction is given daily for a fortnight to cure all types of ulcers in the digestive system.

Pueraria tuberosa (Willd.) DC. (Fabaceae); CRI 10,003; Dharigummedi; Vidari; Tubers; Contraception; the consumption of tuber in raw form presents conception. But cooked tubers lost its contraceptive property.

Rosa damascena Mill. (Rosaceae); CRI 9946; Gulab; Gulab; Rose petals; Skin diseases; few rose petals, 2-4 drops of almond oil & 4 teaspoons of rose water is to be used for taking bath which gives healing effects to the body and soul & good for skin ailments.

Rubia cordifolia Linn. (Rubiaceae); CRI 9956; Tamaravalli; Majith; Roots; Acne; Rub a piece of majith root on a rubbing stone with a tea spoon of ghee apply to face for curing acne.

Sapindus trifoliatus Linn. (Sapindaceae); CRI 9954; Kunkudu chettu; Reetha; Fruits; Hair's tonic; Reetha & Shikakai fruits powder is used as a shampoo for the growth of hairs.

Semecarpus anacardium Linn. f. (Anacardiaceae); CRI 9986; Bhallataki; Bhilawa; Fruits; Rheumatism & ascites; Fruits are used for ascites & rheumatism.

Sesbania grandiflora (L.) Poiret. (Fabaceae); CRI 10,004; Avesi; Basna; Leaves & flowers; kidney & bladder stones; One to two teaspoonful of leaf juice is given daily for the cure of kidney & bladder stones.

Sida cordifolia Linn. (Malvaceae); CRI 10,005; Chirubenda; Kungyi; Whole plant; Gonorrhoea; Whole plant with roots of Enocostemma littorale Blume is mixed & juice is extracted with sugar and cumin seeds. Half a glass is given to the patients two times a day 3-4 days which is very useful for gonorrhoea.

Solanum torvum Swartz. (Solanaceae); CRI 10,006; Kondavuste; Usti; Fruits; Liver disorder; Dried fruits are seasoned and used in various food items to improve the bile secretion.

Sphaeranthus indicus Linn. (Asteraceae); CRI 9992; Boddatarupa; Gul-e-mundi; Inflorescence; cough & chest congestion; Decoction of the flowers is given for cough & chest congestion.

Stachytarpheta jamaicensis Vahl. (Verbenaceae); CRI 9968; Chirchiti; Uttirani; Leaves; Fevers; Decoction of the leaves is given for fevers.

Strychnos potatorum Linn. f. (Loganiaceae); CRI 10,007; Katakamu; Nirmali; seeds; conjunctivitis; seed's paste prepared with honey is applied to the eyes which cures cojuctivitis.

Tectona grandis Linn. (Verbenaceae); CRI 9969; Teku-Chettu; Sagwan; Wood; Burning of stomach; Decoction of the wood's powder is given orally for burning of stomach.

Terminalia arjuna (Roxb. ex. DC.); (Combretaceae); CRI 10,008; Tellamaddhi; Arjuna; Stem bark; to cure high blood pressure; Stem bark along with raw of asgandh-desi & fruits of Amla and Gulbel are powdered & two spoons taken daily to control blood pressure.

Thevetia peruviana (Pers.) Schum (Apocynaceae); CRI 10,009; Pacha-ganneru; Pila-kaner; Stem bark; Intermittent fevers. The bark is useful in various kinds of intermittent fevers.

Vernonia cinerea (L.) Less. (Asteraceae); CRI 10,015; Garitikamma; Sahadevi; Seeds; Leucoderma. A spoonful of seed's powder is mixed with black pepper is given internally daily for leucoderma.

Discussion

In the present study some traditional therapeutic methods employed by the natives of Araku valley of Paderu Forest Division have been discussed. Out of 95 taxa of medicinal plants collected and identified from the study area 42 are used locally in folk medicines by local tribals and other ethnic people viz. Bagatta, Dulia, Gadaba, Konda-Dora, Khond, Kulia, Mukka-dora, Porja and Valmiki for the various common ailments; including diarrhoea and dysentery, cough & cold, fever, ulcers, skin diseases and rheumatic arthritis.

From the enumeration it is clear that tribals of Araku valley of Paderu Forest Division still depend, partially, on the nature for their livelihood. No doubt civilization has touched almost all villages, but for economic backwardness they depend on forest for food, fuel, other requirements and an important are is the medicinal practices. These practices and knowledge treasures are transferred to these generations from their forefathers. (Bapuji and Venkat ratnam, 2009).

Pharmaceutical researches acknowledge that screening plants on the basis of information derived from traditional knowledge saves billion dollars in time and resources. However, the traditional knowledge has been eroding in the tribal society day by day. The crucial factors responsible for such erosion are the pressure of modernization and migration of youth from tribal areas to semi-urban or urban areas to take up job and employment. If such things are continue to happen in these communities then knowledge related to ethnobotany will vanish from the region. Similar factors were believed to be the reason for the loss of traditional ethnobotanical knowledge in Iban community in Sarawak Malaysia (Jarvie and Perumal, 1994) and Raji tribal community of Central Himalaya, India (Negi *et al.,* 2002). The plant based traditional medical systems continue to provide the primary health care to more than three-quarters of the world's populace. The World Health

Organization has estimated that over 80% of the global populations rely chiefly on traditional medicine (Akerele, 1992).

Usage of some of the medicinal plants recorded during the present investigation was found to be the same as reported by the earlier workers from the study area (Jain, 1991) among these were *Rubia cordifolia* Linn.; Root used for curing acne, *Coriandrum sativum* Linn.; Seeds used for conjunctivitis, *Acacia nilotica* (Linn.) Willd.; Leaves used for curing redness of the eyes, *Mucuna pruriens* (Linn.) DC; Seeds used as aphrodisiac, *Polygonum barbatum* Linn.; Root's powder is used as diuretic & cures kidney functions, *Pterocarpus santalinus* Linn. f.; Stem wood is used to cure ulcers in the stomach, *Curcuma aromatica* Salisb.; Rhizome's paste is used for the cure of skin diseases, *Azadiracta indica* A. Juss.; A poultice of neem leaves used for boils & eczema, *Semecarpus anacardium* Linn. f.; Fruits used for ascites & rheumatism, *Helicteres isora* Linn.; Fruits powder used for Children stomach pain. However, their manner of use in majority of cases, are different as far as the part of the plant used, ingredients added and method of preparations are concerned. Many new uses of some of these species have been recorded and provided.

The data on folk medicinal uses have been compared with recent available literature, (Anonymous, 1948-1976; 1992; 2001; Hussain *et al.,* 1992; Jain, 1991; Rastogi and Mehrotra, 1991-1998; Chetty & Rao, 1989; Hemadri, 1981,1991,1992; Henry *et al.,* 1978, 1994;Vijay kumar & Pullaiah, 1998; Nagaraju & Rao, 1989, 1990; Balaji Rao *et al.,* 1995; Gupta *et al.,* 1997; 2005; 2007; 2008; 2009 & 2010; Imam *et al.,* 1992; Vedavathy *et al.,* 1991; Venkata raju and Reddy, 1998; Sudhakar and Rao, 1985; Suryanarayana raju, 1996; Raja Reddy, 1986; 1988; Arunee kumar *et al.,* 1991; Elliot, 1859; Ellis, 1987 and Kumar & Nisteswar, 1983) and found that most of the folk medicinal plants are duly reported in the literature, however, their mode of application, ingredients and parts used are different. Therefore the present study represents contemporary folk uses of medicinal plants of the area investigated. It would be worthwhile to subject all these folk drugs to scientific testing in the context of claims reported herein.

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Conservation of Unani Medicinal Plants in Andhra Pradesh: A Need of the Day

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Abstract

Andhra Pradesh Forests contain a rich flora of medicinal value and it has been found that the demand for the medicinal plants has been increasing year after year. At the same time it has also been observed that many of the important plant species are fast disappearing due to various biotic factors such as fires, grazing and illicit removal besides enormous use as raw material for manufacturing ISM drugs.

A survey team of this institute, therefore, initiated germplasm collection of Unani medicinal plants from the different agro-climatic regions of Andhra Pradesh Forests for evaluation, multiplication and conservation of genetically important medicinal plants and results are encouraging. For this programme, a developmental strategy for indigenous Unani herbal drugs is very important process with a view to provide necessary infrastructure for operation processes such as agro-techniques, drying, packing under hygienic conditions, storing and marketing the produce in the domestic consumer market, and for export. These issues are discussed in the present report. In view of these considerations, it seems necessary that at least the important and the more commonly used Unani medicinal plants of Andhra Pradesh are studied systematically with reference to their biodiversity status and suitable conservation studies are suggested.

The study provides information on prioritized Unani medicinal species needing special attention for their protection and conservation. In this endeavour agrotechniques for cultivation of such species are given in an effort to provide available information on this most vital aspect.

Keywords: Unani medicinal plants, A.P. forests, Biodiversity.

Introduction

The International Convention on Biological Diversity, 1992 obliges all parties, including India to prepare an inventory and monitor biodiversity and make all attempts to conserve these resources. India's biological diversity Act 2002 aims to promote conservation and sustainable use and equitable sharing of benefits of India's biodiversity resources.

There has been a rapid decline in the biodiversity of the world, more particularly during the past two decades or so. Biodiversity losses have been alarming in the developing countries in the tropics. For example, in India, the Uttara Kannada district of Karnataka, the forest area has come down from 8,000 sq km to 6,000 sq km, in about 40 years (Potter, 1996). This demonstrates an enormous loss of biodiversity in a small area over a short period of time. There are innumerable

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examples, the world over. The underdeveloped countries are generally less aware of the degree of biodiversity loss in their countries and its consequences.

Biodiversity losses occur due to habitat destruction, over harvesting, pollution, inappropriate and often accidental introduction of exotic plants and animals, etc. Habitat destruction is often related to development projects like land conversion, construction of dams, etc. Biodiversity is also lost due to sudden natural calamities like floods, cyclones, hurricanes, earth quakes, etc. Conservation of biodiversity is one of the paramount concerns the world over. Governments, nongovernmental organisations (NGOs), scientists are all preoccupied with the problem of devising ways and means of conserving biodiversity, or at least retarding the rapid rate of its loss. It is in this context the Unani medicinal plants of Andhra Pradesh require a thorough taxonomic handling: (a) for their accurate botanical description and taxonomic determination, (b) to understand the magnitude of their diversity and usefulness, and; (c) to determine the need and extent of conservation. Present communication deals with these aspects.

The area of the present investigation is Andhra Pradesh forests which lies at 75^0 to 75^0·5' E Longitude and 13^0 to 19^0 N Latitude. The main geological formations of the Andhra Pradesh forests are Deccan Tropical (Eastern Ghats to Telangana), Gondwana formation (Godavari valley) and Dharwar Peninsular Granites.

In this direction the important contributions are those of (Joshi, 1986; Dave, 1986; Dalal, 1986; Khan, 1953; Kulkarni, et.al., 1997; Rao & Kumari, 1997; Raju, 1997; Akerale, 1991; CAMP Reports, (1995, 1996, 1997; Daniel, 1997 and Hemant, 2002).

Forests and Vegetation

The Andhra Pradesh forests are next only to Madhya Pradesh, Orissa and Maharashtra. Bulks of the Andhra Pradesh forests are tropical dry deciduous with teak as a major species in Telangana Region. There are pockets of moist deciduous forests in valleys in Vizag, East and West Godavari districts. Mangrove forests occur at the mouth of the rivers Krishna and Godavari. Red sandal occurs in the forests of Cuddapah, Chittoor districts and to a small extent in the districts of Hyderabad and Tirupathi. Bamboo occurs in the forests of Adilabad, Khamam, Mahboobnagar, Kurnool, East & West Godavari, Vizag and Srikakulam districts.

