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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.

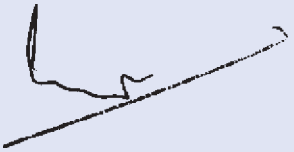
Unani system of Medicine, although originated in Greece, is one of the recognized systems of medicine of the country. Although, the Unani medicine have been in use for centuries and are known for their therapeutic efficacies, there is a need to scientifically establish their efficacy and safety in order 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 *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.



(Dr. Mohammad Khalid Siddiqui)
Editor-in-Chief

Breakthrough in the Etiopathogenesis of *Bars* (Vitiligo) – A Preliminary Clinical Study by DA_6+BSL_3 Therapy*

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Abstract

To assess any role of helminths in the development of *Bars* (vitiligo), a preliminary clinical study was carried out at OPD of Regional Research Institute of Unani Medicine, Srinagar, by administering orally Unani antihelminthic compound drug namely, DA_6, one tablet two times daily in empty stomach and application of BSL_3 lotion locally and exposure to sun for two minutes in 20 patients of either sexes.. The patients were selected at random and 9 patients already under treatment under other treatment groups and who had shown no response were made the subject of the study. The results obtained so far have been interesting and encouraging indicating relation between the two. The details have been discussed in the paper.

Key Words: Vitiligo; Clinical study; Kashmir.

Introduction

Bars (Vitiligo) is a skin disease produced due to derangement of phlegmic humor. It is also known with other common names such as *Sufaid Daagh, Phulbehri, Savitra*, etc. *Bars* is neither contagious nor infectious. It is called as *hi¯ther* in Kashmiri.

About 0.5 to 1 percent of the world's population, or as many as 65 million people, have vitiligo. In the United States, 1 to 2 million people have this disorder. Half of the people who have vitiligo develop it before age 20; most develop it before their 40th birthday. The disorder affects both sexes and all races equally; however, it is more noticeable in people with dark skin. In fact, 30 percent of people with vitiligo have a family member with the disease. However, only 5 to 7 percent of children will get vitiligo even if a parent has it, and most people with vitiligo do not have a family history of the disorder (*http://www.medicinenet.com/vitiligo/article.htm*). According to other reports, 0.1 to 8.8 percent of world population suffers from it (Anonymous,1986).

In India, the incidence among dermatology outdoor patients is estimated to be between 3 to 4 per cent. (Anonymous, 2006). Out of thousands of vitiligo patients, one or two vitiligo neonatorum patients are also reported. During the period from 15.05.1983 to 31.03.1997, out of 2750 new patients of vitiligo who reported at OPD of this institute for their treatment, only 02(0.07%) patients were vitiligo neonatorum. Or in other words, 01 patient out of 1735 patients of vitiligo who reported here for treatment was vitiligo neonatorum.

*This paper was presented at Seminar on "Clinical Research Methodology" jointly organized by CCRUM, New Delhi and Faculty of Medicine (Unani), Jamia Hamdard, New Delhi at Jamia Hamdard, New Delhi on 3-4, April, 1995.

Bars is usually of unknown etiology and is characterized by depigmented patches of varying sizes and shapes. The patches are usually symmetrical in nature. The cause and treatment of vitiligo has been described in Unani classics in details (*Ibn Sina,* 1906*;* 1916*, Al Razi,* 1955*).*

In Unani Medicine, it is mentioned that due to altered metabolic activities in the body when abnormal phlegmic humor (or *balgham-e-ghair tabaee*) is produced, it develops patches of depigmentations with sharply defined convex borders on any part of the body. The helminths are developed in the intestine due to accumulation of abnormal phlegm (*Ibn Sina*, 1916).

It is said that due to defects in the *quwat-e-dafia* (expulsive power), the *phlegm* is not properly metabolized which gives favorable conditions for the development of helminths. It is due to defects or failure of transformative power at tissues levels that the depigmentations occur over the surface of the body. That is why we advocate to avoid cold and moist foods, fish, milk and moist fruits and vegetables and eat upon only such foods that produce heat and dryness in the body which is necessary for the proper metabolism of *phlegm* (*Ibn Sina*, 1916).

Vitiligo is a *pigmentation* disorder in which melanocytes in the skin are destroyed. As a result, white patches appear on different parts of the body. Similar patches also appear on both the mucous membranes (tissues that line the inside of the mouth and nose), and the retina (inner layer of the eyeball). The hair that grows on areas affected by vitiligo sometimes turns white. The cause of vitiligo is not known, but doctors and researchers have several different theories. There is strong evidence that people with vitiligo inherit a group of three genes that make them susceptible to depigmentation. The most widely accepted view is that the depigmentation occurs because vitiligo is an autoimmune disease- a disease in which a person's immune system reacts against the body's own organs or tissues. As such, people's bodies produce proteins called cytokines that alter their pigment-producing cells and cause these cells to die. Another theory is that melanocytes destroy themselves. Finally, some people have reported that a single event such as *sunburn* or emotional distress triggered vitiligo; however, these events have not been scientifically proven as causes of vitiligo. Vitiligo seems to be somewhat more common in people with certain autoimmune diseases. These autoimmune diseases include *hyperthyroidism* (an overactive thyroid gland), adrenocortical insufficiency (the adrenal gland does not produce enough of the hormone called corticosteroid), *alopecia areata* (patches of baldness), and *pernicious anemia* (a low level of red blood cells caused by the failure of the body to absorb vitamin B_{12}). Scientists do not know the reason for the association between vitiligo and these autoimmune diseases. However, most people with vitiligo have no other autoimmune disease. Vitiligo may also be hereditary; that is, it can run in families. Children whose parents have the disorder are more likely to develop vitiligo (*http://www.medicinenet.com/vitiligo/article.htm*).

The conventional treatment available at present is not so effective with complications. In view of the failure of this treatment and to develop a new and cheap alternate therapy for this disease, a preliminary clinical study was carried out at Regional Research Institute of Unani Medicine, Srinagar to assess any role of helminths in the development of vitiligo. The study was carried out on 20 patients of vitiligo of either sexes and they were put on oral coded unani antihelminthic compound drug, $DA_{6,}$ one tablet two times daily in empty stomach and application of BSL_3 lotion locally over the vitiligenous patches and exposure to sun for two minutes during July, 1994 to December, 1994.

Materials and Method

20 patients of varying ages ranging from 15 years to 25 years with male and female ratio 1:1.2 were selected at random from the OPD of Regional Research Institute of Unani Medicine, Srinagar (Table-1).

The patients were registered in a special case sheet prescribed by the CCRUM, New Delhi. The each patient of vitiligo was examined and findings were recorded in the case sheet. The study was conducted during July, 1994 to December, 1994. Each patient was subjected to some laboratory investigations. Routine stool examination of each patient was fortnightly done. Pre and post-treatment photographs of each patient was also obtained. Certain dietary restriction and recommendations were also advised.

The patients were divided in to two groups, namely, group A (N=11), comprising new patients of vitiligo who had not received any treatment and group B (N=9) of those who were already under other treatment groups for vitiligo but had shown no response of regimentations. The patients in both groups were put under coded unani antihelminthic compound formulation, DA_6+BSL_3 (Table-4).

Out of 20 patients selected for the study in both groups, 5 patients out of 11 in group A and 4 patients out of 9 in group B who showed presence of ova in their stool examinations, were dewormed. Repeat stool examinations were done after completion of therapy (Table-5).

The therapy was then started in both groups by $DA_{6,}$ 500 mg tablet two times daily in empty stomach and BSL_3(lotion) for local application over vitiligenous patches. The applied parts were then exposed to sun for one minute and was washed later on. The patients in both groups were advised to report for assessment every 15^{th} day. The total duration of treatment in both groups was 180 days. Certain dietary restrictions and recommendations were also advised. No concomitant medication was given during the therapy. The consent from the patient was obtained before starting the therapy.

Observations

Out of 20 patients of vitiligo, 11(55.00%) were male and 09(45.00%) were female with male to female ratio of 1.22:1 (Table-1). The chronicity of the disease was from 1-36 months (Table-2). During the study, it was found that different parts of the body had vitiligenous patches of different sizes and percentage of the body areas involved were variable ranging from 10 % to 60 % (Table-3).

Table-1. Age and Sex-wise distribution of 20 patients of vitiligo

S.No.	Age range in years	No. of patients (%)	Sex	Sex ratio
1.	15-20	11(55.00)	Male	
2.	21-25	9(45.00)	Female	1.22:1
Total	-	20	-	-

Table-2. Chronicity of the disease in months in 20 patients of vitiligo

S.No.	Duration in months	No. of patients (%)	%age
1.	1-12	6	30.00
2.	13-24	9	45.00
3.	25-36	5	25.00
Total	-	20	100

Table-3. Percentage of body areas involved in 20 patients of vitiligo in ascending order

S.No.	Percentage of areas involved	No. of Patients
1.	0-10 %	3
2.	11-20 %	5
3.	21-30 %	3
4.	31-40 %	6
5.	41-50 %	2
6.	51-60 %	1
Total	-	20

After deworming of the patients, it was observed that 1 patient in group A and 2 patients in group B showed the presence of ova again (Table-5). The patients revealed that they had not been dewormed for long. During the entire duration of treatment, 240 stool examinations were conducted fortnightly in all 20 patients of vitiligo. It was also observed that the patients belonged to rural and urban areas both with low to high income status.

Table-4. Distribution of 20 patients of vitiligo in both patient groups

S.No.	Patient Groups	No. of Patients	Drug Therapy
1.	A	11	DA_6+BSL_3
2.	B	9	DA_6+BSL_3
Total	–	20	–

A – New patients of vitiligo
B – Old patients of vitiligo shifted to this therapy

Table-5. Presence of ova in 20 patients of vitiligo in both groups

S.No.	Groups	Presence of ova (before treatment)	Presence of ova (after treatment)
1.	A	5	1
2.	B	4	2
Total	-	9	-

Table-6. Percentage-wise response of the therapy in 20 patients of vitiligo after 280 days

S. No.	Patient groups	No. of patients	Percentage of response					
			Cured (100%)	V.good (91-99%)	Good (71-90%)	Fair (51-70%)	Satisfa. (41-50%)	Poor upto (40%)
1.	A	11	–	1(5.0)	4(20.0)	2(10.0)	3(15.0)	1(5.0)
2.	B	9	–	–	1(5.0)	2(10.0)	1(5.0)	5(25.0)
Total	–	20	–	1(5.0)	5(25.0)	4(20.0)	4(20.0)	6(30.0)

A - New patients of vitiligo
B – Old patients of vitiligo shifted to this therapy

Results and Discussion

Vitiligo is usually of unknown etiology and is characterized by depigmented patches of varying sizes and shapes. The patches are usually symmetrical in nature (*Ibne Sina,* 1906*, Ibne Sina, 1*916*, Al Razi,* 1955).In Unani Medicine, it is described that due to altered metabolic activities in the body when abnormal phlegmic humor (or *balgham-e-ghair tabaee*) is produced, it develops patches of depigmentations with sharply defined convex borders on any part of the body. The helminths are developed in the intestine due to accumulation of abnormal *phlegm* (*Ibn Sina*, 1916).

Vitiligo is a *pigmentation* disorder in which melanocytes in the skin are destroyed. As a result, white patches appear on the skin in different parts of the body. The hair that grows on areas affected by vitiligo sometimes turns white. The cause of vitiligo is not known, but doctors and researchers have several different theories. There is strong evidence that people with vitiligo inherit a group of three genes that make them susceptible to depigmentation. The most widely accepted view is that the depigmentation occurs because vitiligo is an autoimmune disease-a disease in which a person's immune system reacts against the body's own organs or tissues. As such, people's bodies produce proteins called cytokines that alter their pigment-producing cells and cause these cells to die. Another theory is that melanocytes destroy themselves. Finally, some people have reported that a single event such as sunburn or emotional distress triggered vitiligo; however, these events have not been scientifically proven as causes of vitiligo (http://www.medicinenet.com/vitiligo/article.htm).

The response in vitiligo patients in both groups has been varied. The response was from 91-99% in 01(5.0%) patient in group A while as there was no response in group B. The response was 71-90% in 04(20.0%) patients in group A while as only 01(5.0%) patient had it in group B. There were 02(10.0%) patients who had got 51-70% response in both groups. 03(15.0%) patients had got 41-50% response in group A while as only 01(05.0%) patient had it in group B. Only 01(05.0%) patient had 40% response in group A while as 05(25.0%) patients had got the same response in group B (Table-6).

The rate of repigmentation in patients in group A whose stool examinations had no ova is fast in comparison to the patients in the same group having ova in their stool examinations. Similarly, rate of regimentations is slightly more in the patients in group B who had no ova in their stools than those who had ova in their stools.

It is also said that due to defects in the *quwat-e-dafia* (expulsive power), the phlegm is not properly metabolized which gives favorable conditions for the development of helminths. It is due to defects or failure of transformative power at tissues levels that the depigmentations occur over the surface of the body. That is why we advocate to avoid cold and moist foods, fish, milk and moist fruits and vegetables

and eat upon only such foods that produce heat and dryness in the body which is necessary for the proper metabolism of *phlegm* (*Ibn Sina*, 1916).

According to s one study, metabolic disorders, dietary deficiency and low serum copper level may cause this vitiligo. Gastrointestinal disorders, e.g. intestinal worms, chronic amebiasis and chronic dyspepsia may be precipitating and additional factors. When there is low serum copper and protein level, the enzyme tyrosine is not activated and it does not produce tyrosine in the body. Since tyrosine is a copper containing enzyme, it has been suggested that vitiligo results from disturbances of copper metabolism, because low serum copper levels have been reported in upto 30% of the Vitiligo patients (Behl, *et al.,* 1961). It has been reported that copper deficient diets result in the depigmentations of the skin of the experimental animal (David, 1990). The removal of copper ions and the action of ascorbic acid both inhibit tyrosine (Rose, 1983).