Biodiversity – Overview

Although there are around 8,000 medicinal plants species used by different communities in India across different ecosystems, only around 10% of them (880 species) are in active trade. Among these, some 48 species are exported in the form of raw drugs and extracts, while an estimated 42 species are imported. The wild populations of about 100 of the traded species are known to have declined, thereby making them to be considered threatened. This is the situation of raw drug trade in India that unfolds. Before ascertaining the reasons for this, let us try to

understand the "what", "where" and "how much" of these raw drugs are in the state of threat of their survival, and needs immediate attention for their protection and conservation (Ravi, 2001).

Conservation and Developmental Strategies for Medicinal Plants

Several national and international agencies have formulated appropriate policies and strategies for the conservation of medicinal Plants. The world conservation strategy (IUCN, UNEP & WWF, 1980) defines conservation as "the management of human use of the biodiversity so that it may yield the greatest sustainable benefit to present generation". The primary goals of biodiversity conservation as envisaged in the world conservation strategy are:

1. Maintenance of essential ecological processes and life support systems on which human survival and economic activities depend;
2. Preservation of species and genetic diversity and;
3. Sustainable use of species and ecosystems, which support millions of rural communities as well as major industries.

Need for Biodiversity of Unani Medicinal Plants of A.P.

Medicinal plants are found in forest areas from the planes to the southern part of India with the greatest concentration in the tropical and subtropical regions. Some of these, found at Areku valley particular in stressful environments, grow very slowly and cannot survive elsewhere. Others withstand more easily in different ecological conditions including the Unani medicinal plants wealth of India which is declining constantly over the years.

Causal Factors

Many factors both natural and man made have been responsible for limiting the distribution of Unani medicinal plants species and are causing them to become rare or even extinct.

1. Environmental factors

a) *Rainfall:* For the past few years the annual rainfall has decreased resulting in the loss of many herbaceous species during summer months.

b) *Deforestations:* Deforestations have been reported over the last two decades. The spread of agriculture, logging, fire wood collection, heavy wood collection, heavy grazing, etc., are the main reasons for reduction of Unani medicinal plants in area. Many valuable Unani medicinal plant species are eradicated or minimized every year due to the deforestation activities.

2. Developmental influences

a) *Submersion:* Loss of many species of medicinal plants has been noticed in forests due to submersion, eg., the Nalamala forest is the catchments of Srikakulam Dam, the main reservoir of A.P. for irrigation and power generation. Submersion of nearly 10 sq. km of forest area during monsoons has resulted in the loss of valuable medicinal plants species.

b) *Infrastructure:* Expansion of roads, installation of power lines and construction of buildings has caused extensive damage to forests and medicinal plants, e.g., Nagarjuna sagar forests of Nalgonda district of A.P.

3. Agriculture and forestry methods

a) *Monoculture:* There has been a progressive increase in monoculture plantations of economically important indigenous as well as exotic species in forests. Monoculture plantation totally affects the organic productivity and reduces the natural stability and complexity resulting in loss of medicinal plants. e.g., *Eucalyptus* and *Acacia* species in many forests.

b) *Encroachments:* Encroachments over forestlands have assumed alarming levels. Apart from felling of trees and clearing vegetation, the cultivation practices followed on high sloppy lands has caused soil erosion, and decline in medicinal plants wealth.

c) *Overexploitation:* Gathering of Unani medicinal plants from the forests are rampant. The collection is by way of unorganized forest collectors, who in turn, sell the raw drugs to a contractor at the price fixed by the latter. But now, due to the awareness created by the members of the 'Local Unani Medicinal Practitioners Association', illegal gathering has been controlled to a certain extent.

Conservation and Cultivation

Due to illicit cuttings, indiscriminate collections and number of other biotic interferences, the herbal wealth is declining at a fast rate even in Andhra Pradesh. About 50 plants which require conservation and cultivation to maintain the herbal treasure of Andhra Pradesh are listed in the present paper. Mass and clonal selections were also adopted for the improvement of various medicinal plant species. The suitable location for cultivation for each plant has also been given under bracket (Table 1). The area of cultivation can be chalked out as per the market demand and availability of land.

In addition to above, few other plants which do not grow as wild in A.P. forests but can be cultivated in herbal gardens are :

Table-I. List of important Unani medicinal plants suggested for conservation and cultivation to maintain the Herbal treasure of Andhra Pradesh forests.

S. No.	Botanical Name	Common Name	Suitable locations for cultivation of each plant
1	*Adhatoda zeylanica* Medik	Adosa	In marginal hedges
2	*Aloe barbadensis* Mill.	Ghigwar	Along margin hedges
3	*Aristolochia indica* L.	Tella-ishvari	Shady places and herbal farms
4	*Asparagus racemosus* Willd.	Satawar	In deciduous forests of A.P.
5	*Bauhinia variegata* Linn.	Kachnar	Roadsides of A.P.
6	*Caesalpinia crista* L.	Gajaga	Marginal hedges of herbal farms
7	*Cassia augustifolia* Vahl.	Senna makki	Can be cultivated in herbal farms and fields
8	*Celastrus paniculatus* Willd.	Malkangni	In all deciduous forests
9	*Centella asiatica* (L.) Willd.	Brahmi	In farms and fields in moist places
10	*Clerodendrum serratum* (L.) Moon	Bharangi	As a hedge in the herbal gardens
11	*Commiphora wightii* (Arnott) Bhandari	Guggul	In deciduous forests of A.P.
12	*Embelica officinalis* Gaertn.	Amla	Forests, gardens and road sides
13	*Embelia ribes* Burm.f.	Babrung	Forests of Narsapur and preferably in shady places
14	*Gloriosa superba* Linn.	Kalihari	In herbal gardens
15	*Hemidesmus indicus* R.Br.	Ushba-desi	As a climber in herbal garden
16	*Operculina turpethum* (Linn.) Silva-Manso	Dudh-kalmi	Along hedges
17	*Plumbago zeylanica* Linn	Shitraj	In herbal farms
18	*Plumeria alba* Linn.	Champa	Road sides and herbal gardens

Table-I. *(Contd.)*

S. No.	Botanical Name	Common Name	Suitable locations for cultivation of each plant
19	*Semecarpus anacardium* Linn.f.	Bhilawa	In the deciduous forests of Narsapur
20	*Solanum nigrum* Linn.	Mako	In beds of herbal garden and farms
21	*Strychnos nux-vomica* Linn.	Kuchla	In the forest of Tirupathi and Vikharabad
22	*Strychnos potatorum* Linn.f.	Nirmali	In the forests of Narsapur and Adilabad
23	*Terminalia arjuna* (Roxb.) W&A.	Arjuna	Both sides of the roads and deciduous forests
24	*Terminalia belerica* Roxb.	Bahra	South A.P. forests gardens and road sides
25	*Withania somnifera* Dunal.	Asgand desi	In herbal farms

- *Rauvolfia serpentina* Benth. ex Kurz (Asrol); *Tylophora indica* (Bum.f.) Merrill (Antamul); *Andragrophis paniculata* Wall ex Nees (Kalmegh); *Saraca indica* Linn. (Ashoka); *Piper longum* Linn. (Piplamul) etc.

Joshi (1986) stressed the need for the conservation and cultivation of medicinal plants in Gujarat. He mentioned that due to illicit cutting, indiscriminate collections and number of other biotic interference, the herbal wealth is diminishing at a fast rate in Gujarat. Dave (1986) also mentioned that there is a scope for cultivation of more species of medicinal plants in the forests on a large scale in Gujarat e.g. Khari, Babul, Neem, Siras, Sheesham, Amla, Amaltas, Harda, Imli, Anar, Nariyal, Ashoka, Champa, Amrita etc.

The issue of conservation and cultivation of medicinal plants has been extensively dealt in the literature (Anonymous, 1992, 2001; Chopra et al., 1992; Gamble and Fischer, 1915-1935; Gupta et al., 2009; Hooker, 1897-1997; Khan, 1953, 2001; Sarin, 1996, 2004; UNEP, 1995; Varier, 1994) stressing the need for their sustainable use before it is too late.

The CRI, Hyderabad initiated germplasm collection of Unani medicinal plants from different agro-climatic regions of Andhra Pradesh forests and transplanted in the herbal garden in an attempt to conserve their biodiversity (Table 2). The results are encouraging in terms of multiplication and conservation of genetically important

Table-2. Agrotechniques for cultivation of the important Unani medicinal plants growing in A.P. forests

S. No.	Botanical Name/ Family	Unani Name/ Common Name	Propa-gation material	Soil Type(s)	Space	Manure & fertilizers	Irrigation	Useful parts	Har-vesting	Yield	Profit	Uses
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1.	*Cassia angustifolia* Vahi. (Caesalpiniaceae)	Senna	Seeds @ 5 kg/ht	All types of soils	40x30 cm	FYM 5-10 t/ha N 80 kg/ha P_2O_5 – 40 kg/Ha K_2O 40kg/ haZnSO_4 50 kg/ha	6-7 days initially, 15-20 days later	Leaves	90 days after sowing, 2 harvests at 30 to 35 days	2000 kg dried leaves and 800 to 1000 kg pods/ ha/year	Rs.12,000/ ha (NP)	Leaves are used as laxative, purgative for habitual consti-pations
2	*Withania somnifera* Dunal. (Solanaceae)	Asgandh-Desi	Seeds	Sandy loam soil	60x60 cm	FYM 5-10 t/ha	Rainfed 15-20 days gap in non-rainy days	Roots, seeds, fruit, bark and leaves	150 to 170 days	400 kg to 500 kg/ha of dried roots, 50 kg seed/ha	Seeds rate @ 5 kg/ha Rs.30,000 to 40,000 per ha - net Income per year	Roots are toxic, useful for rheumatism, diuretic
3	*Aloe barbadensis* Mill. (Liliaeeae)	Gheekwar	Root suckers & rhizome	All types of soils	60 x 45	FYM 15 t/ha NPK mixture 150 kg/ha	4-5 irrigations/ year	Leaf pulp	8 months after planting	10,000 to 12,000 kg/ha of fresh wt. Leaf pulp	Crop needs replantation after 5 years suckers required Rs.20,000/ ha (NP)	Stomachic, liver disorders and cosmetics

Table-2. *(Contd.)*

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
4	*Catharanthus roseus* G .Don. (Apocynaceae)	Sada bahar	Seeds, stem, cuttings, seed 2.5 kg	Wide variety of soils	45x35 cm	FYM 10-15 t/ha N 40 kg/ haP_2O_5 – 30 kg/ haK_2O 60 kg/ha	4-5 irrigations/ year	Leaves, roots	12 months of sowing	4 tons of leaves and 1.5 of roots/ha. year	Irrigated, NP: Rs. 25,000/ha	Anti-spasmodic, Leukaemia, abortifacient & skin diseases
5	*Acorus calamus* Linn. (Araceae)	Bach	Live ends a tops of the previous crop	Moist soil (same as rice)	30x30 cm (staggered planting preferred	FYM 10-15 t/ha N 25 kg/ ha P_2O_5 – 50 kg /ha K_2O 60 kg/ha	5 cm water level in the beginning and 10 cm water level in the field later	Rhizomes	After 100 to 120 days of planting, later on at 60-75 days	10 tons of Rhizomes/ ha	5t/ha rhizomes required for planting, Net profit (NP): Rs. 15,000-20,000/ha	Stomachic, appetizer, kidney diseases, epilepsy and hysteria
6	*Glycyrrhiza glabra* Linn. (Fabaeeae)	Mullethi	Roots cuttings, runners & under-ground stem	Wide variety of soil	5x45x60 cm	FYM 15-20 t/ha N 40 kg/ha P_2O_5 – 40 kg/Ha K_2O 20kg/ ha$ZnSo_4$ 25 kg/ha	Weekly intervals	Rhizomes/ roots	15-24 months after planting	2-3 tones of dried Roots/ha.	Net profit Rs.25000/ ha.	Expectorant, tonic, laxative & mild astringent

Table-2. *(Contd.)*

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
7	*Piper longum* Linn. (Piperaceae)	Pipli	Seeds, suckers, cuttings & layering	Well drained loamy soils	60x60M	FYM 20 t/ha	Once in a week	Roots, fruits	6 months after planting	400 kgs/ha year dry spike, 1000 kg/ha (3^{rd} year) 500 kg/ha (dry roots).	Green to dry spike, ratio is 10: 15 (Shade is required) NP: Rs. 13,000/ha	Aphrodisiac, useful for bronchitis and asthma
8	*Rauvolfia serpentina* Benth. (Apocynaceae)	Asrol	Seeds, root Cuttings & stem cuttings	Clay loam	45x30cm	FYM 25-30 t/ha N 60 kg/ha P_2O_5 – 30 kg/Ha K_2O 30 kg/ha	Once in fortnight	Roots	2-3 years after planting	2,200 kg/ ha of air dried roots (2 years old)	Seed rate @ 10 kg/ha, 3300 kg air dried roots/ ha 3 year old. NP: Rs.30,000/- to 50,000/- per ha	Sedative, anti-hypertensive and use in epilepsy also
9	*Gloriosa superba* Linn. (Liliaceae)	Adavinabhi	"V" shaped rhizomes	Sandy loam soils ph 6 to 7	60x45 cm	FYM 15-20 t/ha N 125 kg/ha P_2O_5 – 50 kg/Ha K_2O 75kg /ha	Once is fortnight	Tubers and seeds	170-180 days, pods are shade dried.	200-250 kg dried Seeds/ha & pericarp 150 to 180 kg/ha	Tubers are also require for planting, net income is Rs. 38,000/ ha/year	Roots are used for rheumatism & gout & also used for chronic ulcers and piles

Table-2. *(Contd.)*

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
10	*Vetiveria zizanioides* (Linn.) Nash. (Poaceae)	Khas	Rooted tips	Wide variety of soils	45x30 cm	FYM 5-10 t/ha N 25 kg/ha P_2O_5 – 25 kg/Ha K_2O 25 kg /ha	2-3 times in a month	'Roots	15-18 months after planting	4-5 of roots and 20 kg of oil per hec	0.6 to 1% oil from roots NP: Rs. 30,000/ha	Perfumery & cosmetics
11	*Rosemarinus officinalis* Linn. (Lamiaceae)	Rosemary	Stem cuttings & seeds	Light loamy soils	120x45 cm	FYM 15t/ha N 100 kg/ha P_2O_5 – 80 kg/Ha K_2O 75 kg /ha	Weekly once	Leaves	8 months after planting - 1st year - 2 harvest, subsequent 2-3 harvest	12-15 t of herb ha/ year, 85-100 kg of oil/ha/ year	0.7% of oil from Leaves. NP: Rs. 40,000/ha	Perfumery, soaps & detergents
12	*Coleus forskorlii* Briq. (Lamiaceae)	Pashan-bhedi	Stem cuttings	Porous, well drained soils	60x20cm	FYM 10t/ha N 40 kg/ha P_2O_5 – 60 kg/Ha K_2O 75 kg /ha	Once in 3 days for the first 2 weeks later on weekly intervals	Tubers	135-150 days after planting	1500-2000 kg dry tubers/ha	NP: Rs. 30,000/ha	Chronic cough, asthma, painful urination, epilepsy & improves vitality

Table-2. *(Contd.)*

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
13	*Mucuna pruriens Baker, non DC.* (Fabaceae)	Kaunch	Seeds	Wide range of soils	60x60 cm	FYM 15 t /ha N 100 kg/ha P_2O_5 – 80 kg/Ha K_2O 75 kg /ha	4-6 irrigations	Seeds	Harvested 3-4 times in the season	1500-1750 kg Seeds/ ha (rainfed) 3000 to 3750 kg Seeds/ha irrigated.	Crop needs supports, seed 50 kg/ha. NP: Rs. 25,000/ha	Menstrual disorders, nervine tonic and astringent
14	*Andrographis paniculata* Wall. Ex. Nees. (Acanthaceae)	Kalmegh	Seeds, stem cuttings	All types of soils	50x15 cm or 15x15 cm	FYM25t/ha N 75 kg/ha P_2O_5 - 75 kg/ha K_2O 50 kg/ha	Weekly once	Whole plant	90-120 days of sowing	200-2500 kg dry Herb/ha	Seed rate @ 400 g/ha. NP: Rs. 25,000/ha	Bitter tonic Febrifuge & jaundice
15	*Ocimum sanctum* Linn. (Lamiaceae)	Tulsi	Seeds@33 00g/ha	All types of soils	40x40 cm	FYM 15 t/ha N 120 kg/ha P_2O_5 - 50 kg/ha K_2O 60 kg/ha	Weekly intervals	Leaves	1st harvesting - 90 days after planting 75 days intervals	10-15 t. of fresh Herb/ha/ year, 10 to 200 litres oil/hec	Herb contains 0.1 -2.3% oil. NP: Rs. 20,000/ha	Antiseptic & expectorant & memory enhancer

*NP = Net Profit

medicinal plants. Seriousness of this problem has to be, therefore, considered in order to evolve proper agro-techniques for the cultivation and ensure availability of the regular supply of medicinal plants.

For the success of this programme, a combined approach of medico-botanists, forest Officers, agriculturists and pharmaceutical personnels is essential with cooperation and support of Government. A developmental strategy for Unani herbal drugs for operations such as drying, packing under hygienic conditions, storing and marketing the product in the domestic consumer market is also important under experts guidance.

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Clinical Study of Eosinophilia with Reference to the Efficacy of Qaranfal (*Eugenia caryophylla* Thunb.), Irsa (*Iris ensata* Thunb.), Zanjabeel (*Zingiber officinalis* Rosc.) and Maghz-e-Amaltas (*Cassia fistula* Linn.) and its Management

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Abstract

The concept of eosinophilia in Unani System of medicine seems to be new. But if we trace back the historical genesis of this disease, we will to know that the basic concept is an ancient one. Most of the famous unani scholars have described the *Nar-e-farsi* (Eczema), *Jarb* (Scabies),*Sual* (cough), *Hikka* (Pruritus), *Hikkaul unf* (Nasal itching) and *Shara* (Urticaria) in their treatises .Although the etiopathogenesis of these ailments have different humoral involvements but their clinical presentation resembles with hypersensitivity (*Zood Hassasiyat)*. In Unani classical text, the symptoms and signs (*alamat)* of these clinical entities have been attributed towards the concept of hypersensitivity (*Zood hassasiyat*) and it has now proven by researchers that hypersensitive immune response of body to the allergens found in the environment plays a vital role in the etiopathogenesis of these ailments.

The main objective of this study was to scientifically evaluate the anti-allergic activity of drugs Irasa (*Iris ensata Thunb.*), Zanjabeel(*Zingiber officinalis Rosc.*), Qaranfal (*Eugenia carryophyllaThunb.*) and Maghaz-e- Amaltas(*Cassia fistula Linn.*) in commonly encountered eosinophilic diseases like Tropical Pul monary Eosinophilia, Bronchial Asthma, Worm Infestation, Urticaria and Allergic Rhinitis. For this purpose, the following non pharmacopeial preparation based on *Mufrad Advia*(Single Drugs) was used, whose composition is given elsewhere. Significant improvement in symptoms & signs and laboratory findings of the disorder was observed. At the end of the study, it was concluded that the formulation was found effective in Eosinophilia of various etiologies especially in Tropical Pulmonary Eosinophilia, Urticaria and Allergic Rhinitis. The primary end point, mean Differential Eosinophil Count (DEC) of patients suffering from Tropical Pulmonary Eosinophilia (TPE), Bronchial Asthma, Urticaria, Worm Infestation , Allergic Rhinitis was 29.33±3.67 %,13.63±2.60 %, 13.17±2.59 %, 11.88±1.92 %, 16.25±4.68 % and it got reduced to 14.75±3.30 %, 12.94±2.24 %, 6.08±1.17 %,11.44±2.08 %, 8.38±2.75 % respectively.The Absolute Eosinophil Count (AEC) of patients suffering from Tropical Pulmonary Eosinophilia (TPE), Bronchial Asthma, Urticaria, Worm Infestation, Allergic Rhinitis was 1868.70±443.78 per cumm, 917.67±221.84 per cumm, 874.33±195.90 per cumm, 805.44±253.47 per cumm, 1072.58±388.02 per cumm and it got reduced to 931.83±300.64 per cumm, 877.80±218.12 per cumm, 400.58±91.99 per cumm, 766.81±246.48 per cumm, 550.75±226.20 per cumm respectively.

Keywords: Eosinophilia, *Eugenia caryophylla* Thunb, *Iris ensata* Thunb, *Zingiber officinalis* Rosc., *Cassia fistula* Linn., Hypersensitivity, Unani medicine.

Introduction

Eosinophilia is the presence of >500 Eosinophils per microliter of blood and is common in many settings besides parasite infection (Isselbacher *et al*., 2005).

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Eosinophilia occurs in immediate hypersensitivity reactions, drug reactions, and some collagen diseases (Goldman *et al*., 2004, Gutierrez *et al*., 2000).Parasitism or atopy is the most common aetiology, and in one study, these factors explained 92% of 47 cases of Eosinophilia (Toel *et al*.,1985). As a result of their potential role in Asthma, Eosinophils have received considerable attention for research community in the last decade (Beutler *et al*., 2001). On going through the Unani classical text the basic concept of Eosinophilia seems to be old. Most of the famous Unani scholars like Hippocrates (460-370 BC), Galen (130-200 AD), Rhazes (885-925 AD) and Avicenna (980-1080 AD) have described the diseases which are invariably associated with Eosinophila like Zeequn-Nafas (Asthma), Deedan-e-Ama (Intestinal Worms), Daulfeel (Elephantiasis), Nar-e-Farsi (Eczema) and Jarb (Scabies) in their treatises. They have mentioned the etiological factors and clinical features of these diseases which are almost similar to the etiological factors and clinical features of Eosinophilia.

Simulating the symptoms and signs like Shara (Urticaria), Hikka (Pruritus), Sual (Cough), Attas (Sneezing) and Hikka-ul-Unf (Nasal Itching) have been described in details. It is but obvious that there was no proper equipment (microscope) and technologies to diagnose the eosinophilia as disease at the time of ancient Unani Physicians. The only way to diagnose a disease was experience and observations.

Avicenna (980-1037AD), in his book Al Qanoon Fit Tib has mentioned smoke among the causes of Zeequn Nafas (Asthma). In context of Attas (Sneezing), he has advised to abstain from dust and smoke to prevent sneezing. While describing the symptoms of worms, he has mentioned breathlessness. It is worth mentioning that he has also written about difficulty in speech (dysarthria) in the symptoms of worms. Under the heading of Alamat (symptoms) of worms he has written edema of body and swelling of testes, which resembles the signs of filariasisss. In context of cough, he has mentioned dust particles and smoke as the aetiological factors. It is noteworthy that he has explained about seasonal variation in the intensity of cough during different seasons. He has mentioned ingestion of *Ghaleez aur Raddiul kemoos* (heavy and adulterated) food as one of the causes of *Hikka* (Pruritus), which reflects the concept of allergy to food (Kantoori, 1303H).