Now, it can be said that this is the same disturbance of copper metabolism which occurs a result of the defect in the metabolism of the phlegmic humor by defective expulsive power in the stages of digestive processes in the body. It is, thus presumed that these disturbances could be the initial reasons for the process of depigmentations, thus Vitiligo is the result of disturbances occurring in the first stage of the digestion.

The trial drug, besides acting as an antihelminthic has also proved to be good intestinal antiseptic, because, besides killing or destroying the helminths, it might have broken the chain some where in the body that had no helminths which could have otherwise been in any way responsible for the production of bad phlegmic humor in the stages of digestive processes which cause skin manifestations in the form of depigmentations leading to development of vitiligo.

Conclusions

1. The drug has given good response.
2. The drug besides acting as an antihelminthic, has also acted as a good intestinal anti-septic which has detoxified the bad phlegmic humor produced by the expulsive power in the stages of digestive processes.
3. The rate of regimentations was fast in the patients whose stool examinations were negative for the presence of helminths in both groups than that of those who had positive stool examinations for ova of Ascaris lumbricoids in both groups.
4. It is, therefore, concluded that helminths are associated with for the development of vitiligo, which is the result of the disturbances occurring in the first stage of digestion.

Acknowledgement

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Asbab-e-Sitta Zarooriya (Six Essential Factors) for Prevention of Lifestyle Diseases

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Abstract

There are some fundamental principles in system of Unani Medicine to maintain human health. Every person is supposed to have a unique humoral constitution both in Kamiat and Kaifiat which represent his healthy states. As-bab-e-Sitta Zarooriya (six essential pre-requisites) are mainly responsible for the production and maintaining this unique humoral constitution in the body (Ibn-Rushd, 1980).Therefore, all these six essential factors should be in proper proportion and within normal limit to maintain health. Any imbalance or abnormality in one of them may cause diseases. Continuous changes in the lifestyle of our society, are affecting these six essential lifestyle factors (Asbab-e-Sitta Zarooriya) and gives result of various lifestyle diseases like Diabetes, Hypertension, and Obesity etc. To prevent from these lifestyle diseases, it is a dire need of today to follow six essential lifestyle factors properly as mentioned in Unani Tib. In this paper these factors and lifestyle diseases will be discussed in detail.

Key Words: Lifestyle Factors, Lifestyle Disease, Diabetes Mellitus, Cardio-Vascular Diseases.

Introduction

People are working for a long time without rest and consuming fast foods, Cold drinks, Tae, Coffee, Junk food, Tinned food etc. These factors are affecting our Natural lifestyle. Many other factors are also affecting our natural lifestyle and basic (requirements) needs of the body. The fact is that stress, sedentary lifestyle and long working hours are leading to “Killer” disease or lifestyle disease like diabetes, cardiovascular diseases and Obesity. Studies have estimated that in a little over a decade from now, chronic diseases like diabetes, hypertension, heart attack, Cancer and AIDS would count for over 65% of deaths in India compared to 53% in 2005. Also nearly 11% of Indian urban population and 3% of rural population above the age of 15 have diabetes. Lifestyle is causing juvenile diabetes and people are prone to diabetes at younger ages. Similarly stress both at work and at home is going to take a further toll with the number of people suffering from hypertension estimated to rise 213.5 millions in 2005, compared to 118.2 in both millions in 2000 representing on 80% rise (Anonymous,2008).

Health-promoting lifestyle choices can reduce the risk of developing chronic disease and the causes of premature death. What you choose to eat, drink or otherwise ingest, how much you sleep and how active you choose to be can significantly impact both your health and longevity.

Six lifestyle behaviors have the greatest influence on your health and physiological age. They can be added as part of your daily lifestyle choices to improve your life span and potentially add years to your life (by Kirsti A. Dyer MD, MS, FT For About.com).

Description

There are six essential lifestyle factors, OR Asbab-e-sitta zarooriya i.e.

- Hawa (Air)
- Makoolat-O-Mashroobat (Food and Drinks)
- Harkat-O-Sukoon-E-Badani (Bodily Movements and Repose)
- Harkat-O-Sukoon-E-Nafsani (Psychic Movements and Repose)
- Naum-O-Yaqza (Sleep and Wakefulness)
- Ahtebas-O-Istefragh (Retention and Excretion)

All six essential lifestyle factors should be in proper balance. Imbalance in any factor can produce disease in the human body. These factors are discussed here as follows:

Hawa (Air): Air is present around us, and we take inspiration in this atmosphere for the existence of life .So air is an element for the body and vital sprit .There for it is essential for composition and construction of the body or organ, it is also important for vital sprit (Rooh).Air is a continuous and complete help for vital sprit (Rooh); which is provided by inspiration .It is a factor for correction of vital sprit (Rooh).

Ibn Abbas Majusi (d. 994 A.D.) Further Elaborates:

"Whenever disequilibrium occurs in the substance of the air pollution and putrefaction are produced in both the substance (Maddah) and quality, causing plenty of bad symptoms (a'rad-rdiyah) and diseases in human beings".

At another place, he says:

"Epidemic (Waba) spreads only in the place where the natural state of air changes. Because of this change, hot and harmful fevers (hummiyat-harrah raddiyah) ,plague and other diseases are produced in human beings , and animal also get serious and dangerous diseases .But these epidemic diseases are produced in the food

In this regard Ibn Sina says:

"When change occurs in the air, the troubles (awarid) are created in the body. When the air gets petrified, the humours also become putrefied. This purification starts in the humours of the heart. Because of the nearness, the air strikes the humour in the heart easily".

According to Unani Medicine mufsid-l-ardi and mufsid hawa;I cannot enter into the human body unless and until the nature of the air (one of the asbab-I bittah) alters, and in turn, the temperament of the basic component of the human body (ada; akhlat; arwah) changes accordingly Ibn Abbas Majusi writes",

It should be borne in mind that mere deterioration of the state (quality) of air does not cause serious contagious diseases in human beings, It causes diseases only

in those persons whose body contains such corrupted humours which are ready to accept all acts and effects of the air, when the polluted air is inhaled by a man and it enters the body are transformed rapidly in to the temperament of that air due to their semblance, and thus it causes serious and fatal diseases" (Azmi A.A. 1995).

Western Medicine claims that the diseases are constituted in the human body by foreign agents (Bacteria and Virus etc) through the media of air, food and water. These foreign agents responsible for the diseases have been detected evidently with the help of microscope.

As regard Unani Medicine, it also emphasizes (as has been explained above) that diabetes's are because d in the human body altered Asbab-I-Sittah. The first two Asbab-I-Sittah are air in fact ,the basic vehicles for transporting the foreign agents (Mufsid-Hawa'I and Mufsid-I-Ardi) in to the human body and causes diseases. Several outstanding Unani physicians have described more precisely these foreign agents in their works, Ibn Sina says".

Unani Medicine adopts quite a different approach in the treatment of the diseases. We have already dealt in the treatment of the disease s.viz the altered Asbab-I-Sittah which in turn alter the temperament of the body and thereby cause diseases. In Unani Medicine there are two terms for the temperamental misbalanced in akhlat ,a'da, and arwah: {1} Su-i-mizaj-I sadah (simple temperamental disturbance) {2} Su-i-Mizaj-Maddi (Temperamental disturbance caused by the substance, i.e. foreign agent) This concept of the mechanism of causing diseases itself reveals that the foremost attempt should be made by a Tabib to correct the altered temperament of the affected part (a 'Ada,' Akhlator Arwah of the human body by using both drug s And diets. Once the temperament of the affected part is restored to normal state, the disease should be cured; and of foreign agents (Mufsid Ardi wa Hawai) are responsible for the disease, they would be killed or paralyzed and body by Tabiat.

In addition to the correlation of the temperamental, disbalance in the body .attempt should also be made by Unani physicians to bring the altered nature of asbab-sittah daruriyah especially air and water, to their normal state .Besides, other steps such as diet and if necessary appropriate physical exercise should also be taken to make Tabiat-i-mudbbirah-I badan stronger so that the chances of reappearance of a disease could be prevented or minimized" (Azmi A.A. 1995).

Respiration is essential for living organism, as well as air should be fresh in our environment for this purpose. Any pollution in air can lead to ill-health.

Makoolat-O-Mashroobat (Food and Drinks)

All the food articles should be free from any pesticide or other pollutants. Water and other drinks should be fresh and avoid tinned food. Food and drinks should be taken in proper timing. Excessive food or over eating can produce obesity. Smoking should be stopped. Because smoking produce Hypertension, and other respiratory

disease. Calorie restricted diet should be taken because high calorie diet produce obesity.

A. Intake of Sodium salt in diet may be important. Hypertension may be associated with low potassium diet. Salt should be taken with moderate restriction (less-than 3 gram/day) because excessive sodium intake increases B.P.

B. Alcoholics are often Hypertensive. Alcohol however is not a direct pressure agent and Hypertension develops during alcohol with drawl mediated by the sympathetic nervous system. Alcohol intake should be moderate.

- Smoking – should be stopped.
- Obesity – calorie restricted diet. Over eating and Lack of exercise are the cause of obesity.
- Diet – Rigid dieting is the best treatment i.e. 800 to 900 calories per day. It must contain amounts of all essential food stuffs. Bulkiness of food is important as the patient needs to be satisfied foods to be avoided, bread and anything made with flour, cereals potatoes and other whole root vegetables foods containing much sugar, all sweets and salt. Fatty foods like cream, butter, fat, beans and pork, fluids not more than 2 pints a day. No restriction of meat, fish and fowl, all green vegetables, eggs and fruits.

Using Alcohol should be in Moderation or not at all

Moderate alcohol consumption (one drink for women, two for men) is associated with a lower risk of heart disease. Higher levels of alcohol can lead to health and behavioral problems, including an increased risk for high blood pressure, stroke, heart disease, some cancers, accidents, violence, suicide and deaths in general.

Eating should be Regular well-balanced Meals, including Breakfast

A healthy balanced diet can help provide energy, lower risks for certain diseases—heart disease, hypertension, diabetes and cancers—while maintaining a normal weight.

Not using Tobacco Products — Smoking, Chewing, Snuff or others

Chronic exposure to the nicotine in tobacco may accelerate coronary artery disease, peptic ulcer disease, reproductive disturbances, esophageal reflux, hypertension, fetal illnesses and death and lead to delayed wound healing (From ADAM's Illustrated Health Encyclopedia) From About's Guide to Smoking Cessation, Terry Martin .

Harkat-O-Sukoon-E-Badani (Bodily Movements and Repose)

Our daily routine work should be balanced. Physical movements of daily routine work should be in proper manner.

To Reduce the Risk of Obesity, Hypertension & Diabetes

Exercise: Regular physical exercise may reduce B.P. substantially and heavy exercise reduces Fat and help to control Obesity. Individuals who undertake regular physical exercise have lower blood pressure than sedentary individuals. In sedentary workers, exercise burnt energy and reduces glucose level and contributes in the management of Obesity, Diabetes and Hypertension is useful as a supplement to dieting unless there is a medical contraindication.

Starvation: fasting is a method of treatment offers advantages of dramatic drop in weight within one week of treatment and this may be of psychological benefit(Golwalla *et al.,* 1994).

Engaging in Regular Physical Activity should be Advised

Thirty minutes a day of regular physical activity contributes to health by reducing the heart rate, decreasing the risk for cardiovascular disease, and reducing the amount of bone loss that is associated with age and osteoporosis.

Maintaining a Healthy Body Weight

Physical activity helps the body use calories more efficiently, thereby helping in weight loss and maintenance. Additionally, sixty minutes of regular physical activity will help in maintaining weight.

Harkat-O-Sukoon-E-Nafsani (Psychic Movements and Repose)

Alcohol is often Hypertensive so avoid alcohol to protect from Hypertension. Sadness, depression, Psychosis, these produce psychological disturbance.

Environmental Factors Related to Essential Hypertension, Obesity

Passive mechanism of hypertensive effect of obesity include a high salt intake (which tends to accompany a high food intake).Stimulation of sympathetic system by high intake of refined carbohydrates and obesity- induced hyper adrenocorticism.

Naum-O-Yaqza (Sleep and Wakefulness)

Sleep of our daily routine life should be in a balance proportion. About eight hour to sleep is required to normal healthy young men in 24 hours. Balance between sleep and wakefulness is essential to maintain health. Lack of sleep may produce disease like insomnia and related diseases, adequate sleep is must require. Prolonged insomnia can produce Obesity in children.

One of the possible explanations for the association between overweight and sleep could be that the two hormones ghrelin (which signals appetite) and leptin (which indicates satiety) – are thrown into imbalance when sleep is not adequate. When the level of these hormones is modulated, it could increase appetite and weight gain (Anonymous, 2008).

Lack of sleep might be known better as an adult, the affection of overworked professional. But, it now appears that children are not shielded from this lifestyle malaise and it is beginning to tell on their health. Children who get less than eight and a half hour of sleep at night are six times more likely to be obese. In fact shortened sleep, it was found, poses twice the risk of childhood obesity than does eating fried food six times a week. There is the pressure of studies, the long travel time to school, and the influence of their parents' lifestyle and routine, all of which inevitably impact on them. There are also some sedentary activities like computer games and television watching which often take place at a time when children should be asleep. Watching television has an independent impact on obesity, the study found: children who watched television for an hour and a half or more were 19 times more likely to be overweight than those who watched TV for 45 minutes or less (Anonymous April, 2008). Getting a regular amount of sleep is important to give your body a chance to restore and regenerate not only the proverbial "batteries" but to attend to all of the metabolic functions required by the body, such as regenerating old cells, getting rid of wastes and repairing cell damage (*http://adam.about.com/encyclopedia/infectiousdiseases/Sleep-disorders.htm*).