In 1846, Wharton Jones is usually credited with the first description of unstained Eosinophils (Wharton, 1846). The discovery of the Eosinophil was announced by Paul Ehrilich in a presentation to the physiological society of Berlin on 17th January 1879, the title of the paper was “contribution to knowledge of granulated connective tissue cells and of eosinophil leucocytes” (Mahmoud *et al*., 1979).In Tibb-e- Unani Eosinophilia is not mentioned as disease; therefore the line of treatment is not available in ancient literature. But when it is studied and analyzed, Zeequn Nafas (Asthma), Sual (Cough), Deedane Ama (Heminthiasis), Attas (Sneezing), Shara (Urticaria) and Jarb (Scabies) wa Hikka (Pruritis) were seem to be relevant to Eosinophilia. So the treatment could be laid down on the basis of the above conditions.

Material and Methods

The present study was conducted on randomly selected 80 patients presenting with clinical features of their respective groups in which the main feature was Peripheral Blood Eosinophilia from the indoor and outdoor patients of the Department of Moalijat, Ajmal Khan Tibbiya College and Hospital, Aligarh Muslim University, Aligarh during the period extending from 2006-2008. Before starting the trial, informed written consent from each patient was taken and the trial was conducted after the approval of ethics committee. The diagnosis of Eosinophilia was made by Differential Eosinophil Count (DEC) and Absolute Eosinophil Count (AEC). Once the diagnosis of specific Eosinophilia was made, the drugs Irsa, Zanjabeel, Qaranfal, and Maghz-e-Amaltas 6 grams, 3 grams, 3 grams and 4 grams respectively in the form of powder in the dosage 6 grams 12 hourly for 60 days was administered orally. The drugs under trial were procured from Dawakhana Tibbiya College, Aligarh Muslim University, Aligarh.The patients were informed of the expected benefits and hazards and no concomitant treatment was allowed. Clinical assessment of the patient was done fortnightly while haematological evaluation at monthly intervals for two months. Whereas X-Ray Chest (PA View), X-Ray PNS (Water's View), Serum IgE and CT scan wherever needed was done before starting treatment and after the termination. Various biochemical tests were done at the beginning and at the termination of clinical trial.

The observations were tabulated and statistically analyzed by calculating the Mean, Standard deviation followed by paired't' test to the observations recorded before and after the treatment, hence the significance was ascertained. The patients with Eosinophilia who came under observation were broadly divided into five groups' viz. Tropical Pulmonary Eosinophilia (TPE), Bronchial Asthma, Worm Infestation, Urticaria and Allergic Rhinitis. One of Neurocysticercosis also came under observation.

Results

As shown in table no. 1 and 2, the overall improvement in Differential Eosinophil Count and Absolute Eosinophil Count was observed in all the cases but maximum effect in Tropical pulmonary Eosinophilia (TPE) followed by Urticaria and Allergic Rhinitis. Minimal response was seen in Bronchial Asthma and Worm Infestation and no response was seen in Neurocysticercosis.

Table-1 shows that before starting the study mean Differential Eosinophil Count (DEC) of patients suffering from Tropical Pulmonary Eosinophilia (TPE) was 29.33 ± 3.67 % and it got reduced to 14.75 ± 3.30 %. When paired't' test was applied to the observations, recorded before and after the treatment, it was found that $t=50.071$; $P<0.001$ the effect of drugs in decreasing the DEC was highly significant.

Mean Differential Eosinophil Count (DEC) of patients suffering from Bronchial Asthma was 13.63 ± 2.60 % and it got reduced to 12.94 ± 2.24 %. When paired't' test was

Table-1. Showing Effect of Drugs on Differential Eosinophil Count (DEC) in Eosinophilia of Various Etiologies

Total No. of Cases – 80

Aetiology of Eosinophilia	Follow-Up (in days)		
	Before Treatment	After Treatment	
	Mean DEC ± S.D.(%)	Mean DEC ± S.D.(%)	Mean DEC ± S.D.(%)
	0 day	30th day	60th day
TPE No. of Patients – 12	29.33 ± 3.67	23 ± 3.67	14.75 ± 3.30 t = 50.71; p < 0.001
Bronchial Asthma No. of Patients – 23	13.63 ± 2.60	12.17 ± 2.42	12.94 ± 2.24 t = 2.33; p < 0.05
Urticaria No. of Patients – 12	13.17 ± 2.59	10.67 ± 2.39	6.08 ± 1.17 t = 16.30; p < 0.001
Worm Infestation No. of Patients – 16	11.88 ± 1.92	9.94 ± 2.11	11.44 ± 2.08 t = 2.15; p < 0.05
Allergic Rhinitis No. of Patients – 16	16.25 ± 4.68	10.88 ± 3.16	8.38 ± 2.75 t = 14.82; p < 0.001
Neurocysticercosis No. of Patients – 01	13.00 ± 0.00	14.00 ± 00.00	13.00 ± 0.00

applied to the observations, recorded before and after the treatment, it was found that t=2.33; P<0.05 the effect of drugs in decreasing the DEC was significant.

Mean Differential Eosinophil Count (DEC) of patients suffering from Urticaria was 13.17±2.59 % and it got reduced to 6.08±1.17 %. When paired't' test was applied to the observations, recorded before and after the treatment, it was found that t=16.3; P<0.001 the effect of drugs in decreasing the DEC was highly significant.

Mean Differential Eosinophil Count (DEC) of patients suffering from Worm Infestation was 11.88±1.92 % and it got reduced to 11.44±2.08 %. When paired't' test was applied to the observations, recorded before and after the treatment, it was found that t=2.15; P<0.05 the effect of drugs in decreasing the DEC was some significant.

Mean Differential Eosinophil Count (DEC) of patients suffering from Allergic Rhinitis was 16.25±4.68 % and it got reduced to 8.38±2.75 %. When paired't' test was applied to the observations, recorded before and after the treatment, it was found that t=14.82; P<0.001 the effect of drugs in decreasing the DEC was highly significant.

As there was only 1 case of Neurocysticercosis and paired 't'test could not be applied on single data, hence t and p values were not calculated. But according to the values of DEC before and after the treatment, our drugs had insignificant effect on DEC.

Table 2 shows that before starting the study mean Absolute Eosinophil Count (AEC) of patients suffering from Tropical Pulmonary Eosinophilia (TPE) was 1868.70±443.78 per cumm and it got reduced to 931.83±300.64 per cumm. When paired't' test was applied to the observations, recorded before and after the treatment, it was found that t=19.65; P<0.001 the effect of drugs in decreasing the AEC was highly significant.

Mean Absolute Eosinophil Count (AEC) of patients suffering from Bronchial Asthma was 917.67±221.84 per cumm and it got reduced to 877.80±218.12 per cumm. When paired't' test was applied to the observations, recorded before and after the treatment, it was found that t=2.32; P<0.05 the effect of drugs in decreasing the AEC was significant.

Table-2. Showing Effect of Drugs on Absolute Eosinophil Count (AEC) in Eosinophilia of Various Etiologies

Total No. of Cases – 80

Aetiology of Eosinophilia	Follow-Up (in days)		
	Before Treatment	After Treatment	
	Mean AEC ± S.D. (per cumm)	Mean AEC ± S.D. (per cumm)	Mean AEC ± S.D. (per cumm)
	0 day	30th day	60th day
TPE No. of Patients – 12	1868.70 ± 443.78	1397.61 ± 353.20	931.83 ± 300.64 t = 19.65; p < 0.001
Bronchial Asthma No. of Patients – 23	917.67 ± 221.84	798.94 ± 244.19	877.80 ± 218.12 t = 2.32; p < 0.05
Urticaria No. of Patients – 12	874.33 ± 195.90	699.60 ± 146.68	400.58 ± 91.99 t = 14.62; p < 0.001
Worm Infestation No. of Patients – 16	805.44 ± 253.47	634.40 ± 209.79	766.81 ± 246.48 t = 2.76; p < 0.05
Allergic Rhinitis No. of Patients – 16	1072.58 ± 388.02	676.50 ± 208.85	550.75 ± 226.20 t = 11.90; p < 0.001
Neurocysticercosis No. of Patients – 01	845 ± 0.00	910 ± 0.00	845 ± 0.00

Mean Absolute Eosinophil Count (AEC) of patients suffering from Urticaria was 874.33±195.90 per cumm and it got reduced to 400.58±91.99 per cumm. When paired't' test was applied to the observations, recorded before and after the treatment, it was found that t=14.62; P<0.001 the effect of drugs in decreasing the AEC was highly significant.

Mean Absolute Eosinophil Count (AEC) of patients suffering from Worm Infestations was 805.44±253.47 per cumm and it got reduced to 766.81±246.48 per cumm. When paired't' test was applied to the observations, recorded before and after the treatment, it was found that t = 2.77; P < 0.05 the effect of drugs in decreasing the AEC was significant.

Mean Absolute Eosinophil Count (AEC) of patients suffering from Allergic Rhinitis was 1072.58±388.02 per cumm and it got reduced to 550.75±226.20 per cumm. When paired't' test was applied to the observations, recorded before and after the treatment, it was found that t=11.90; P<0.001 the effect of drugs in decreasing the AEC was highly significant.

As there was only 1 case of Neurocysticercosis and paired't' test could not be applied on single data, hence t and p values were not calculated. But according to the values of AEC before and after the treatment, our drugs had insignificant effect on AEC.

Discussion

Effect of Drugs in Bronchial Asthma

This group was consisted of 23 patients. Maximum benefit was observed in the crepitations. There was 82.6% improvement in crepitations. Expectorant (Tarique, 2004) property of Zanjabeel, Irsa and Qaranfal and antiseptic (Sharma, 2003, Sala, 2003) propertyof Qaranfal may be attributed to this effect of drug. Expectoration will cause non-stagnation of sputum leading to less chances of infection. No improvement in emphysema was noticed as this is a permanent change.

Effect of Drugs in Tropical Pulmonary Eosinophilia (TPE)

Maximum benefit was observed in hyper-functioning of accessory muscles as there was 83.33% improvement. This effect can be explained by virtue of anti-allergic property of Zanjabeel and anti-inflammatory and antispasmodic effect of Irsa (Chopra *et al*, 1958).

There was 50% improvement in the rhonchi at the end of study. Our drugs had anti-inflammatory, antispasmodic and expectorant properties. Thus by removing mucous plug from airways it ease the obstruction and reduced the rhonchi. There was 75% improvement in the cough at the termination of treatment. This effect was due to anti-allergic and expectorant property of Zanjabeel and Irsa.

Effect of Drugs in Worm Infestation

Maximum effect was observed in pain in abdomen, improvement was 85.71%. This effect was due to the vermicidal and purgative (Sala, 2003) property of Maghz-e-Amaltas. This can also be explained by antispasmodic property of Irasa and Qaranfal.

Effect of Drugs in Urticaria

There was 58.33 %, 83.33%, 58.33 and 66.67% improvement in the clinical features of local itching, swelling, generalized itching and rhonchi respectively. As the Urticaria is almost always associated with local itching, swelling and severe rhonchi so improvement in all these clinical features can be explained on the basis of anti-allergic activity of Zanjabeel, anti-inflammatory activity of Maghz-e-Amaltas and Esra and antispasmodic activity of Irasa and Qaranfal.

Effect of Drugs in Allergic Rhinitis

All the presenting features were associated with hypersensitive immune response of the body to the allergens found in the environment. Our formulation constituents include Ginger and Irsa which had anti-allergic and blood purifier effect respectively; hence improvement in nasal itching, running of nose, sneezing and headache may be attributed to these effects of drugs.

Conclusion

This unani formulation not only provides the relief in allergic manifestations, but also manages some of the etiologies of Eosinophilia.Thus managing Eosinophilia with Qaranfal (*Eugenia caryophyllaThunb.*), Irsa (*Iris ensataThunb.*), Zanjabeel (*Zingiber officinalis Rosc.*) and Maghz-e-Amaltas (*Cassia fistula Linn.*) is a Holistic approach, which is backbone principle of management in Unani System of Medicine

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The Effect of *Luk Magsool* (Processed Lac) on Diet Induced Hyperlipidemia in Albino Rats

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Abstract

Luk (Lac) is a resinous substance secreted by an insect (*Karica lacca*/*Laccifer lacca*) on the twigs of certain trees. *Luk Magsool* (processed Lac) has been described to be an effective drug in Unani literature, used in the management of obesity and hyperlipidemia. In the present study it was studied for its effect on body weight and lipid profile of normal and lipid rich diet (atherogenic diet) fed albino rats over a period of one month. Animals were divided into 5 groups. Group I received vehicle and normal diet throughout the study. Group II received normal diet and *Luk* (280 mg/kg). The remaining three groups received high lipid diet and served as Negative control (no treatment), Standard control (Gemfibrozil 112 mg/kg) and Test group (*Luk* 280 mg/kg), respectively. One month after the treatment blood was collected from all the animals and the total Cholesterol, Triglyceride, LDL, VLDL, HDL, HDL/LDL ratio and atherogenic index were calculated. Body weight was calculated weekly. The findings of different groups were analysed statistically using Student's't' test.

The test drug brought significant reduction in the level of Cholesterol, Triglyceride, LDL, VLDL and atherogenic index and induced an increase in HDL and HDL/LDL ratio. Body weight increased during the study period but was not found significant. The study demonstrated that *Luk* possesses hypolipidemic, anti hyperlipidemic and anti atherogenic effect. It can be used to manage obesity and dyslipidemia, and also to prevent and cure atherosclerosis and CHD.

Keywords: Lac, Hyperlipidemia, Atherogenic index, Obesity, CHD

Introduction

Luk (Lac) is a resinous substance deposited on the twigs of trees of Banyan, Croton, Acacia, *Peepal* etc, by a small insect (Fig. 1) *Carteria lacca* (Nadkarni, 1976) or *Laccifer lacca* (Anonymous, 1998). It is used medicinally in various traditional systems of medicine (Rao and Ali, 1970). In Unani medicine a number of pharmacological effects such as anti inflammatory, anti bilious, hepatoprotective, stomachic, aphrodisiac, blood purifier, detergent, deobstruent, anti obesity and anti tussive, etc have been attributed to it (Ghani, 1920). It has also been described to be good especially for blood, hepatic, renal and splenic disorders (Husain, 1892; Ghani, 1920). However, its ability to improve *Samne Mufrat* (Obesity) and *Farte Tadassum Fiddam* (Hyperlipidemia) for which it is frequently used by Unani physicians, got such appreciation that other effects were almost eclipsed and *Luk Magsool* (processed lac) attained the status of first choice single drug for the management of obesity, hyperlipidemia and related disorders. It has also been included in the famous anti obesity pharmacopoeal compound drug *Soffofe Mohazzil* (Kabiruddin, 1967) which has been reported to possess anti obesity and

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Fig. 1. Lac insect

antihyperlipidemic activity (Laique, 1999). Obesity and hyperlipidemia are reported to complement each other and cause a number of life threatening diseases mainly atherosclerosis and Coronary Heart Disease (CHD) (Gambhir, 2001) and thereby, are considered to be the important source of morbidity and mortality worldwide. Thus preventing these two disorders holds the key to reduce the burden of many serious diseases. *Luk* is in use in Unani medicine since ancient times and almost all important writers have described its therapeutic utility in *Dasumate Akhlat* (Hyperlipidemia) and *Same Mufrat* (Obesity) (Razi, d. 925; Ibn Sina, d. 1038; Jurjani, d. 1140) but no admissible scientific study has been carried out on this important drug. Although in a preliminary clinical study it has been reported to produce hypolipidemic activity (Anwar et al., 1997) but the absence of any control and lack of blinding in the study design, cast doubt on the authenticity of data.

In view of the above, the present study was therefore, designed to evaluate the efficacy of *Luk Magsool* in diet induced hyperlipidemia and weight gain in experimental animals. Body weight, lipid profile, HDL/LDL ratio and atherogenic index of plasma were calculated after one month's treatment to determine the efficacy of the test drug. Since *Luk* is almost always used after treating it with the decoction of *Izkhir Makki* (*Andropogan scenanthus*) and *Revand chini* (*Rheum emodi*) that besides possessing decoctive, demulcent, deobstruent properties and ability to help remove the viscid and sticky humours (Ghani. 1920), have also been described to protect the visceral organs such as liver, spleen and kidney etc and improve their functioning, therefore, the effect of the test drug was also studied on hepatic and renal function.

Material and Methods

Experimental Animals

Wistar albino rats of either sex weighing 100-150 g, divided in to 4 groups of 6 animals each were used. They were maintained on standard diet (unless stated otherwise) and water *ad libitum* and housed in polypropylene cages at room temperature (25-30 ^{0}C) with a 12 h light: 12 h dark cycle. Animals were acclimatized for one week before starting the treatment.

Test Drug and dosage

Luk was procured from Dawakhana Tibbiya College, Aligarh Muslim University (AMU), Aligarh which has a valid license of supplying crude drugs. The sample was authenticated by Unani physicians at A. K. Tibbiya College, AMU, Aligarh before it was processed according to the method described in National Formulary of Unani Medicine and other Unani books (Anonymous 2007, Ghani, 1920). A decoction from *Andropogan schaenar* and *Rheum emodi* (50 g each) was prepared and *Luk* (100 g) was ground with it in a China clay mortar until a homogenous paste was prepared. The remaining decoction was then added to the paste in another big vessel; mixed well and left for 30 minutes to allow the big particles to settle down (one litre of decoction was used for 100 g of *Luk*). The liquid was then decanted and kept for about 4-6 hours at a secure place. It was again decanted and the precipitate was collected as *Luk Magsool*.

The dose of *Luk Magsool* for albino rats was extrapolated from human therapeutic dose (2 g) after multiplying it by a conversion factor of 7 (Freidrich et al., 1966), and was found to be 280 mg/kg. *Luk Magsool* was suspended in distilled water and administered intragastrically with the help of a gastric canula, once daily.

Diet

Animals during the acclimatization period were fed the commercially available rat chow (Lipton, India). Afterwards a special high lipid diet/atherogenic diet (Kimuru et al., 1998) containing butter (5 g), bread slice (1), wheat flour (3 tea spoon), milk powder (1.5 tea spoon), cholesterol powder (60 mg/kg) and coconut oil (1 ml) was also given during experimentation period along with the normal diet to all the animals except those in plain control and normolipidemic *Luk* treated groups. The high lipid diet was given every day in the morning to the animals and when they consumed it they were allowed free access to the normal diet.

Treatment schedule

After acclimatization period animals were divided into different groups and treated as follows:

Group I (plain control)	Normal diet throughout the study
Group II (normolipidemic *Luk* treated group)	Normal diet + 280 mg/kg of *Luk Magsool*
Group III (negative control)	High lipid diet + normal diet
Group IV (standard control)	High lipid diet + normal diet+ 112 mg/kg of Gemfibrozil
Group V (*Luk* treated group)	High lipid diet+normal diet + 280 mg/kg of *Luk Magsool*

After 30 days all the animals were sacrificed under pentobarbitone anaesthsia and blood samples were collected for the estimation of lipid profile. Total Cholesterol, Triglyceride and HDL were calculated with the help of macro analyzer using kits supplied by Point Scientific, Michigan, USA. The LDL and VLDL were calculated with Friedewald (1972) formula. The atherogenic index of plasma was calculated by the formula AIP = Log [TGL/HDL], while HDL/LDL ratio by dividing the value of HDL with that of LDL. Body weight of the animals was recorded weekly. RFT and LFT were also done to determine the toxicity of test drug, if any.

The findings were compared and analysed using Student's t test. P value of 0.05 or less was considered significant.

Observations and Results

The weight of animals in control group increased from 150 g on day one to 164.43 g ($p< 0.01$) after one month, showing a gradual normal growth. In group II an increase was observed in weekly intervals but the total increase (148 g to 155 g) was not found significant. The negative control group exhibited the maximum growth of about 12%. There was little difference however, between the weight gain exhibited by normal (9%) and negative control groups. The test drug showed an increase of 5.33% which was found significantly lesser in comparison of plain control and negative control groups ($p<0.05$). The increase was not found significant as compared to the initial reading (Table 1).

Total cholesterol in plain control group was found to be 93.33 mg/dl which increased to 105 mg/dl in negative control ($p<0.01$) and came down to 72. 56, 74.72 and 75.16 in normolipidemic, standard control and *Luk* treated groups, respectively ($p<0.01$). The level of Triglycerides was found to be 33.33, 26.20, 46.36.28.66 and 26.34 mg/dl in group 1-5, respectively. The value was found to be significantly increased in negative control as compared to the plain control group ($p<0.01$) while it decreased significantly in normolipidemic, standard and *Luk* treated groups ($p<0.05$). The LDL and VLDL levels in negative control group increased significantly as compared to the control group while in all three treated groups it was found to be decreased ($p<0.05$). The HDL cholesterol on the other hand increased in all

Table-1. Effect of Test Drug on Body Weight (Mean weight in gm ±SE)

	Day 1	After 1 week	After 2 weeks	After 3 weeks	After 4 weeks	% change
Group 1 plain control	150±5.21	152±4.1	156±6.13	159±5.9	164±6.4**a	9.3
Group II Normolipid control	148±4.1	149±3.2	152±3.2	154±2.91	155±5.6	4.76
Group III Negative control	147±3.86	148±5.1	153±2.86	158±4.68	165±2.3**	12.24
Group IV Standard control	148±3.91	149±3.2	151±4.12	153±6.16	154±2.1*b	4.05
Group V Treated group	150±6.08	152±5.91	155±3.76	156±6.42	158±5.16*b	5.33

*= P<.05

** P< 0.01

a=compared with initial readingb= compared with negative control

treated groups (p<0.05). A significant increase in HDL cholesterol and decrease in LDL cholesterol induced by the test drug resulted in increase in HDL/LDL ratio in treated groups. The atherogenic index of plasma also decreased significantly as compared with the control and negative control groups (p<0.05 and 0.01) (Table 2).

RFT and LFT values in all the groups did not show any significant change in any group (Table 3 & 4).