Ahtebas-O-Istefragh (Retention and Excretion)

Evacuation and excretion of fluids and secretions should be regular. Retention should also be necessarily regular.

These all six factors are essential to human being which could not forgettable during whole life:

- Balance of lifestyle factors is guarantee of perfect health.
- Imbalance of lifestyle factors could produce disease.
- Lifestyle factors have a key role in the Regimenal therapies.

Discussion and Conclusion

Asbab-e-Sitta Zarooriya are the six essential pre-requisites for promotion and preservation of human health, whenever any change or imbalance in these factors i.e. Water, food and drinks Physical work, Rest, Psychological work, Sleep, Wakefulness, Retention of nutrients and Excretion of waste from the body, may lead to ill health. Due to fast urbanization in our country changing lifestyle is not in accordance with the Asbab-e Sitta zarooriya leading to development of various

lifestyle diseases like obesity, Diabetes Mellitus, Cardiovascular diseases etc. the rational and sensible follow-ups of the Asbab-e-Sitta zarooriya may help in minimizing the severity of the diseases. Therefore it is essential to maintain Asbab-e-Sitta Zarooriya, These factors have a great significance in controlling lifestyle diseases and maintenance of health.

However, it is possible to maintain health to follow the:

- Not smoking.
- Maintaining a healthy weight (with BMI less than 25 kg/m2) during middle age; Exercising 30 minutes or more each day.
- Eating a healthy diet, with an emphasis on high intakes of fruits and vegetables, cereal fiber, chicken and fish, nuts, legumes, low trans and saturated fats, and taking a multivitamin for at least five years.
- Drinking alcohol should be avoided.
- Sleep And Wakefulness should be balanced.
- Bowel habits should be regular.

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Standardization of An Important Herbal Unani Drug 'Lodh Pathani' (*Symplocos racemosa* Roxb.)

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Abstract

Bark of the plant *Symplocos racemosa* Roxb. is used as drug Lodh Pathani in Unani System of Medicine. Being bitter, hot and dry 2°, the plant possesses many medicinal properties, So Phytochemical and Physico-chemical studies on the bark of *Symplocos racemosa* Roxb. has been carried out for its standardization in order to lay down standards for the quality assurance of genuine drug.

The main aspects included in the study are organoleptic characters, Physico-chemical constants, qualitative determination of organic chemical constituents, fluorescence analysis of powdered drug and extracts, quantitative analysis for total alkaloid and crude fiber content, thin layer chromatographic profile, UV and IR spectral studies of the drug.

Key Words: Standardization, *Symplocos racemosa* Roxb., Physico-chemical and Phytochemical, TLC, UV and IR spectra.

Introduction

The plant *Sympolocos racemosa* Roxb., belongs to the family Symplocaceae. Drug yielding plant is an evergreen tree found in plain and lower hills throughout India (UPI, 2007). It contains three alkaloids Loturine, Colloturine, Loturidine and a large quantity of red coloured matter (Dymock, 1891; Chopra, *et al.,* 1956; Khory and Katrak, 1958; Nadkarni, 2000; Farooq, 2005).

The Bark is used by Unani Physicians as analgesic (Hasan, 1894), antidysentric (Khan, 1892; Farooq, 2005), anti-inflammatory (Haleem, 1948), astringent (Dymock, 1891; Dayal, 1933; Chopra *et al.,* 1958; Nadkarni, 2000; Evans, 2003). Besides these, it is also useful in curing eye diseases as eye tonic (Haleem, 1948; Nabi, 1958) and also used in treating urinary disorders (Evans, 2003). Thus keeping in mind the medicinal importance of the drug it was felt desirable to standardize the Lodh Pathani (Bark) in order to lay down the standards for quality check.

Material and Methods

Collection of Plant Material

The bark was collected from Dawakhana Tibbiya College, AMU, Aligarh and identity was established by comparing with the authentic sample available in Tibbiya College, AMU, Aligarh.

Chemical Parameters

First the organoleptic characters were identified. Then powder of the bark of *Symplocos racemosa* Roxb., was used for chemical analysis. Physico-chemical

studies like total ash, acid insoluble ash, water soluble ash, alcohol and water soluble matter, moisture content and successive extractive values using Soxhlet extraction method were carried out as per guidelines of WHO (Anonymous, 1998) and Govt. of India (Anonymous, 2008). Qualitative analysis of the drug was conducted to identify the chemical constituents present in the drug (Overtone, 1963; Harborne, 1973). Total alkaloid and crude fibre content were also determined quantitatively (Jenkins, 1967).

Fluorescence characters of the powdered drug and successive extracts with and without chemical treatment in day light and UV light at short (253nm) and long (360nm) wave length were observed according to the method described by Kokoski *et al.,* (1958) and Chase, *et al.,* (1949). Thin layer chromatographic analysis was conducted (Stahl, 1969; Harborne, 1973,) on precoated silica gel $60F_{254}$ TLC plates (E. Merk). The plates were visualized in day light, iodine vapour, in short UV and long UV. They were also derivatised using Vanillin-sulphuric acid and heated at 105^0C.

For UV and IR spectroscopy the alcoholic extract of the drug was obtained by refluxing powdered drug (5.0 gm.) with absolute alcohol (50 ml) for 5 hours and removing the solvent under reduced pressure. Then UV spectrum of alcoholic extract was recorded using Hitachi Ratio Beam U-1800 spectrometer. IR spectrum of alcoholic extract of Lodh Pathani was determined in Nujol with Perkin Elmer 1600 FTIR spectrometer.

Observations

A. Organoleptic characters: The bark was in slightly curved pieces of approximately 1cm thickness, outersurface uneven and rough due to fissures and cracks, grayish brown woody externally while inner surface was pinkish brown, feebly bitter in taste and odourless. Summarized in Table-1.

B. Physico-chemical constants: The analytical values in respect of Physico-chemical constants of drug were established and are depicted in Table-2.

Table-1: Organoleptic Characters of *Symplocos racemosa* Roxb.

S.No.	Organoleptic parameter	Observation
1	Appearance	Woody bark
2	Colour	Grayish brown
3	Smell	Odourless
4	Taste	Slightly bitter
5	Texture	Rough

Table-2. Physico-Chemical Constants

S.No.	Parameter	Analytical Value (%)*
1.	Ash Values	
	(a) Total Ash (w/w)	14.96
	(b) Acid Insoluble Ash (w/w)	0.89
	(c) Water soluble Ash (w/w)	2.35
2.	Moisture Content (v/w)	6
3.	Alcohol soluble matter(w/w)	51.636
4.	Water soluble matter (w/w)	54.8
5.	Successive extractives	
	(a) Pet. ether (60-80^{0}C)	1.05
	(b) Chloroform	1.37
	(c) Ethyl acetate	0.6
	(d) Absolute alcohol	21.7
	(e) Distilled water	24.32
6.	Crude fiber content (w/w)	0.246
7.	Total Alkaloid content (w/w)	0.20

* Values are average of three experiments.

C. Qualitative analysis of organic chemical constituents of drug: The Phytochemicals present in the drug were identified on the basis of different chemical tests given for various plant constituents (Overtone, 1963; Harborne, 1973), results have been summarized in Table-3.

D. Fluorescence analysis of powdered drug and various extracts: Powdered drug and successive extracts were screened for fluorescence characteristics under UV light. The results obtained are given in Table-4 and 5.

E. UV and IR spectral study of the drug: UV spectrum of the alcoholic extract of the drug Lodh Pathani was plotted for light absorbed versus wavelength, and the drug showed maximum absorption (λ_{max}), which is characteristic of a particular drug and helps in standardization of herbal drug. For our standardization of Lodh Pathani Infra Red spectrum of alcoholic extract was also recorded and major characteristic bands were noted, which are given in Table-6.

F. Thin Layer Chromatography (TLC): Thin Layer Chromatographic analysis of alcoholic extract was carried out using different solvent systems and visualizing agents, and R_f values were calculated to standardize the drug for its identity and purity. Results are summarized in Table-7 and Fig.1 and Fig.2.

Table-3. Qualitative Analysis of Phytochemicals

S.No.	Chemical Constituent	Tests/Reagent	Inference
1.	Alkaloids	Dragendorff's reagent Wagner's reagent Mayer's reagent	+ + +
2.	Carbohydrate	Molisch's Test Fehling's Test Benedict Test	+ + +
3.	Flavonoids	Mg ribbon and Dil.Hcl	+
4.	Glycosides	NaOH Test	–
5.	Tannins/Phenols	Ferric Chloride Test Liebermann's Test Lead Acetate Test	+ + +
6.	Proteins	Xanthoproteic Test Biuret Test	– –
7.	Starch	Iodine Test	+
8.	Saponins	Frothing with $NaHCO_3$	+
9.	Steroid/Terpenes	Salkowski Reaction	+
10.	Amino Acids	Ninhydrin Solution	–
11.	Resin	Acetic Anhydride test	+

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

Discussion

The present standardization study has brought out many diagnostic characters of herbal drug *Symplocos racemosa* Roxb. (Lodh pathani) covering organoleptic, Physico-chemical and Phytochemical aspects on the basis of which the drug can be identified from its possible adulterants and other wasteful matter present in the commercial sample.

Physico-chemical parameters like ash values, extractive values, moisture content, soluble matter etc. gives indication of quality of drug. If adulteration is caused by siliceous matter, then ash content with increase, if drug is not properly stored the moisture content may change. In the same way phytochemical screening is helpful to know the chemical constituents present in the drug.

Literature survey revealed that the therapeutic properties of the crude drugs are mainly due to physiologically active constituents like alkaloids in the drug (Ghani, 1921).

Table-4. Fluorescence Analysis of Powdered Drug With Various Chemical Reagents.

S. No.	Chemical Reagent	Observations		
		Day Light	UV Short	UV Long
1.	Conc. Sulphuric acid	Black	Black	Black
2.	Conc. Hydrochloric acid	Dark brown	Black	Black
3.	Conc. Nitric acid	Orange	Dark green	Black
4.	Iodine solution (5%)	Reddish orange	Green	Dark green
5.	Ferric chloride solution (5%)	Green	Green	Dark green
6.	Sodium Hydroxide Solution (25%)	Dark red	Green	Black
7.	Dil. Sulphuric acid (25%)	Dark brown	Gray	Dark blue
8.	Dil. Hydrochloric acid (25%)	Dull brown	Greenish gray	Dark blue
9.	Liquid Ammonia	Brick red	Dark green	Black
10.	Lead Acetate	Reddish brown	Green	Black
11.	Formic acid	Orange	Green	Purple
12.	Benedict Reagent	Reddish brown	Dark green	Black
13.	Wagner's reagent	Dull brown	Green	Dark green
14.	Dragendorff's reagent	Dark red	Black	Dark green
15.	Powder as such	Buff	Grayish brown	Dark brown

Table-5. Fluorescence Analysis of Successive extracts

S.No.	Extracts	Observations		
		Day Light	UV Short	UV Long
1.	Pet. Ether	Buff	Dull Green	Black
2.	Chloroform	Buff	Green	Black
3.	Ethyl acetate	Reddish brown	Green	Black
4.	Alcohol	Shining red	Dark green	Black
5.	Water	Brownish red	Green	Black

Table-6. UV and IR Spectral Details of Alcoholic Extract of Drug

UV, λ_{max} (nm)	230
IR, ν (cm^{-1})	3300, 2850, 1725, 1600, 1525, 1030

Table-7. TLC Profile of Alcoholic Extract of Lodh Pathani

Extract	Solvent system	Visualising agent	No. of Spots	R_f values
Alcohol	1. n-Butanol:	Day light	3	0.18, 0.67, 0.94
	Acetic acid:	Iodine vapour	3	0.18, 0.67, 0.94
	Water	Vanillin-H_2SO_4	3	0.18, 0.67, 0.94
	(4: 1: 5-Top layer)	UV Short	6	0.06, 0.19, 0.32, 0.48, 0.80, 0.95
		UV Long	7	0.06, 0.15, 0.33, 0.45, 0.67, 0.75, 0.92
	2. Toluene:	Day light	3	0.22, 0.38, 0.73
	Ethyl acetate:	Iodine vapour	4	0.22, 0.38, 0.64, 0.73
	Methanol	Vanillin-H_2SO_4	3	0.15, 0.22, 0.38
	(1:2:1)	UV Short	5	0.22, 0.38, 0.58, 0.64, 0.73

Phytochemical screening showed the presence of alkaloid, so total alkaloid content of the drug was estimated quantitatively and found to be 0.20% which can be taken as one of the parameter in ascertaining the quality of genuine drug. Crude fiber content of the drug was also estimated as 0.246%, its content higher than the prescribed amount in a particular drug indicates adulteration with the other more lignified not official parts of the plant.

By observing the powder and extracts of Lodh Pathani under ultra-violet light the adulteration may be detected. The colour of the drug in powder form and on treatment with different chemicals in day light and U.V. light is a helpful diagnostic feature of the identification of genuine drug. Further the purity of the test drug was achieved using instrumental techniques like TLC, UV and IR spectroscopy.