Discussion

The study demonstrated *Luk Magsool* induced lipid lowering effect in normolipidemic and hyperlipidemic groups of animals. It also lowered the body weight in both the groups, significantly. A significant decrease in atherogenic index and an increase in HDL: LDL ratio indicated its protective and curative role in CHD, MI, atherosclerosis and other cardiac diseases. The high lipid diet increased the body weight as well as the cholesterol and lipoproteins significantly as was seen in the findings of negative control group and accordingly the atherogenic index and HDL: LDL ratio were also altered. The reversal of hyperlipidemia and its atherogenic attributes in hyperlipidemic group and their significant reduction in normolipidemic group of animals

Table-2. Effect of test drug on lipid profile (Mean ± SE)

Group	Total Cholesterol (mg/dl)	Triglyceride (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)	HDL: LDL	Atherogenic Index of Plasma
Group 1 plain control	93.33 ±5.20	33.33 ±4.1	28.00 ±2.1	48.66 ±3.5	6.7 ±0.51	0.47 ±0.12	0.076
Group II Normal diet ± Luk	72.56 ±2.94*	26.20 ±2.4*	40.33 ±1.40*	17.43 ±0.22**	5.24 ±0.62*	1.49 ±0.52**	-0.187
Group III Hyperlipidemic diet	105.0 ±3.5**	46.36 ±3.1	26.16 ±0.81	36.23 ±3.1*	9.27 ±1.83**	0.37 ±0.83	0.249
Group IV Hyperlipidemic diet ± Gemfibrozil	74.72 ±5.1*	28.66 ±2.5*	42.83 ±1.22*	16.16 ±1.22**	5.73 ±0.95*	1.63 ±0.90*	-0.174**
Group V Hyperlipidemic diet ± Luk	75.16 ±4.1*	26.34 ±3.5*	40.16 ±1.32*	15.4 ±1.65**	5.26 ±1.25*	1.35 ±0.18*	-0.183**

*= P<.05 ** P< 0.01

Table-3. Effect of test drug on liver function (Mean ± SE)

	Control	Hypolipidemic ± *Luk*	Negative control	Standard control	Test group
SGOT (IU/dl)	32.33 ±2.10	30.60 ±2.40	37.83 ±5.0*	31.6 ±2.7	35.91 ±5.3
SGPT (IU/dl)	28.13 ±2.83	26.0 ±81.5	32.16 ±3.5	32.21 ±3.2	31.5 ±2.24
S. ALP (IU/dl)	10.00 ±1.21	8.13 ±2.1	12.61 ±1.4	8.21 ±1.0	7.93 ±1.23
S. Bilirubin (mg/dl)	0.71 ±0.2	0.67 ±0.1	0.79 ±0.1	0.69 ±0.2	0.74 ±0.1

*= P<0.05

Table-4. Effect of Test drug on Kidney function (Mean ± SE)

	Control	Hypoli-pidemic ± *Luk*	Negative control	Standard control	Test group
S. Creatnine (mg/dl)	0.91 ±0.1	0.68 ±0.09	0.94 ±0.2	0.84 ±0.1	0.89 ±0.1
S. Urea (mg/dl)	30 ±2.3	27 ±3.2	32 ±4.24	30 ±1.81	31 ±3.64
S. Uric Acid (mg/dl)	5.12 ±1.02	4.67 ±0.8	5.3 ±21.0	5.21 ±1.0	5.3 ±21.2

clearly indicated that the test drug possesses hypolipidemic, anti hyperlipidemic, weight lowering and anti atherogenic effect.

The test drug did not allow the body weight to increase significantly in groups of animal received *Luk* as compared to plain as well as negative control groups, indicating weight lowering effect of the test drug. A very little difference between the weight of normal and negative control group observed at the end of the study, may be due to the fact that the deposition of fat and thereby weight gain is a slow process and takes place little late (Yin et al., 2002) as compared to the serum lipid that attains a significant level a bit early (Odetola et al., 2004).

Lipids especially cholesterol and lipoproteins are considered important because they mainly cause atherosclerosis. And even hypercholesterolemia alone is considered sufficient to cause atherosclerosis. A lipid rich diet maintained for three weeks causes a significant increase in serum lipid level in experimental animals (Odetola et al., 2004). In another study even relatively low level of cholesterol diet has been reported to induce fatty streaks in arteries and sometimes even plaques in a few weeks (Wilson et al., 2008). Increased plasma level of LDL and VLDL has been identified as causal factor of atherosclerotic disease (Kannel et al., 1971) and their reduction has been shown to reduce the incidence of CHD significantly (Anonymous, 1984). VLDL rich in triglyceride is the precursor of LDL that serve to supply cholesterol mainly from liver to peripheral tissues where as the HDL effectively transport cholesterol from various tissues towards liver for final elimination. The reverse cholesterol transport renders HDL to be anti atherogenic and thus it has an inverse correlation with the incidence of CHD (Glomset, 1979). It has also been reported that excessive plasma lipids stimulate platelet aggregatabilty and thus promote atherosclerotic development (Velkovaski et al., 2002). So the main preventive approach should be effective reduction of hypercholesterolemia specially the LDL-C, VLDL-C and triglyceride, and elimination of lipids accumulated in the tissues by enhancing its catabolism.

In Unani Medicine two types of *Shahm* (fat) viz. *Sameen* and *Widak*/*Rawaj* have been described. The former is a thinner form of fat which is usually attached to the muscles, vessels and nerves and features in blood producing G*haleez* and *Lazij khilt* (viscous and sticky humour) in vessels while the latter accumulates in tissues and organs and forms body mass (Ibn Nafees, d. 1288). The fat on account of possessing cold temperament has a tendency to accumulate in the parts of the body that are considered relatively cold, or the organs that are afflicted with cold temperament following certain pathological conditions. *Shahm* reduces *Hararate Gharizia* (innate heat) and constricts the blood vessels because of *Boroodate mizaj* (domination of cold temperament). Constriction of blood vessels arrest adequate supply of *Ruh* (Pneuma) to the *Aza* (organs). As a result the level of *Hararate Gharizia* (innate heat) diminishes that leads to the failure of the function of body and finally causes an early death (Majoosi, d. 994 Ibn Sina, d. 1038). Azam Khan further elaborated that *Ghilzat* (vicidity) and *Lozoojat* (adhesiveness/stickiness) of *Akhlat* are the factors responsible to arrest the passage of *Ruh* through vessels (Khan, 2003). *Dasumate Akhlat/Farte Tadassum* (Hyperlipidemia) has also been described to cause *Salabate Sharaien* (Artereosclerosis) along with *Tasaddude Sharaien* (Atherosclerosis) and *Samne Mufrat* (obesity), which are interwoven and make way for many diseases (Jurjani, d. 1140). *Borudat* causes *Salabat* (Artereosclerosis), deposition of fat in the vessels causes *Tasaddud* (Atherosclerosis) while its accumulation in other parts of the body induces *Samne Mufrat* (Obesity). Recent reports have also confirmed a close relationship among them (Mac Gill, 2002). Thus, the improvement in dyslipidemia can prevent the development of these abnormalities or reverse them to avert many life threatening diseases. *Luk* by reducing the level of total Cholesterol, Triglyceride, LDL and VLDL significantly, is demonstrated to possess hypolipidemic effect and thus can prevent the cardiac diseases or at least arrest their progression. This was further confirmed by the improvement of HDL: LDL ratio and the atherogenic index that are considered more objective indicators of cardiac disease (Gaziano et al., 1997).

The hot temperament of *Luk* (hot^2 & dry^3) appears to modify the *Barid* temperament of *Akhlat* (altered due to presence of excessive fat having cold^2 and wet^3 temperament) or the organs which are afflicted with *Boroodat. Hararat* serves two purposes. Firstly, it increases the liquidity of *Akhlat* and reduces its stickiness and thereby aggregatabilty (Kabeeruddin, ynm), secondly, it improves the overall metabolism, and thus help in the elimination of excessive fat. *Dasumat* (Hyperlipiemia) present in the blood is of two types *Lateef* (lighter) and *Kaseef* (heavier). *Lateef* part is metabolized into *Ghiza* (nutrition) and produces *taghzia/harart* (energy), whereas, the *Kaseef* part goes towards the cold *Aza* (organs) and *Aghshia* (membranes) where it solidifies due to coldness (Qarshi, 1998). The test drug on account of being improver of the functioning of visceral organs such as liver, spleen, intestine and kidney etc is likely to enhance the over all metabolism and facilitate the utilization and the elimination of lipids. The blood purifier effect of the test drug, help remove the undesirable constituents from the blood through other mechanisms.

Treatment of the test drug with two important drugs *Izkhir* and *Revand* as devised by Unani physicians appears to be aimed at two objectives. Firstly, they have demulcent, desobstruent, resolvent and decoctive properties that help remove the viscid matter and clear the passage for the supply of *Ruh*; in this way they have a complementary role for *Luk magsool*. Secondly, they have protective effect on visceral organs especially the liver, kidney and spleen, and the physicians may have thought of the treatment of *Luk* with these two drugs in view of a possible toxic effect of *Luk*, as it is always intended to be used for a long period of time to manage obesity and hyperlipidemia. The findings showed that the test drug did not produce any side effect at least on two vital organs. This is important in the context of the reports that drugs used in dyslipidemia in modern medicine, cause serious side effects (Wong, 2000). Another aspect that is worth mentioning is that these two drugs have been described to increase the secretion of bile which may help in the partial removal of lipid from the body (Ghani, 1920). Though it can not be taken as important mechanism evolved in the elimination of lipid as 95% of the bile acid is reabsorbed from the intestine but the sequestration of the bile acid in the intestine and thus preventing their reabsorption and enterohepatic recirculation, resulting in decreased absorption of exogenous cholesterol and increased metabolism of endogenous cholesterol into bile acids in the liver, has been accepted as one of the important mechanisms of lowering the lipid level. Interestingly such an important effect is produced by none other than the resins (Cholestyramine and Colestipol) which are considered to be one of the oldest and probably safest hypolipidemic agents used in modern medicine (Goodman and Gilman, 2006). *Luk* being a resin and as shown in this study, an important hypolipidemic agent, merits further investigation in this regard.

In the light of observations and the discussion it can be concluded that *Luk Magsool* possesses significant hypolimidemic, antihyperlipidemic, weight lowering and anti atherogenic effect and can be used to prevent and cure heart diseases specially atherosclerosis and CHD.

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Clinical Evaluation of a Topical Unani Formulation in Warm-e-mehbal (Infective Vaginitis)

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Abstract

Vaginal infections are the most common health problem of women and have been increasingly linked to a growing array of serious health risks. The three major causes of vaginitis are bacterial vaginosis, candidiasis and trichomoniasis. The current treatment protocols involving nitroimidazoles are curative but metronidazole resistance is on rise. However there is no clear and precise description of vaginitis, and the disease is described collectively under the heading of *Warm-e-reham*. A number of drugs are available that are highly effective for the cure of vaginitis. So the study was planned to evaluate the efficacy of a topical Unani formulation in infective vaginitis. It was open randomized and standard controlled study using High vaginal swab culture as the main objective parameter. It was noted that test group shows significant improvement in clinical parameters. The data signifies that the test drug is as efficacious as metronidazole and clindamycin combination in clearing the infection from the vagina. It was also noted that the results are better for candidial infection in the test group.

Keywords: Vaginitis, HVS culture.

Introduction

Infective conditions of the vagina are the most common disorders of females. Vaginitis accounts for more than one million OPD visits every year in United States (Leppert and Peripert, 2004). The three major causes of vaginitis are bacterial vaginosis (BV), candidiasis and trichomoniasis.BV is the most common type of vaginitis. The microorganism involved in BV are very diverse. These include *Gardnerella vaginalis, Mobilincus, Bacteroides* and *mycoplasma*. A change in normal flora including the reduction of lactobacillus allows more resistant bacteria to gain a foothold and multiply. The incidence of candidiasis has increased dramatically during the past decade with an increase in non albicans strains. Trichomoniasis is the most common nonviral sexually transmitted disease, and it is associated with many perinatal complications. Common epidemiologic risk factors associated with vaginitis are being sexually active, promiscuity, poor local hygiene, douching, IUCDs, antibiotic use, estrogen use, immunosuppresion (such as HIV, corticosteroid therapy), diabetes mellitus and behavior factors (Nyirjesy, 2008).Irrespective of the etiology, vaginitis is usually manifested by soreness of vulva, swelling of labia minora, inflammation with evidence of pruritus, scanty to copious discharge, irritation of varying degree, dysparuenia and dysuria.

In classical Unani literature, it was found that there is no separate and precise description of *Warm-e-mehbal* (vaginitis), however, *Warm-e-reham* has been described in classical text. After going through the description of *warm-e-reham,* it has been observed that Unani scholars described the inflammation of vagina, cervix

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and uterus collectively due to anatomical proximity of vagina and uterus. According to them, 'Warm-e-reham' is either Haar (inflammatory) and caused by forceful coitus/ after abortion or Usr-e-Wiladat during post partal haemorrhage or sulb (non-inflammatory/benign) caused by Khilet-e-Sauda/Dam-e-Mohtariq.