Thin layer chromatography is one of the important parameter used for detecting the adulteration and judging the quality of the drug. Thin layer chromatographic analysis

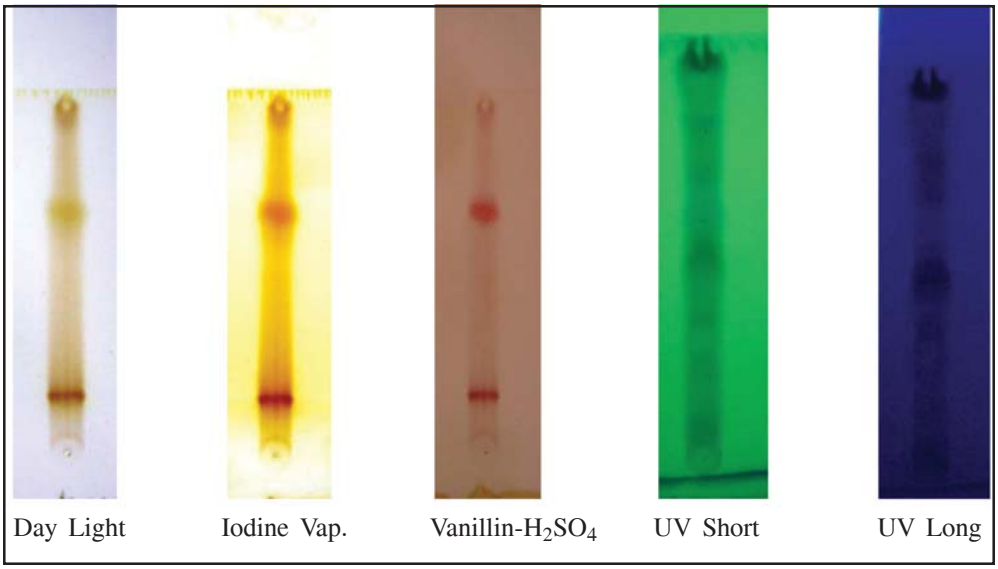

Fig. 1. TLC of Alcoholic Extract of Lodh Pathani

Solvent System: n-Butanol: Acetic Acid: Water (4: 1: 5-Top layer)

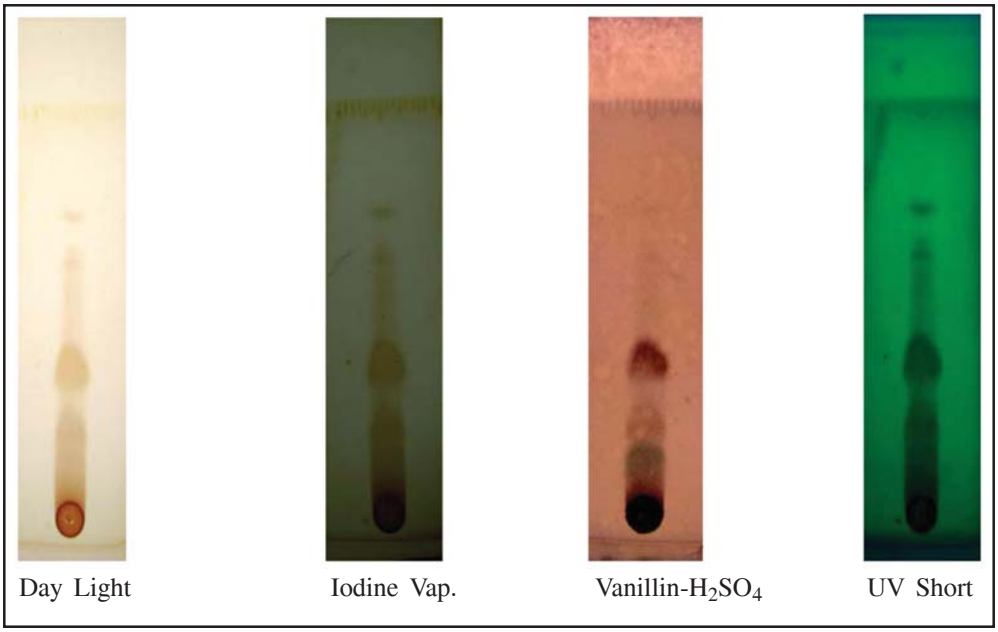

Fig. 2. TLC of Alcoholic Extract of Lodh Pathani

Solvent System: Toluene: Ethyl Acetate: Methanol (1: 2: 1)

of alcoholic extract of the drug was done and R_f values were calculated by visualising in day light, UV light , Iodine vapors and spraying with Vanillin-H_2SO_4 to standardize the drug for its identity and purity. The other novel instrumental technique used here for the identification of genuine drug is UV and IR spectroscopy. The alcoholic extract of Lodh Pathani was subjected to UV irradiation at different wavelengths

and the intensity of absorption was recorded. The spectrum obtained showed wavelength of maximum absorption λ_{max}, which is characteristic of a particular drug. Here in case of Lodh Pathani λ_{max} was 230 nm. Each drug has a characteristic λ_{max}, by which it can be identified. This information is helpful in standardization of herbal drug. Generally Infra Red (IR) spectroscopy is used for the determination of different functional groups present in a compound. IR spectrum has a region known as finger print region (1430-910 cm^{-1}) characteristic of a particular compound. This region can be compared with the fingerprints of human beings, which differ from person to person. To check the purity of drug, the IR spectrum of commercial sample may be compared with the IR spectrum of the authentic sample. If bands in the finger print region are similar the test drug would be genuine. So major bands in the alcoholic extract of Lodh Pathani are given (Table-6), which will be helpful in confirming the identity and purity of the drug.

This study assumes great significance as it will facilitate identity of genuine drug and detection of adulterants and waste material in the commercial drug.

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The Effect of Ushba (*Hemedesmus indicus*) – A Less used Unani Hepatoprotective Agent - on CCl_4 Induced Liver Damage

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Abstract

Since, the commonly used Unani Hepato-protective Drugs have already been subjected to primary scientific testing, mostly with positive results, study should now be directed to wards the promising, less commonly used agents, to widen the list for choosing candidates for advanced studies, as well as, to get hepato-protective drugs of new *types*. Under this consideration, we studied the effect of Ushba (*Hemedesmus indicus*) on Ccl_4 induced Liver Damage in rats. The drug was found to produce a significant reduction in the elevation of biochemical parameters of liver function due to Ccl_4 induced damage. S Bilirubin was brought down to the normal range, but rest of the parameters, though significantly reduced, remained somewhat above the normal range. Since, the dose studied corresponded to the clinical dose in Unani texts, which are mostly towards the lower side due to the cautious attitude of Unani Physicians, therefore, higher doses should be studied, along with toxicity testing. The study scientifically validated the Unani use of Ushba as Hepato-protective Agent, paving the way for its greater clinical use and also indicated lines for further study to make full use of its potential.

Key Words: Ushba; *Hemedesmus indicus*; Hepato-protective; Hepatitis

Introduction

The functional and structural complexity of liver, its serious and common diseases and the signal failure of Western Medicine to come up with effective treatments long back generated interest in Unani and other Traditional Hepato-protective Drugs. Consequent research has validated many such drugs. This has provided assurance to the already existing widespread use of Unani Drugs for Liver Diseases, even in Western Medicine. According to one estimate nearly 100 plants have been scientifically shown to possess Hepato-protective Activity (Subramonium, 1999). We, believe that now the time has come to examine the less used Unani Hepato-protective Agents. We have adopted the following criteria for short-listing such drugs:

(i) Select Drugs reported to be Hepato-protective in Unani texts but not being commonly used by contemporary Unani physicians.

(ii) Short list on the basis of Traditional Unani Principles such as Mizaj etc.

(iii) Further short list on the basis of frequency of current Unani use; reports from non-Unani sources, including folk surveys and indications from scientific research findings, such as, presence of compounds likely to be Hepato-protective, being an ingredient of a scientifically validated polypharmaceutical preparation, partial and inconclusive validations etc.

One drug found to be quite interesting by these considerations was Ushba. It is a well known Unani drug used quite commonly as a Blood Purifier (Najmul Ghani,

1917), reported to be useful in Amraz Jigar (Liver Disorders) (Najmul Ghani, 1917). It is reported to be a Mudir (Diuretic) (Mohammad Husain,1895) which according to Unani principles makes it likely to be useful in Liver Diseases. Folk Medicine reports also indicate its usefulness for Liver Diseases (Kirtikar & Basu, 1996). Despite such a promising profile, quite surprisingly currently it is not used in Liver Disorders by Unani physicians. It has not yet been studied scientifically for Hepato-protective Activity. So, as Ushba fulfilled our criteria, it was subjected in the present study to the test for Hepato-protective Activity on biochemical markers of liver function in Carbon tetrachloride (Ccl_4)induced liver damage in rats.

Material and Methods

Preparation of Extract

Ushba *(Hemidesmus indicus)* was obtained from the Dawakhana Tibbiya College, Aligarh Muslim University, Aligarh. The drug was identified at the Pharmacognosy Section of Department of Ilmul Advia, AMU, Aligarh. It was shade dried and powdered in Haawan Dasta (Iron Mortar) as a coarse powder for extraction and kept in an airtight container. The powdered drug was extracted in 50% alcohol with Soxhlet's apparatus for 6 hours. The extract was filtered and dried by evaporation on water bath. Fresh suspension of extracts was prepared in distilled water, which was administered orally with the help of oral feeding cannula. The dose for the animal was calculated by multiplying the Unani clinical dose of test drugs by conversion factor of 7 for rat (Dhawan *et al.,* 1982). It was determined to be 60mg/100g

Liver Function Test (Biochemical) in CCl_4 induced Liver Damage

The test was carried out in albino rats of either sex of 150-200 g body weight. The animals were divided into 2 groups of 6 animals each. Animals in Group I the control, and were administered with 20 ml/kg of distilled water. The animals in Group II were administered with 60mg/g of the test drug, daily, for 6 days. On the fifth day all the animals were administered with Ccl_4 in a dose of 0.1 ml/100g by subcutaneous injection. On the seventh day the animals were sacrificed and blood was collected for the estimation of bio-chemical markers of liver function, namely, S Bilirubin by the method of Malloy and Evelyn (1937), AST (SGOT) and ALT (SGPT) by the method of Reitman & Frankel (1957) and S Alkaline Phosphatase by the method of Kind and Kings (1954), using Reagent kits supplied by SPAN Diagnostic Ltd (Code No. 25920).

Observations and Results

S. Bilirubin was found to be 1.2±0.13 mg/100ml in Control Group while, it was significantly decreased to 0.67±0.08 mg/100ml ($P<0.01$).

The concentration of ALT/SGPT was found to be 173±3.52 U/L in the Control Group while, it was significantly reduced to 81.83±2.42 U/L (P<0.01) in the animals treated with Ushba.

The concentration of AST/SGOT was found to be 182.16 ±2.17 U/L in the Control Group while, it was significantly reduced to 114.0 ±6.20 U/L (p < 0.001) in the animals treated with the test drug.

The concentration of S. Alkaline phosphatase was found to be 74.25±2.24 KAU/100ml in the Control Group while, it was significantly reduced to 30.36±5.91 KAU/100ml (P<0.01) in the animals treated with the test drug. The results are presented in Table I.

Discussion

Since, commonly used Unani Hepato-protective drugs have already been scientifically validated, the time has come to turn to the lesser used drugs in order to increase the ambit of primarily validated drugs that may be subjected to advanced studies. Ushba (*Hemidesmus indicus*) is a well known Unani drug used mainly as a Musaffi Dam (Blood Purifier) ( ). However, it has been reported to be useful in Yarqan (Jaundice) only in the later period by Unani Physicians of India (Azam Khan, 1313 H). The earlier Unani texts are silent about its role in Liver Diseases. Its Musaffi Dam action, not only reported from earliest times but also widely applied in therapy, supports the claims of Indian Tabibs (Unani Physicians) as according to Unani principles Fasad Dam (Corruption of Blood) can give rise to liver diseases. Musaffi Dam action is considered to be Anti-infective in the Biomedical* context, so, it can be said that Ushba would be particularly effective in liver diseases of infective aetiology such as Hepatitis A, B etc. Since, these disorders make up the bulk of serious liver diseases, a Traditional Drug expected to be specifically useful in such diseases would be of special clinical value. However, Ushba has still not been subjected to scientific scrutiny. Therefore, it was considered worthwhile to test it for Hepato-protective Activity against Carbon tetrachloride induced liver damage. The

Table I: Effect of Ushba (*Hemedesmus indicum*) on Biochemical parameters of Liver Function in CCl_4 induced Liver Damage

Group	S Bilirubin mg/100ml	S ALT/GPT U/L	S AST/GOT U/L	S Alk. Phos. KAU/100ml
Control	1.2±0.13	182.16±2.17	173.0±3.52	74.25±2.24
H. indicus (60mg/100g)	0.67±0.08*	114.5±6.20*	81.83±2.42*	30.36±5.91*

n=6 * = p < 0.01

50% Alcoholic Extract of the drug was used as it is expected to elute the maximum range of phytoconstituents.

The study revealed that the 50% Alcoholic Extract Ushba significantly reduces the elevation of S Bilirubin, S ALT/S GPT, S AST/ S GOT and S Alkaline Phosphatase produced to experimental liver damage by Carbon tetrachloride. Thus, the study showed Ushba to possess Hepato-protective Activity. However, only S Bilirubin was brought down to the normal range. The rest of the parameters though significantly reduced were still above the normal range. This indicates that Ushba possesses moderate activity at the dose studied. Since, the dose used corresponded to Unani clinical doses which generally are on the low side, due to the caution of Unani Physicians to avoid unnecessary exposure to Xenobiotics, so, higher doses of the test drug could be more active and should be studied, along with safety/toxicity studies.