A wide range of systemic and local chemotherapeutic agents are available for the treatment of vaginitis but despite the free availability of broad spectrum antibiotics, vaginitis still remains a tedious problem due to their toxicity and intolerance, which includes vulvovaginal burning, pelvic discomfort and rashes. Besides this, metronidazole which is the drug of choice for bacterial and trichomonial vaginitis, has shown evidence of carcinogenic activity following prolonged oral administration (Sarah, 2004). With the use of metronidazole, side effects such as epigastric discomfort, diarrhea, neutropenia, and allergic-type cutaneous reactions may occur (Smilack et al., 1991). Reccurrence and resistance is fairly common which also necessitate, the availability of new alternative therapies.

Unani System of Medicine with its rich and time tested collection of single and compound herbal preparation represents a vast emporium of untapped medical potentialities. Development of this potential requires their scientific validation including phytochemical, therapeutic and toxicological evaluation.

Unani System of Medicine has a long list of drugs that have been used by eminent physicians for the cure of vaginitis. These drugs are not only efficacious but also considerably tolerable and safe. The majority of drugs are cost effective also. The formulation selected for the study includes, Sandal safaid (*Santalum album*), Isabghol *(Plantago ovata), Arq-e-gulab (Rosa damascena),* Suhaga (Borex), Glycerine and Starch. Recent studies of *Santalum album* have shown significant antibacterial (Ochi et al., 2005) and antimicrobial activities (Nadkarni, 1989; Ghani, 1917; Sala, 1997; Prasad, 1994; Ali, 1984; Luo et al., 2007; Aridogari et al., 2002; Biswas et al., 2001). *Plantago ovata* had lubricant and wound healing properties (Nadkarni, 1989; Kirtikar and Basu, 1996; Ghani, 1917; Ibn Baytar, 1985), while Borax had anticandidial activity (Westerhof Das, 2001; De seta et al., 2009; Das Nevas et al., 2008; Ringdahl, 2006) and regulates the vaginal pH.

Despite the safety and efficacy of Unani drugs, they have not been evaluated on modern clinical parameters and proper documentation is not available. Hence, an open, randomized, standard control (metronidazole and clindamycin) clinical study was carried out to evaluate the efficacy and safety of topical Unani formulation of above mentioned drugs in Warm-e-mehbal (infective vaginitis) and results are presented.

Materials and Methods

Study Design

Study type: Open, randomized, standard controlled study

Duration of treatment: Two weeks

Sample Size: 40 patients (30 in test, 10 in control)

Place of Study: Gynae OPDs (Unani, Allopathic)Majeedia Hospital, New Delhi.

Follow Up: All the patients were followed up at the end of 1st and 2nd week of the treatment and at every follow up visit, the improvement was evaluated.

DAYS	Day 0	Day 7	Day 14
VISITS	Visit 1	Visit-2	Visit-3

Inclusion criteria

1. Patients in the age group of 18-45 years.
2. Clinically diagnosed cases of infective vaginitis.
3. Patients coming in non-menstruating phase.
4. Patients complying abstinence during therapy period.
5. Positive HVS Culture.

Exclusion criteria

1. Syphilis, Gonorrhoea.
2. Unmarried patients.
3. Pregnant and lactating mothers.
4. Cases of hepatic and renal insufficiency.
5. Patients not willing to sign inform consent form.

Subject selection

- Vaginal discharge
- Pruritus vulva
- Irritation in and around introitus
- Dysuria
- Dyspareunia
- Inflammed vaginal walls
- White flakes adhered to the vaginal wall/Multiple punctate hemorrhagic spots.
- Positive HVS Culture/Pus cells

Withdrawal criteria

1. Any failure to follow the protocol.
2. Serious adverse reactions or adverse events.
3. Drug defaulters.

Investigations

1. CBC, ESR
2. Urine (R&M)
3. LFT
4. KFT
5. Blood Sugar F,PP
6. VDRL
7. HVS Culture

Investigation Product

Test drug: Constituents – Sandal Safaid *(Santalum album),* Isabghol *(Plantago ovata),* Arq-e-gulab *(Rosa damascena),* Suhaga *(Borax),* Glycerine, Nishasta (*Starch)*

Method of Preparation: Topical Unani formulation prepared in the shape of pessary.

Dosage: One pessary at bedtime.

Route of administration: Per vaginally.

Control drug: Combination of clindamycin and metronidazole (Clingen Plus), one pessary at bedtime per vaginally.

Study Procedure

After obtaining the written informed consent all the patients were randomized in two groups test and control, containing 30 and 10 patients respectively. Thereafter all the patients underwent a clinical examination and a thorough per vaginal and per speculum examination. The test group was given Unani drug pessary for 15 days and followed up at weekly. The control group was given the standard drug (a combination of clindamycin and metronidazole) for seven days. The patients were directed not to take any other medication or douche during the trial and were also asked to practice abstinence from sexual contact. Sign and Symptoms were recorded as per the protocol on the CRF (specially designed for the study). The comparison was analyzed statistically to evaluate the safety and efficacy of trial drugs.

Assessment of efficacy

Clinical parameters

1. Vaginal discharge
2. Pruritus vulva
3. Irritation in and around introitus
4. Dysuria
5. Dyspareunia

Laboratory parameter

1. HVS Culture

Assessment of safety

Assessment of the safety was made on the basis of following parameters:

a) The clinical assessment was done on weekly follow up.

b) Non occurrence of any adverse events during the study period.

c) The safety is assessed as per the grading of "scoring criteria of vaginal irritation".

Results

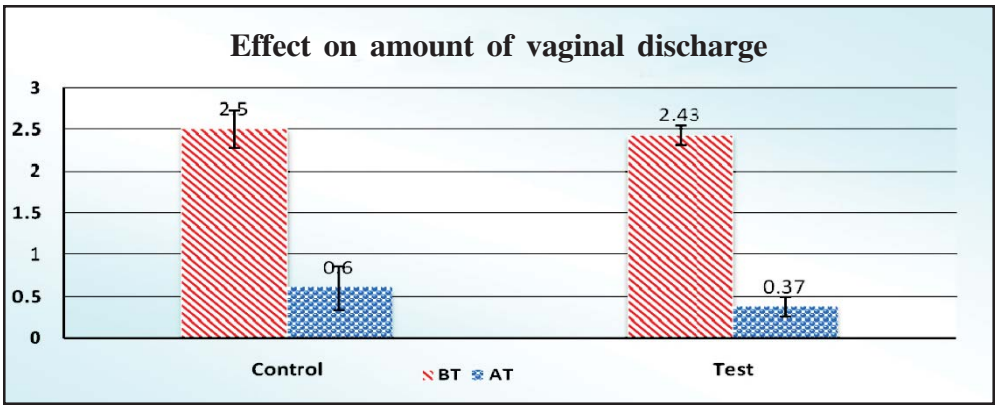
Clinical parameters

Presence of vaginal discharge

At baseline, all patients complained of vaginal discharge. In the test group, 6.7% presented with mild (grade 1), 43.4% with moderate (grade 2) and 50% with severe vaginal discharge (grade 3), whereas in the control group 10% had mild (grade 1), 30% had moderate (grade 2) and 60% had severe vaginal discharge (grade 3).

After completion of the treatment, in the test group, 76.7% of the patients were completely relieved of vaginal discharge, 16.6% patients had mild vaginal discharge and only 10% patients were left with severe vaginal discharge. The relief in vaginal discharge was extremely significant within the test group. ($p < .001$). In the control group, 60% patients were completely relieved of vaginal discharge (grade0), 20% had mild (grade1) and 20% patients had moderate vaginal discharge. The relief in vaginal discharge is statistically very significant within the control group ($p<0.01$). However the difference in relief of vaginal discharge at the end of treatment between

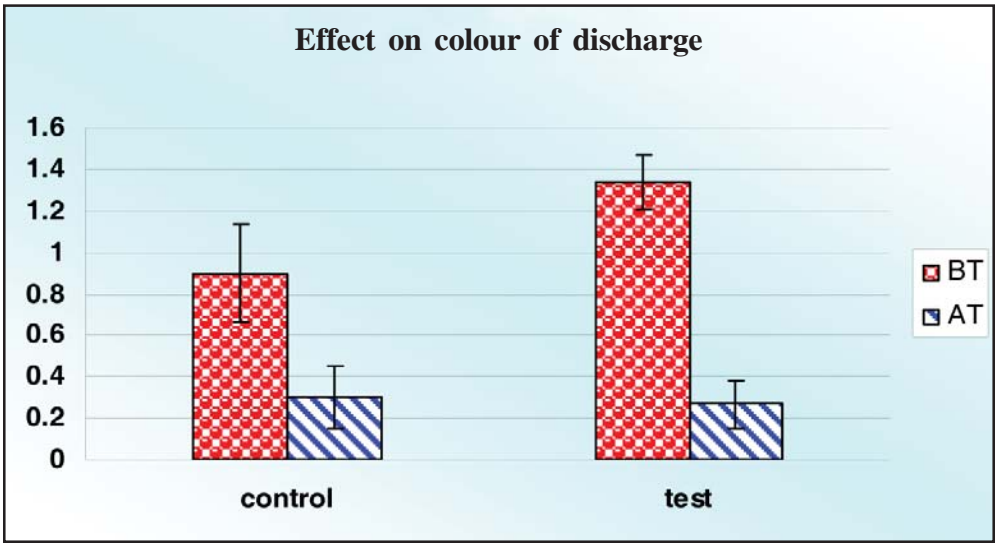
the two groups was statistically insignificant (p>0.05). Nevertheless, the test drug appears to be more efficacious in relieving the vaginal discharge.



Colour of vaginal discharge

At baseline, in test group, 50% had dirty white discharge, 40% had yellowish discharge, 10% had normal colour of vaginal discharge whereas, in the control group, 50% patients presented with dirty white discharge, 20% with yellowish vaginal discharge and only 30% had normal vaginal discharge.

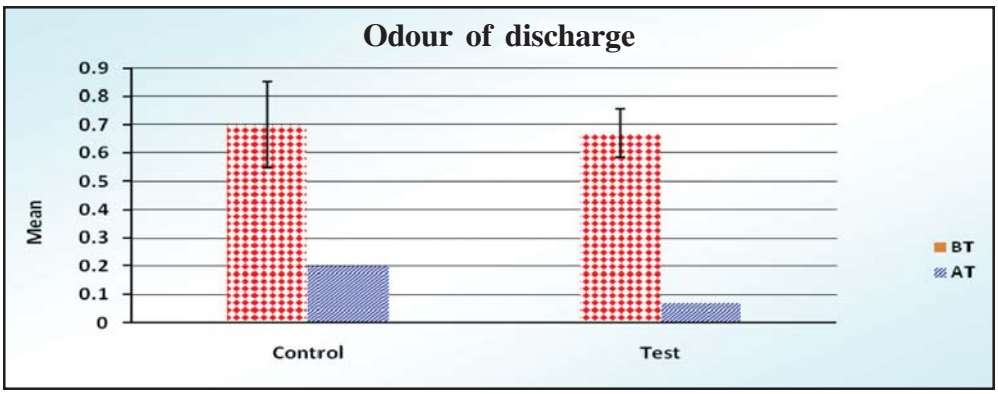
After completion of treatment in the test group, only 6.6% were left with dirty white discharge, 30% with yellowish and 83.4% restored their normal colour of vaginal discharge. The difference within the test group was extremely significant (p <0.001). In the control group 70% patients restored to normal colour of vaginal discharge and only 30% were left with dirty white vaginal discharge. The difference before and after was not statistically significant in the control group (p>0.05).However, the difference between the test and control group in restoring the colour of vaginal discharge was not statistically significant (p >0.05). This shows that test drug is as efficacious as control drug in restoring the normal colour of vaginal discharge.