The study scientifically validates a lesser used Unani Hepato-protective agent for this Activity. Thus, it increases the repertoire of scientifically validated Unani Hepato-protective drugs.

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Reduction of Joint Swelling and Symptomatic Relief of Osteoarthritis of the Knee by Leech Therapy – A Randomized Uncontrolled Study

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Abstract

Background: Leech therapy has been in use for various ailments traditionally including the joint pain. Although different studies have been conducted to evaluate the efficacy of leech therapy in symptomatic relief in osteoarthritis of knee joints but its anti-inflammatory property with respect to the joint swelling is yet to be ascertained.

Objectives: To evaluate the efficacy of leech therapy for reducing joint swelling in osteoarthritis.

Study Design: An uncontrolled clinical study.

Patients: Total of 20 patients with osteoarthritis of knee were selected from the General Out Patient Department of Regional Research Institute of Unani Medicine, Sriangar.

Intervention: A single application of 4–6 leeches applied locally at the site

Measurement: The mean reduction in joint circumference, and subscores of Western Ontario and McMaster University (WOMAC) osteoarthritis score for pain, stiffness, and function at days 7, 22 and 60.

Results: The primary end point, joint swelling was reduced by mean (SD) inches 0.55 (0.5) in right knee joint and 0.74 (0.4) inches in the left knee joint on the day 60 after the application of leeches compared. There was also marked reduction in pain, stiffness, and function scores of WOMAC index. The findings are presented in the paper in detail.

Conclusion: The leech therapy helps in reducing the swelling in patients with osteoarthritis of knee. The potential of leech therapy being anti-inflammatory and the pharmacological properties of leech saliva remain to be clarified.

Key Words: Leech therapy, Osteoarthritis, *Hirudinaria asiatica,* Hirudin, Kallikrein, Tryptase, Anti-inflammatory, Pain, Stiffness, Unani Medicine.

Introduction

The traditional therapies are part of the culture in Asian countries. Various types of therapeutics including herbal and regiminal therapies like leeching, cupping, venesection, purging etc are being practiced since centuries. The valley of Kashmir being rich in traditions, various types of traditional therapies form the part of culture. The tradition of applying leeches on 21st March every year is one of the traditions being adopted since centuries. As 21st March is being celebrated as Nowroz in the valley it marks the beginning of summer season. The Unani System of Medicine advocates the removal of bad matter (*Istefrag*) on the change of season which can be done by removing of bad matter which gets accumulated during the winter

season due to sedentary life style. The *Istefrag* can be done by different regiminal therapies, like leeching, cupping, purging, Turkish bath etc. where the bad humors are removed from the body as a preventive measure so to keep a person healthy in the coming season. The same practice is being followed by different traditional healers in the valley. Though application of leeches or leech therapy has been in practice in the valley of Kashmir since centuries and it was in 1999 when the research workers of Regional Research Institute of Unani Medicine (RRIUM), Srinagar, Kashmir, started to look into the beneficial aspects of this therapy (Younis *et al.,* 2002). The clinical efficacy of leech therapy was also evaluated in different diseases like, frost bite, essential hypertension etc. (Younis *et al.,* 2005). The leeches were used in different diseases from fevers to flatulence in European countries also, but presently this mode of treatment has been limited to relieve the venous congestion in plastic surgeries and some other microsurgeries. Recently a randomized controlled study was conducted to evaluate the efficacy of leech therapy in symptomatic relief of osteoarthritis of knee. The relief was measured by calculating the WOMAC (Western Ontario McMaster University) pain, stiffness and function score. We designed this trial to asses the reduction in joint swelling along with the symptomatic short-term efficacy of leech therapy in osteoarthritis of knee.

Methodology

A total of 20 patients diagnosed as osteoarthritis of knee formed the subject of the study. The patients were selected randomly from Out Patient Department (OPD) of Regional Research Institute of Unani Medicine, Srinagar, Kashmir. The study design was approved by the Institutional Ethics Committee and a written informed consent was obtained from each patient. Four to six leeches were applied after 7 days of registration as the period was considered washout period. The patients were advised to report for first follow-up after 7 days and subsequent follow-ups were done after every 15 days. The leeches were procured from the local supplier and were identified as *Hirudinaria asiatica* by the Zoologist of the University of Kashmir, Srinagar. The patient outcome was measured using WOMAC criteria and reduction in joint circumference which was measured manually by using measuring tape. The girth of the affected joints was measured on each follow up along with WOMAC score. The routine investigations were done at the entry level and after the completion of the study.

The patients enrolled for the study were left without treatment for 1 week and during this period all other medications were stopped so to washout the effect of the previous medications. The study was completed in 60 days.

Statistical Analysis

The data thus obtained was calculated with cross tabulation on computer using Instat – 3 programme for statistical calculations. Mean, Standard Deviation (SD),

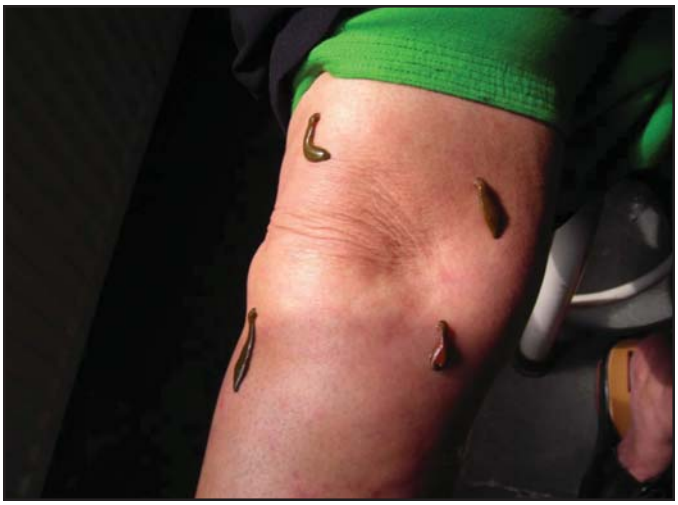
Standard Error of Mean (SEM), Minimum and Maximum were calculated for age, duration of disease, weight, height, Body Mass Index (BMI), WOMAC (pain, stiffness and function scores) and reduction in joint swelling on subsequent follow-ups. Unpaired t-test for group comparison was also done at entry level and at the end of the study for different parameters.

Results

After detailed examination in the General OPD of RRIUM, Srinagar, Kashmir, 20 patients fulfilled the study criteria and agreed to study participation. Table 1 shows the baseline anthropometric and clinical characteristics of the study patients. All the patients had radiographically confirmed grade II to III osteoarthritis of the knee. The mean (SD) age 48.5 (8.5) years with 3 (15%) male and 17 (85%) female patients. The mean (SD) duration of the disease was 30.1 (27.3) months. The mean (SD) body mass index (BMI) was 27.7 (4.7) kg/m^2. The mean (SD) erythrocyte sedimentation rate (ESR) was 14.1 (9.1) mm/1st hour by Westergens method. The mean (SD) WOMAC pain score at the entry level was 12.2 (4.7) in right knee and 13.9 (4.0) in the left knee, the mean (SD) stiffness score at the entry level was 6.6 (2.7) for right knee and 7.4 (2.3) for the left knee, the mean (SD) function score was 34.5 (13.3) for right knee and 39.5 (11.9) for the left knee.

Table-1. Baseline characteristics of the study patients

Parameters		Mean (SD)
Age		48.5 (8.5)
Sex	Male	3 (15%)
	Female	17 (85%)
Duration of Disease		30.1 (27.3)
Body Mass Index (BMI) Kg/cm^2		27.7 (4.7)
Weight Kg		65.7 (8.2)
Height (Mtrs)		1.55 (0.09)
Hemoglobin		10.64 (0.88)
Erythrocyte Sedimentation Rate		14.13 (9.18)
WOMAC, pain score	Right side	12.2 (4.7)
	Left side	13.9 (4.0)
WOMAC, stiffness score	Right side	6.6 (2.7)
	Left side	7.4 (2.3)
WOMAC, function score	Right side	34.5 (13.5)
	Left side	39.5 (11.9)



Outcome Measures

Reduction in Joint Swelling

Leech therapy provided a greater benefit in the primary outcome measures, reduction in joint circumference after 7 days. The mean (SD) reduction in joint circumference was 0.19 (0.3) inches in right knee and 0.29 (0.3) inches in left knee. On the 22nd day of follow-up the mean (SD) reduction in joint swelling was recorded as 0.31(0.4) inches in right knee and 0.42(0.4) inches in left knee joint when compared with the entry level values the P value was 0.1528 in right knee and 0.1471 in left knee joint which were not significant, the difference of means was -0.1170 and -0.1259 for right and left knee joints respectively. At the end of the study i.e. on the 60th day after the treatment the mean (SD) reduction in joint swelling was recorded as 0.55(0.5) inches in the right knee joint and 0.74(0.4) inches in the left knee joint and when evaluated statistically and compared entry level values the P values were 0.0019 for the right knee and <0.0001 for the left knee joint considered to be extremely significant (Table 2). The differences of means were 0.3553 and 0.4462 for right and left knee joints respectively.

WOMAC Pain Score

The mean (SD) WOMAC pain score at the entry level was 12.23(4.7) for right knee joint and 13.9(4.0) for left knee joint. The mean (SD) pain score on day 7 was 10.3(3.7) for right knee and 11.15(3.3) for left knee. On comparison and calculating the unpaired t-test the P value for the right knee was 0.0922 considered not quite significant. The difference of means was -2.088 with 95% confidence interval of difference being -4.529 to 0.3525. The P value of left knee was calculated 0.001 considered to be very significant with difference of means -2.747 and the 95% confidence interval of differences being -4.427 to -1.066.

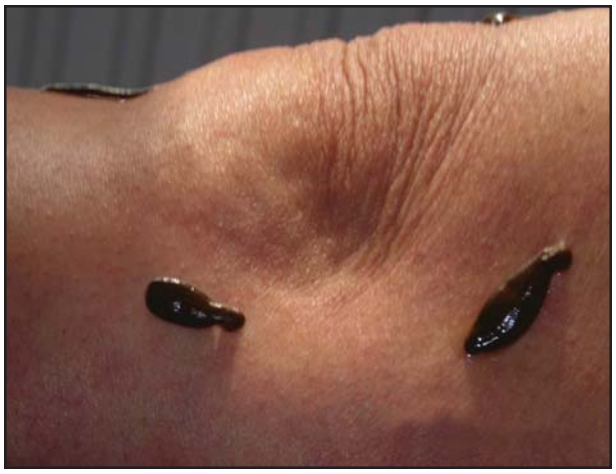
Table-2. Group difference in Joint Circumference and WOMAC score between entry level and end of the study.

End point	Leech Therapy		Comparison with entry level P-value	
	Right Mean (SD)	Left Mean (SD)	Right	Left
WOMAC, Pain score				
Baseline	12.2 (4.7)	13.9 (4.0)	—	—
Day 7	10.3 (3.7)	11.1 (3.3)	0.0922	0.0017
Day 22	9.4 (2.7)	9.1 (2.8)	0.0030	<0.0001
Day 60	5.9 (1.5)	5.5 (1.2)	<0.0001	<0.0001
WOMAC, Stiffness score				
Baseline	6.7 (2.7)	7.4 (2.3)	—	—
Day 7	5.7 (2.0)	5.8 (1.4)	0.1042	0.0004
Day 22	4.5 (1.6)	4.7 (1.3)	<0.0001	<0.0001
Day 60	3.5 (1.0)	3.1 (0.6)	<0.0001	<0.0001
WOMAC, Function score				
Baseline	34.5 (13.3)	39.5 (11.9)	—	—
Day 7	29.3 (10.3)	32.3 (9.4)	0.0612	0.0041
Day 22	29.3 (10.3)	32.5 (9.5)	0.0668	0.0032
Day 60	17.6 (4.1)	16.8 (3.9)	<0.0001	<0.0001
Reduction in Joint swelling (inch)				
Day 7	0.19 (0.3)	0.29 (0.3)	—	—
Day 22	0.31 (0.4)	0.42 (0.4)	0.1528	0.1471
Day 60	0.55 (0.5)	0.74 (0.4)	0.0019	<0.0001

The mean (SD) pain score at the end of the study (60th day after treatment) was 5.9(1.5) for right knee and 5.54(1.26) for the left knee. The P value of pain score when compared to the entry level was <0.0001 for right and left knee joints considered to be very significant (Table 2). The difference of means in right knee joint was -6.329 and 95% confidence interval of the difference being -8.409 to -4.4.249. The difference of means for the left knee joint was -8.359 with 95% confidence interval of difference ranging from -10.146 to -6.573.

WOMAC Stiffness Score

The entry level mean (SD) stiffness score for right knee was 6.69(2.7) and 7.47(2.3) for left knee. On day 7 the mean (SD) stiffness score was 5.78(2.05) for right knee and 5.84(1.42) for the left knee. On comparison the P value for right knee was



0.1042 considered not significant but P value for the left knee was 0.0004 considered to be extremely significant. The difference of means for the right knee was -0.9010 with 95% confidence interval of the difference ranging from -1.992 to 0.189. The difference of means for the left knee was -1.634 with 95% confidence interval of the differences -2.510 to -0.757.

The mean (SD) stiffness score at the end of the study was 3.50(1.05) for the right knee and 3.18(0.66) for the left knee. When compared with the entry level stiffness score the P value was <0.0001 for right as well as left knee considered to be extremely significant (Table 2). The difference of mean for right knee was -3.190 with 95% confidence interval of the differences -4.412 to -1.969. The difference of means for the left knee was -4.294 with 95% confidence interval of the differences being -5.320 to -3.269.

WOMAC Function Score

The mean (SD) function score at the entry level was 34.5(13.3) for right knee and 39.54(11.95) for the left knee. The mean (SD) on the 7th day followup was 29.39(10.3) for right knee and 32.336(9.46) for the left knee. On comparison with the entry level score the P value was calculated at 0.0612 for the right knee which is not quite significant and for the left knee the P value was 0.0041 for left knee joint, considered to be significant. The difference of means for right knee was -5.105 with 95% confidence interval of difference ranging from -10.457 to 0.246. The difference of means for the left knee was -7.179 with 95% confidence interval of difference ranging from -12.013 to -2.345.

The mean (SD) function score at the end of the study for right knee was 17.68(4.15) and for the left knee was 16.0(3.9). When compared with the entry level function score the P value was <0.0001 for right as well as left knee considered to be extremely significant (Table 2). The difference of means for the right knee joint was -16.818 with 95% confidence interval of the difference ranging from -22.675 to

-10.962. The difference of means for the left knee was -22.684 with 95% confidence interval of the difference ranging from -27.938 to -17.430.

Discussion

Due to serious adverse effects of available treatments for osteoarthritis (Wolfe *et al.,* 1999), new therapeutic approaches should be considered especially the traditional approaches. Leech therapy has been in use for treating pain for centuries together but their efficacy for reducing the joint swelling has never been evaluated on modern scientific lines (Giacometti, 1987 & Fields, 1991). In a controlled trial conducted in Germany by Michalsen *et al.,* (2003), only the symptomatic relief was evaluated with leech therapy and all the parameters were subjective in nature (Michalsen *et al.,* 2003). In our study we along with subjective parameters (WOMAC, score for pain, stiffness and function) evaluated the efficacy of leech therapy in reduction of joint swelling. The observed improvement in joint swelling might have been responsible for the improvement in different WOMAC, scores. Moreover a single application of leech reduced the joint swelling for at least 60 days and longer.

Different mechanism may explain the observed effect. First, various pharmacologically active substances besides the thrombin inhibitor *hirudin* have been found in leech saliva, such as anti-inflammatory agent like Eglin, Kallikrein and tryptase inhibitors and various other protein inhibitors.

According to Unani System of Medicine the inflammation is caused by the accumulation of one the four humors. In the majority of inflammations the blood is accumulated at the site. To reduce the swelling there had been the practice of bloodletting from the area of inflammation in the past. The bloodletting was done by venesection, leeching etc (Hamadani, 1980). Since leeching has been termed as painless instrument for bloodletting (Mory *et al.,* 2000) so it may be one of the causes for reduction in joint swelling in osteoarthritis.

The comparison between the entry level results and the end of the study proved to be significant in relation to reduction in joint swelling (P value <0.0001) and WOMAC pain, stiffness, and function score (P value <0.0001) in all parameters thus proving the significance of the therapy.

The limitations of the study being that very small sample size and the study being uncontrolled. We assessed the outcome expectations to approximate the placebo like effects, but there were encouraging results at the end of the study in respect of the reduction in joint swelling and WOMAC score criteria.

In the controlled trials the leech therapy might be less effective if compared with standard treatments but since single application can overcome the economic burden and adverse effects of the conventional therapies. Theoretically leech therapy carries an infection risk because of the bacterium *Aeromonas hydrophila* (Mackay DR *et al.,* 1999), present in the gut of the leech for blood synthesis. Cases of infection and

septicemia with *A. hydrophila* have been reported when leeches were applied on open wounds or to malfused tissues in plastic surgery (Weinfield *et al.,* 2000, Lineaweaver, 1991; Lineaweaver, *et al.,* 1992). So far there are no reported cases of *Aeromonas hydrophila* infection when leeches were applied for treating osteoarthritis or local pain syndrome (Michalsen *et al.,* 2003)

Finally this study may not exactly assess the clinical value and long term effect of leech therapy, as the sample size was small and only 60 days evaluation was undertaken. Re-treatment may be necessary for leech therapy to become clinically valuable in long-term management of osteoarthritis of the knee.

The leech therapy as applied in this study was safe and well tolerated. There was no change in hematological values at the end of the treatment. The mean (SD) hemoglobin was 10.6(0.88) gm% before treatment and 10.48(0.69) gm% at the end of the treatment. So the sucking of blood by the leeches had no effect on the hemoglobin of the subjects.

Conclusion

From the study it can be concluded:

1. That the leech therapy has much scope in the treatment of osteoarthritis.
2. The therapy is safe and economical for the long term use also.
3. Leech therapy helps in reduction of the swelling in osteoarthritis.
4. Controlled trials on larger samples can confirm the efficacy of this therapy.

Acknowledgement

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Identification and Authentication of Powdered Herbal Drugs used Frequently in Unani System of Medicine

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Abstract

A number of classical formulations which are frequently used in unani system of medicine contains crude herbal drugs in their powdered form. To establish the standards of these polyherbal formulations a knowledge of drugs in their powdered form is a must because the ordinary diagnostic features of the drugs in the unground condition largely disappeared in the powder and new modified characters have become prominent. Present paper deals in the identification and authentication of powdered herbal drugs which are frequently used in unani system of medicine. Great emphasis is laid on the most diagnostic characters by which each powder may be identified, particularly within the morphological group to which it belongs. Dimensions of cells and other particles also included as they are of value in distinguishing between closely similar powders.

Key Words: Herbal drugs, Diagnostic characters, Unani medicine.

Introduction

Huboob (Pills); Aqras (Tablets); Majoon; Itrifal; Khamira; Luboob; Marham etc. are a number of polyherbal formulations which are frequently used by unani physicians to cure various ailments. In all these formulations the crude herbal drugs are used in their powdered form (Anonymous, 2006). For the establishment of the standards of these polyherbal formulations a knowledge of crude drugs in their powdered form is a must because the ordinary diagnostic features of the drugs in the unground condition largely disappeared in the powder and new modified characters have become prominent (Wallis, 1969) Present paper deals in the identification and authentication of few powdered drugs which are frequently used in Unani system of medicine. Great emphasis is laid on the most diagnostic characters by which each powder may be identified particularly within the morphological group to which it belongs. Dimensions of cells and other particles also included as they are of value in distinguishing between closely similar powders.

Methodology

Authentic crude drug samples procured from the market; powdered and sieved through 60 mesh. The powdered drug first cleared in the solution of chloral hydrate and then mounted in solution of chloral hydrate and glycerol to prevent the formation of chloral hydrate crystals during the examination of the slide. Lignification was established by the reaction with solution of phloroglucinol and hydrochloric acid. Several preparations with different mountants like iodine water, sudan III, ruthenium red, ferric chloride etc. were also made to emphasise the presence of particularly important cells or cell contents. Care should be taken to avoid the presence of any air bubble (Jackson & Snowdon, 1968; Johansan, 1940; Iyengar, 1997; Tyler and Schwarting, 1956). Most diagnostic features and the dimensions of the cells and

other particles were recorded. The respective photographs were taken from the digital microscope with computer attachment.

Observations

1. *Amla*

Emblica officinalis Gaertn. (Family: Euphorbiaceae)

Part used: Fruit

Important Formulations: Majoon-e-Zabeeb; Majoon-e-Najah; Majoon-e-Musaffi-e-Khoon; Majoon-e-Miqil; Majoon-e-Mundi; Majoon-e-Kundur; Majoon-e-Fanjnosh; Majoon-e- Falasifa; Majoon-e-Azaraqi; Itrifal-e-Kabir; Itrifal-e-Kishneezi; Itrifal-e-Mulaiyin; Itrifal-e-Sagheer; Itrifal-e-Ustukhuddus; Jawarish-e-Fanjnosh; Qurs-e-Mulaiyin (Anonymous 2006)

Powder study: Dark brown powder with aromatic odour and acrid with slight bitterness in taste.

Identifying features: (Fig. A1 – Fig. A4)

(a) Sclereids square-rectangular-isodiametric-triangular, very broad lumen, pitted walled having 112-50-153µ in length and 63-90µ in width.

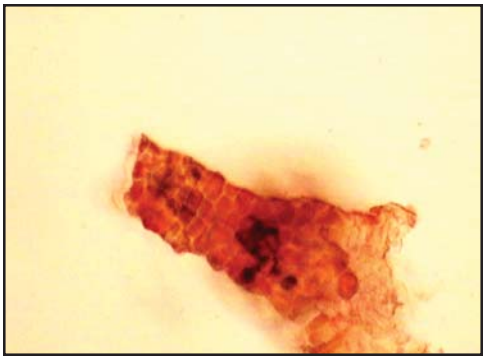

Fig. A1. Fragment of epicarp of *Emblica officinalis* Gaertn x 40

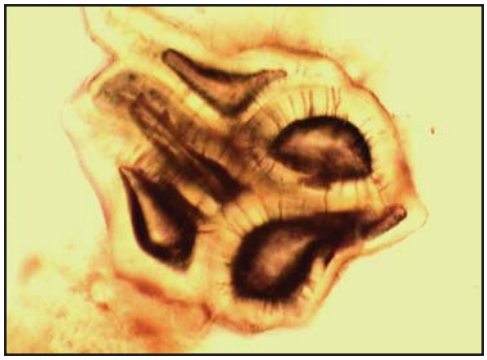

Fig. A2. Sclereids in groups of *Emblica officinalis* Gaertn. x 40

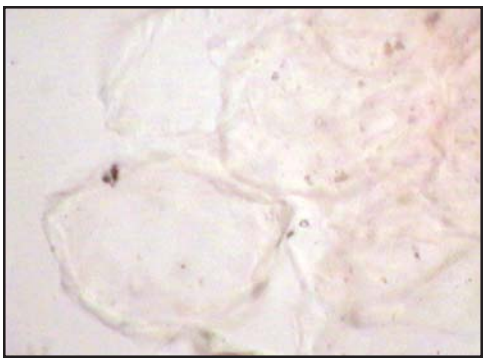

Fig. A3. Mesocarpic parenchyma cell of *Emblica officinalis* Gaertn x 40

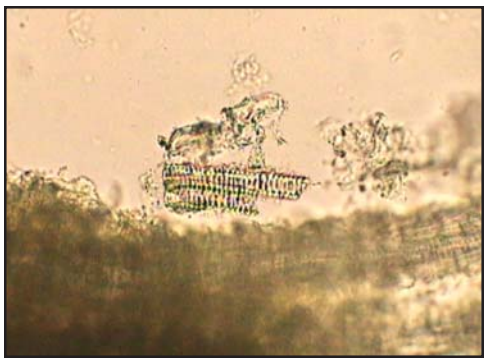

Fig. A4. Vascular elements of *Emblica officinalis* Gaertn x 40

(b) Mesocarpic parenchyma cells.

(c) Vessels with spiral thickenings.

(d) Epicarp in surface view, cells square to polygonal in shape, slightly thick walled.

2. *Balela*

Terminalia bellerica Roxb. (Family : Combretaceae)

Part used: Fruit

Important Formulations: Majoon-e-Zabeeb; Majoon-e-Najah; Majoon-e- Muqil; Majoon-e-Musaffi-e-Khoon; Majoon-e-Mundi; Majoon-e-Kundur; Majoon-e-Falasifa; Majoon-e-Fanjnosh; Itrifal-e-Kabir; Itrifal-e-Kishneezi; Itrifal-e-Sagheer; Itrifal-e-Shahtara; Itrifal-e-Malaiyan; Itrifal-e-Ustukhuddus (Anonymous 2006)

Powder study: Grey coloured, odouroess powder with acrid and astringent taste.

Identifying features: (Fig. B1 – Fig. B12)

(a) Epicarp in surface view, rectangular to polygonal in outline with straight thick walled.