Odour of vaginal discharge

At the start of the treatment offensive odour of vaginal discharge was present in 66.7% and 70% patients of test and control group respectively.

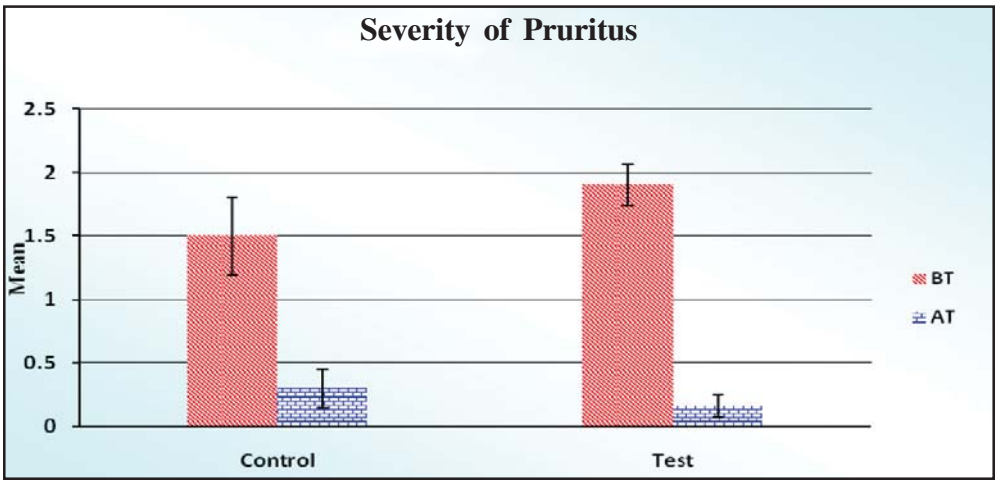
After completion of treatment 93.4% and 80% were completely relieved of offensive odour in the test and control group respectively. In the control group, the difference in relief of offensive odour before and after treatment was statistically insignificant ($p>0.05$) However this difference is extremely significant in the test group ($p<0.001$). But no statistical significant difference was found between the two groups ($p >0.05$)



Pruritus vulvae

Severity of pruritus vulvae is measured on a 4 points Likert scale (0=none, 1=mild, 2=moderate, 3=severe). At baseline in the test group, 20% patient complained of mild pruritus, 46.7% had moderate and 26.7% had severe pruritus vulvae and 6.7% had no pruritus vulvae. In the control group, 50% had mild pruritus, 20% had moderate and 20% patients had severe pruritus.

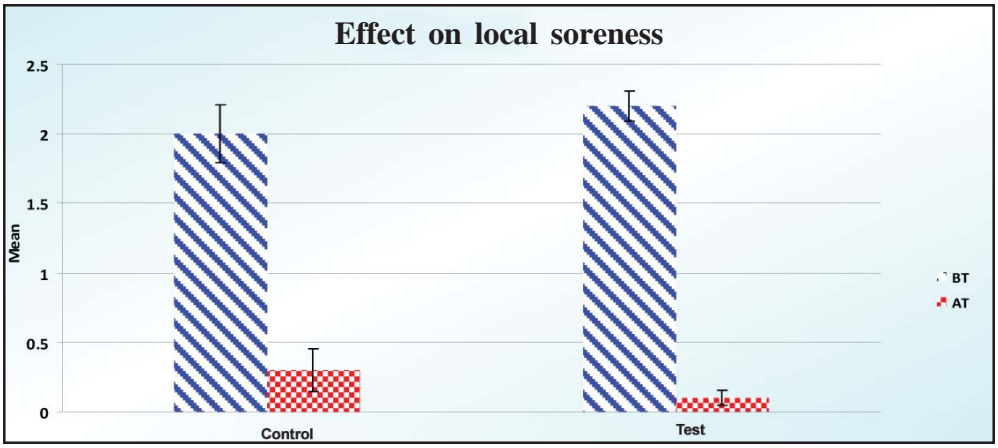
After completion of treatment, in the test group, 90% patients were completely relieved of pruritus vulvae. Mild pruritus was present in only 10% patients .The



difference in relief of pruritus before and after the treatment was highly significant ($p<0.001$) whereas in the control group, 70% patients were completely relieved of pruritus which is statistically significant ($p<0.05$). However the difference between the two groups was not statistically significant ($p>0.05$).

Local soreness

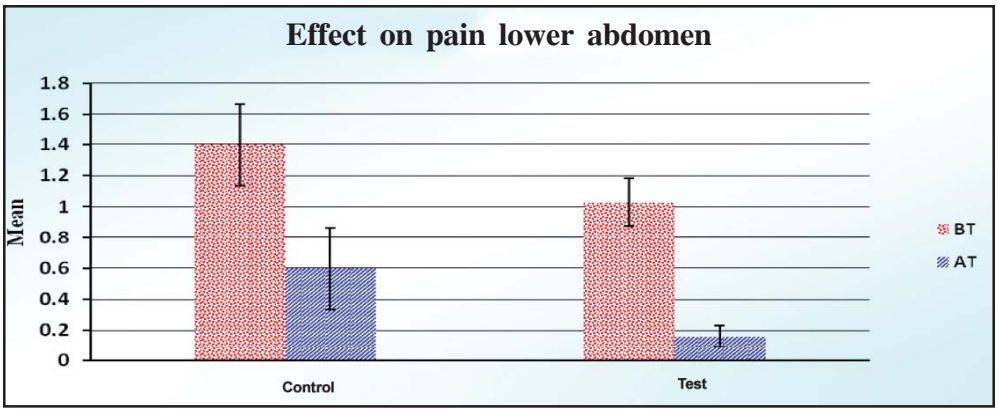
Local soreness was measured on a 4 points Likert scale (0=none, 1=mild, 2= moderate, 3=severe). At baseline, in the test group, 6.7% patients had mild, 60% had moderate and 33.4% suffered from severe local soreness. In the control group 20% had mild, 60% had moderate and 20% complained of severe local soreness.After completion of treatment, 93.4% were completely relieved of local soreness and only 6.7% patients had mild local soreness in the test group whereas in the control group 80% patients were totally relieved while 20% were left with mild local soreness.The statistical difference before & after the treatment in relief of local soreness was significant ($p<0.05$) and extremely significant ($p<0.001$) in the control and test group respectively. However it was not statistically significant ($p>0.05$) when compared between the two groups



Pain in lower abdomen

Pain in lower abdomen in both the groups was measured on a four-point Likert scale (0= none, 1= mild, 2=moderate, 3=severe). At baseline, in the test group, mild abdominal pain was reported in 26.6% patients, moderate in 33.3% and severe abdominal pain in only 13.3% patients. After completion of the treatment 83% were completely relieved of abdominal pain whereas 16.6% were left with mild pain abdomen. It shows moderate significant difference before and after the treatment ($p <0.05$).

In the control group, 20% had mild, 60% had moderate and 20% had severe pain abdomen. After completion of treatment, 60% had totally relieved, while 20% had mild and moderate abdominal pain respectively. The result was statistically insignificant ($p>0.05$).



Laboratory Parameters

High Vaginal Swab Culture (HVS)

High vaginal swab culture was done in each and every patient at the begining and after the completion of the treatment. HVS culture was positive in all the cases of both the groups at the baseline. Before commencement of the treatment, in the test group 15 patients had non-specific infection (i.e. containing pus cells), 4 patients had candidial infection and 11 patients were positive for bacterial infection (*E.coli* was present in 7 patients, 2 had *Staphylococcus aureus,* 1 had *Pseudomonas,* while 1 had â- haemolytic *streptococci*).

In the control group, 5 patients had nonspecific infection, 1 patient had candidial infection, and 4 patients were positive for bacterial infection (*E.coli* were present in 3 patients, 1 had Pseudomonas).

The effect on different types of organisms in the HVS culture after the treatment was found that in the test group, 8 patients out of 15 for nonspecific infection became culture negative, each one from *Staphylococcus aureus* and ß-*haemolytic streptococci* remained positive and all the 4 patients for candidial infection were negative. In the control group, 3 patients out of 5 remained positive for nonspecific infection and all the 3 patients becomes negative for *E.coli* while there was no change in the HVS culture for candidial infection.

After completion of treatment, there was 73% of clearance in HVS in the test group whereas it was 60% in the control group. It shows that the difference is highly significant ($p < 0.001$) in the test group. The difference was also statistically significant ($p<0.05$) for the control group. But the difference between the two groups was not statistically significant ($p>0.05$).

Results and Discussion

The study was unicentric conducted at Majeedia Hospital, Jamia Hamdard New Delhi during Sep2007-April2009. A total of 40 patients were included. The clinically diagnosed patients, having positive HVS culture were selected for the study.

The test group was subjected to topical Unani formulation while the control group was given a combination of metronidazole and clindamycin. The patients were assessed clinically at each weekly follow up. Microbiological investigation (HVS) was done before and after the treatment. The data generated from the research work was subjected to statistical analysis using Wilcoxon sign ranked test and Mannwhitney test.

The relief in vaginal discharge was extremely significant within the test group. ($p < .001$).This may be attributed to the anti inflammatory (Ghani—; kabeerduddin; chugtai; Ghani; 1920; Abdul Hakeem, Ram Lubhaya, 1984) and astringent activity (Ghani—; Kabeeruddin;) of the test drugs. After completion of treatment, 93.4% and 80% were completely relieved of offensive odour in the test and control group respectively However this difference is extremely significant in the test group ($p<0.001$). The improvement in test group is due to *Santalum album* and *Rosa damascena*, as these drugs are reported to possess disinfectant and deodorant activities (Nadkarni, 1909; Ghani, 1917; Sala, 1997; Parsaol, 1994). 90% patients were completely relieved of pruritus vulvae after completion of the test drug. The difference in relief of pruritus was again highly significant ($p<0.001$) The improvement in pruritus may be due to the emollient (Nadkarni, 1989; Ghani, 1917), demulcent (Ali, 1984; Ibn Baytar, 1985) and antipruritic (Chaterji et al., 2005) activities of *Plantago ovata* and *Santalum album*

93.4% were completely relieved of local soreness and only 6.7% patients had mild local soreness in the test group. This extreme improvement in test group is due to cooling and wound healing properties of the test drugs (Nadkarni, 1989; Sala, 1997; Ali, 1984; Kabeeruddin, 1951; Kirtikar & Basu, 1996)

After completion of treatment, there was 73% clearance in HVS in the test group whereas it was 60% in the control group. It shows that the difference is highly significant ($p <0.001$) in the test group.

The above data signifies that the test drug is as efficacious as metronidazole and clindamycin combination in clearing the infection from the vagina. It was also noted that the results are better for candidial infection in the test group .

The exact mechanism of action of drugs (*Santalum album, Plantago ovata, Rosa damascene*, Borax, Glycerine) selected in this study has not yet been worked out, but the significant improvement in test group is due to the antibacterial (Ochi et al.,2005), antiseptic (Nadkarni, 1989; Ghani, 1917; Sala,1997; Parsad, 1994, 1994; Ali, 2004; Ali, 1984; Luo et al., 2007) anticandidial (De Sata et al., 2009; Das Nevas et al., 2008; Ringdanl, 2006), urinary antiseptic (Ballabh et al., 2008), antimicrobial (Aridogan et al., 2002) antiviral and chemopreventive (Benencia and Courreges, 1999) and wound healing activities (Kirtikar and Basu, 1996) activities of these drugs.

The treatment did not show any side effects in either of the groups. The safety is assessed as per the grading criteria of vaginal irritation. The test drug used in the

present study has not been reported to cause any adverse effects in classical text or the previous studies done on individual drugs by different investigators.

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