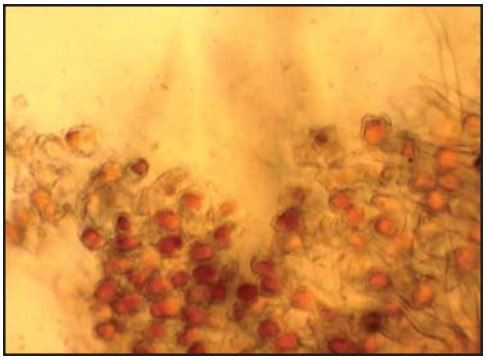

Fig. B1. Epicarp in surface view of *Terminalia bellerica* Roxb x 40

Fig. B2. Trichome of *Terminalia bellerica* Roxb x 40

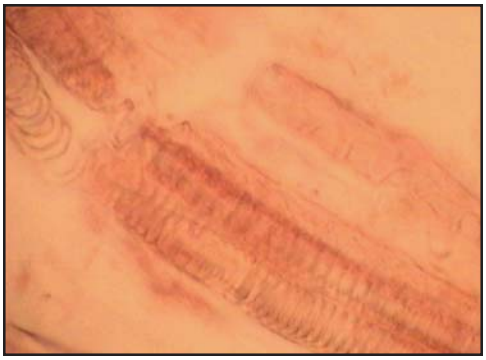

Fig. B3. Spiral vessel of *Terminalia bellerica* Roxb x 100

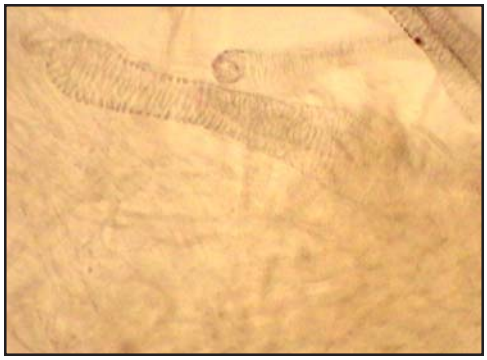

Fig. B4. Reticulate vessel of *Terminalia bellerica* Roxb x 40

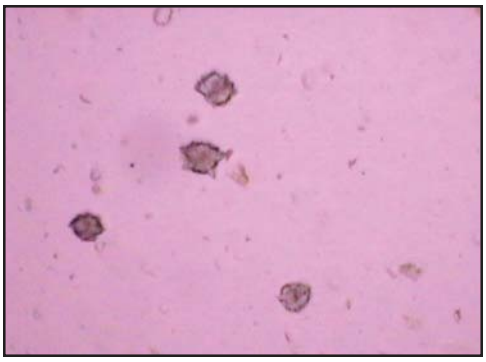

Fig. B5. Rosette crystals of *Terminalia bellerica* Roxb x 40

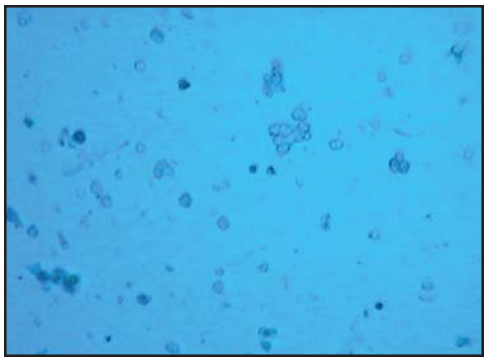

Fig. B6. Starch grains of *Terminalia bellerica* Roxb x 40

Fig. B7. Xylem fiber of *Terminalia bellerica* Roxb x 40

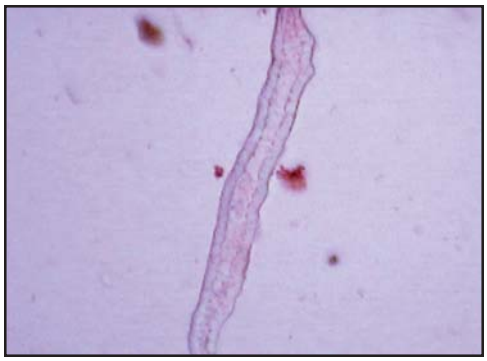

Fig. B8. Fibre tracheid of *Terminalia bellerica* Roxb x 40

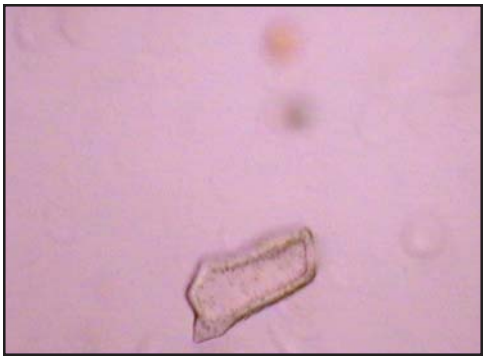

Fig. B9. Sclerotic cell of *Terminalia bellerica* Roxb x 40

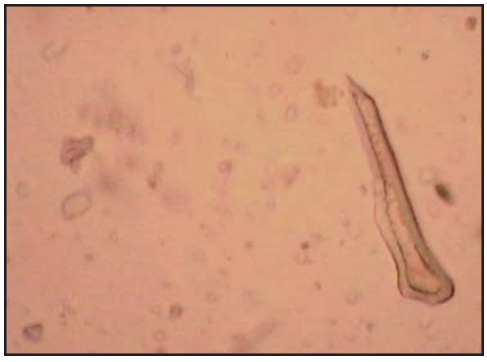

Fig. B10. Sclerotic cell of *Terminalia bellerica* Roxb x 40

(b) Trichome which are simple, unicellular, elongated, uniseriate.

(c) Vessels with spiral, scalariform, reticulateand thickenings and pitted walls having length 100-155-418µ and width 13-17-20µ.

(d) Fibre tracheid having simple pits on their lateral walls having dimensions 198-630-1260µ x 12-15-26µ.

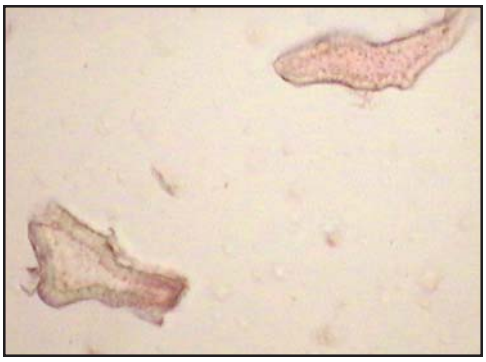

Fig. B11. Sclerotic cell of *Terminalia bellerica* Roxb x40

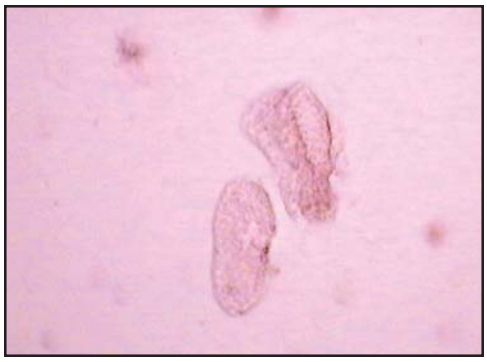

Fig. B12. Xylem parenchyma cells of *Terminalia bellerica* Roxb x 40

(e) Xylem fibers lignified, narrow, thick walled with tapering ends having length 21-26-36µ.

(f) Thick walled xylem parenchyma, rectangular to irregular in shape, posses simple pits.

(g) Sclerotic cells, elongated with pointed or flattened ends and striated walls. Variously shaped, pitted and highly lignified.

(h) Rosette crystals of calcium oxalate.

(i) Starch grains, simple or compound, spherical, round-polygonal having diameter 3-8-20µ with central hilum.

3. *Bao Barang*

Embelia ribes Burm. f. (Family: Myrsinaceae)

Part used: Berries

Important Formulations: Habb-e-Kabid Naushadari; Habb-e-Kibreet; Qurs-e-Deedan (Anonymous, 2006)

Powder study: Reddish brown powder with aromatic odour and astringent and aromatic taste with a slight pungency.

Identifying features: (Fig. C1 – Fig. C4)

(a) Sclereids, either single or in groups, thick walled, wide lumen with striations and pits.

(b) Thick walled parenchyma cells with globular aleurone grains having diameter 1µ – 2.50µ.

(c) Pieces of vessels with spiral thickening having width 9µ – 18µ.

(d) Prismatic crystals of calcium oxalate having dimensions 9µ – 13µ x 4.5µ – 9µ.

Fig. C1. Sclereids of *Embelia ribes* Burm.f. x 40

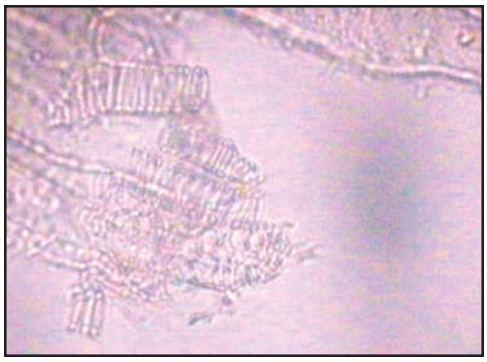

Fig. C2. Vascular elements of *Embelia ribes* Burm.f. x 40

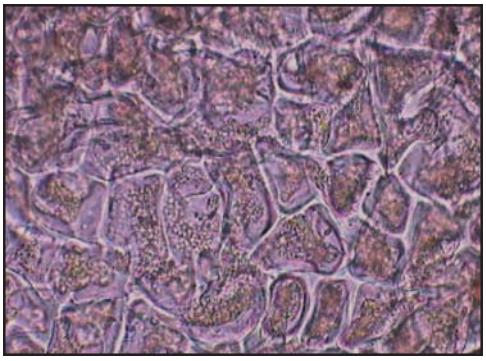

Fig. C3. Parenchyma cellsof *Embelia ribes* Burm.f. filled with aleurone grains x 40

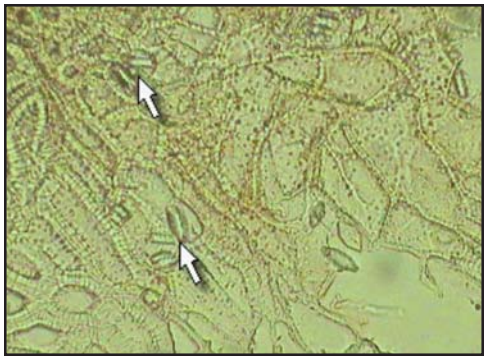

Fig. C4. Prismatic crystals of Embelia ribes Burm.f. x 40

4. *Darchini*

Cinnamomum zeylanicum Blume (Family: Lauraceae)

Part used: Stem bark

Important Formulations: Habb-e-Ambar Momyaee; Habb-e-Munaish; Jawarish-e-Pudina; Jawarish-e-Ood-Tursh; Jawarish-e-Ood Shireen; jawarish-e-Jalali; Majoon-e-Fanjnosh; Majoon-e-Ispand Sokhtani; Majoon-e-Jalali (Anonymous 2006)

Powder study: A reddish – brown powder with a characteristic, pleasant and aromatic odour and taste.

Identifying features: (Fig. D1 – Fig. D6)

(a) Abundant sclereid, either single or in groups, variation in size and shape, mostly isodiametric, U shaped, one wall is thinner than other three, thick wall with small lumen, pit numerous, striations visible.

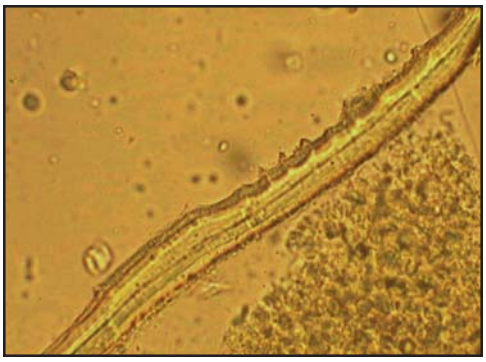

Fig. D1. A piece of fibre of *Cinnamomum zeylanicum* x 40

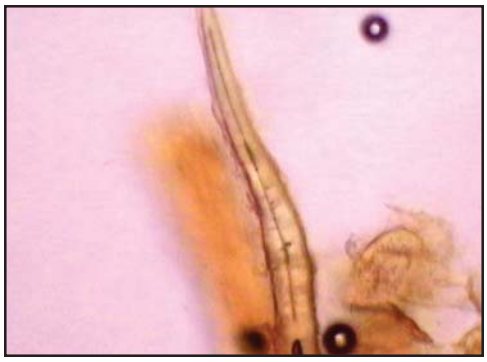

Fig. D2. A piece of fibre of *Cinnamomum zeylanicum* x 40

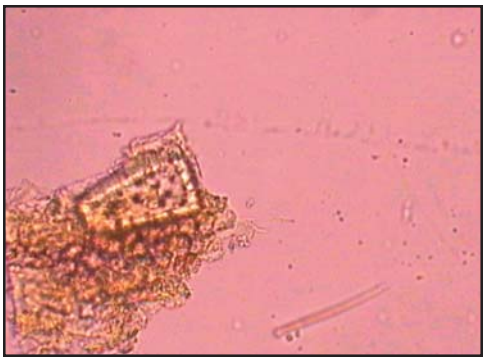

Fig. D3. Sclereid of *Cinnamomum zeylanicum x 40*

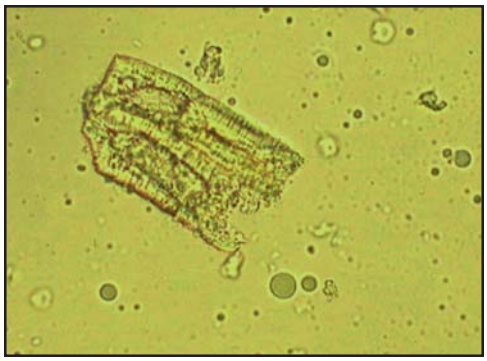

Fig. D4. Sclereid in groups *Cinnamomum zeylanicum* x40

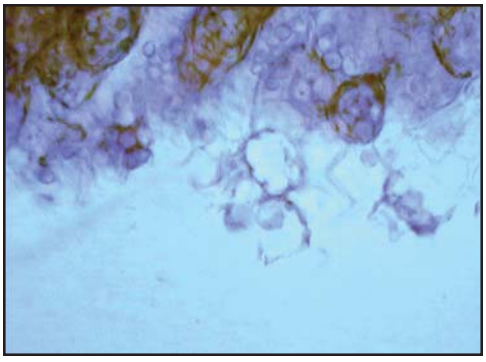

Fig. D5. Parenchyma cells filled with starch grains of *Cinnamomum zeylanicum* x 40

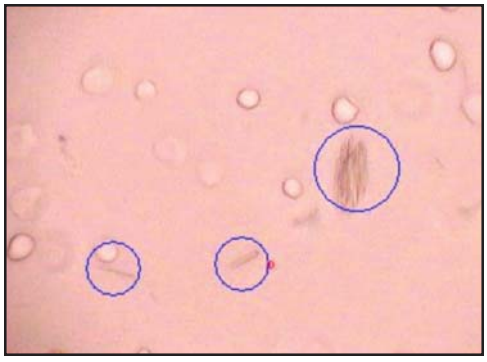

Fig. D6. Acicular crystals of *Cinnamomum zeylanicum* x 100

(b) Abundant fibres, single, thick walled, lignified, uneven lumen, slit shape pits, fibers associated with sclereid having 250-600μ in length and 15-30 μ in breadth.

(c) Acicular crystals of calcium oxalate.

(d) Starch grains (not more than 10μ) , simple, compound upto four or more, round, slit shape hilum.

5. *Filfil Siyah*

Piper nigrum Linn. (Family: Piperaceae)

Part used: Berries

Important Formulations: Habb-e-Azraqi; Habb-e-Hindi Mohallil; Habb-e-Hindi Sual; Habb-e-Kabid Naushadari; Habb-e-Kibreet; Habb-e-Miskeen Namaz; Habb-e-Pachnola; Habb-e-Papita Desi; Habb-e-Papita Wilayati; Qurs-e-Nuqrs; Jawarish-e-Bisbasa; Jawarish-e-Falafili; Jawarish-e-Fanjnosh; Jawarish Kamooni; Jawarish-e-Safarjali Qabiz; Majoon-e-Aqrab; majoon-e-Jalali (Anonymous 2006)

Powder study: Dark gray powder with aromatic odour and pungent taste.

Identifying features: (Fig. E1 – Fig. E6)

(a) Abundant starch grains which are in compact masses; individual grain rounded to angular, 1µ - 5µ in diameter.

(b) Stone cells of epicarp; mostly in groups, isodiametric to more or less columnar to irregular shape with thick porous walls having reddish- brown contents.

(c) Beaker shaped stone cells of the endocarp.

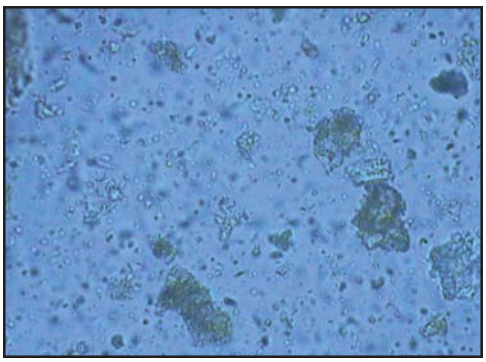

Fig. E1. Starch grains of *Piper nigrum* Linn. x 40

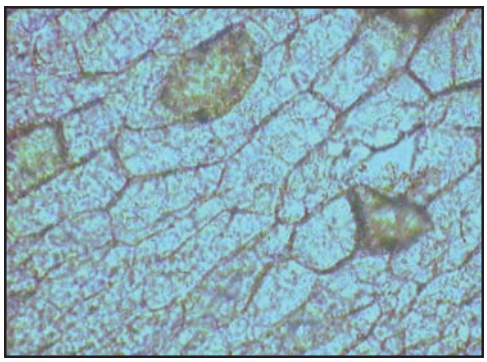

Fig. E2. Fragment of mesocarp of *Piper nigrum* Linn. showing oil cells x 40

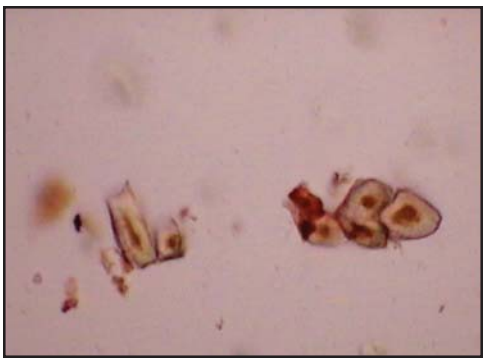

Fig. E3. Stone cells of *Piper nigrum* Linn. x 40

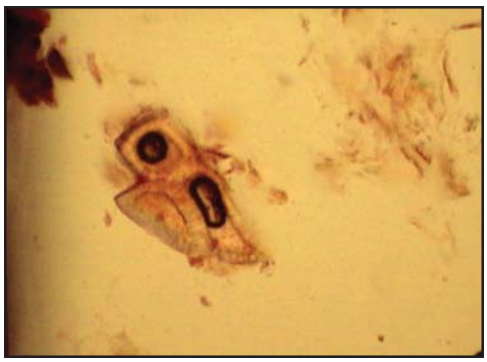

Fig. E4. Stone cells of *Piper nigrum* Linn. x 40

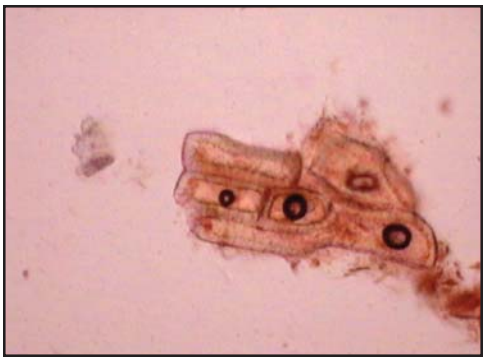

Fig. E5. Stone cells of *Piper nigrum* Linn. x 40

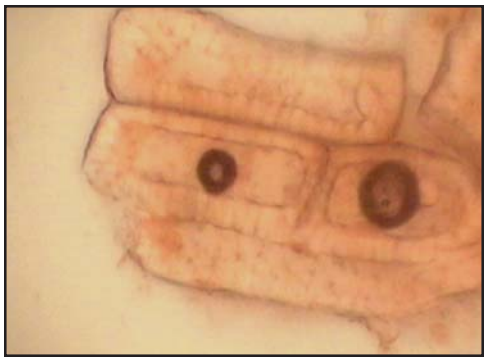

Fig. E6. Stone cells of *Piper nigrum* Linn.(enlarged view) x 100

(d) Fragments of mesocarpic parenchyma having oil cells filled with oil globules.

(e) Numerous yellowish oil globules of various sizes.

6. *Halela Siyah*

Terminalia chebula Retz. (Family : Combretaceae)

Part used: Fruit

Important Formulations: Habb-e-Hindi Chashm; Habb-e-Kabid Naushadari; Qurs-e-Mulaiyin; Itrifal Kishneezi; Itrifal-e-Muqil Mulaiyin; Itrifal-e-Sagheer; Itrifal-e-Ustukhuddus; Majoon-e-Azaraqui; Majoon-e-Fanjnosh; Itrifal-e-Kabir (Anonymous 2006)

Powder study: Yellowish brown powder, odourless with astringent taste.

Identifying features: (Fig. F1 – Fig. F6)

(a) Abundant elongated fibers, which occur mostly in groups, thick walled, lignified with distinct simple pits having width of approx. 13.5ì.

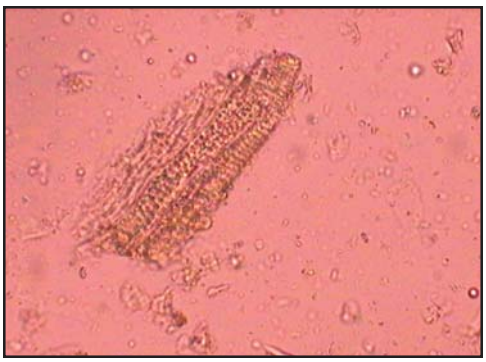

Fig. F1. Spiral vessel of *Terminalia chebula* Retz x 40

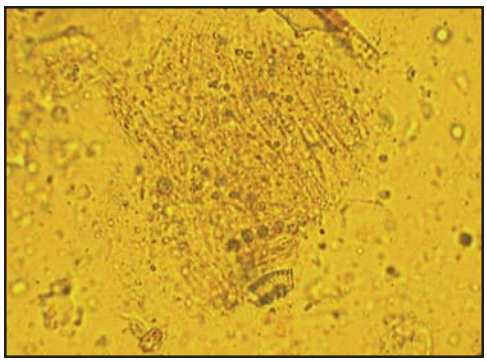

Fig. F2. Calcium oxalate crystals of *Terminalia chebula* Retz x 40

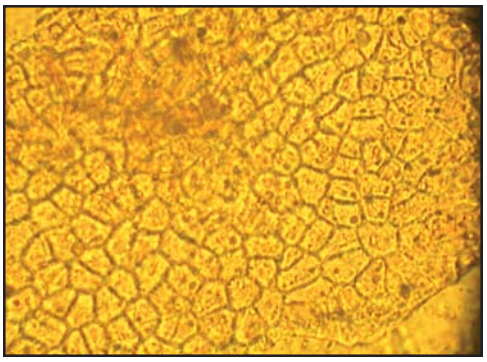

Fig. F3. Epicarp of *Terminalia chebula* Retz x 40

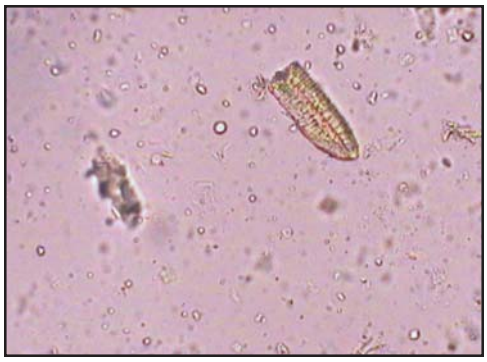

Fig. F4. Sclereid of *Terminalia chebula* Retz x 40

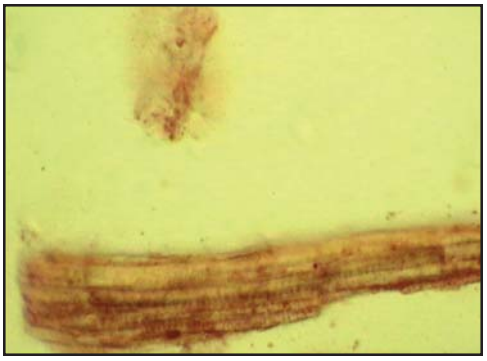

Fig. F5. Fibers in groups of *T. chebula* Retz x 40

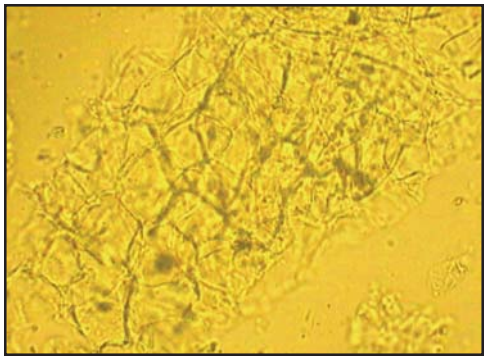

Fig. F6. Mesocarpic parenchyma cells of *T. chebula* Retz x 40

(b) Abundant rosette shaped crystals of calcium oxalate having diameter of 15.75µ - 45µ.

(c) Fragments of vessels having spiral thickening and width 13.5µ - 18µ.

(d) Moderately thick walled parenchyma of the mesocarp.

7. *Kishneez Khusk*

Coriandrum sativum Linn. (Family : Apiaceae)

Part used: Fruit

Important Formulations: Qurs-e-Musallas; Itrifal Kishneezi; Khamira-e-Gaozaban-Ambari Jawahirwala; Tirvaq-e-Nazla; Mufarrah Barid Qawi (Anonymous, 2006)

Powder study: Yellowish brown powder with aromatic odour and spicy but agreeable taste.

Identifying features: (Fig. G1 – Fig. G4)

(a) Abundant sclerenchyma fibers present in layers as masses of very thick walled, sinuous, fusiform cells; lumen narrow, few indistinct pits.

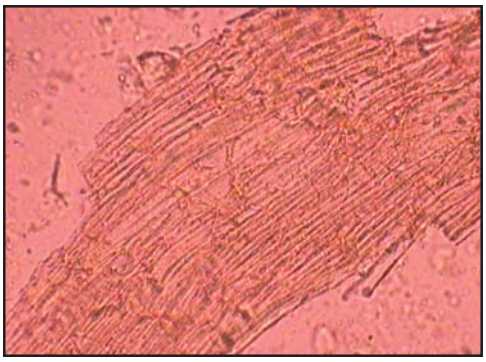

Fig. G1. Fibre from pericarp of *Coriandrum sativum* Linn. x 40

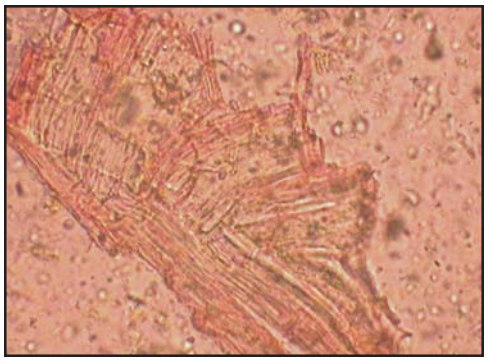

Fig. G2. Endocarp of *Coriandrum sativum* Linn. x 40

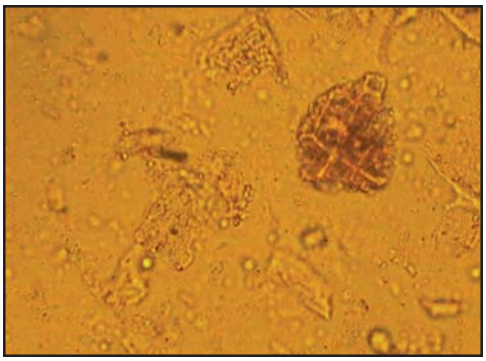

Fig. G3. Vittae of *Coriandrum sativum* Linn. x 40

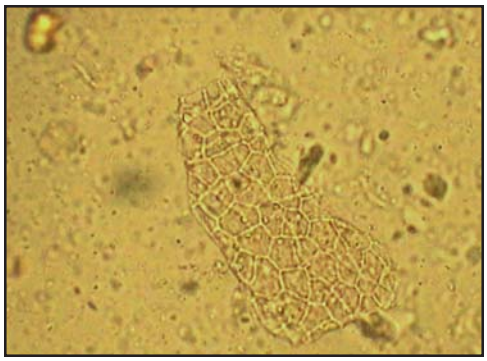

Fig. G4. Endosperm of *Coriandrum sativum* Linn. x 40

(b) Few brown fragments of vittae.

(c) Endocarp composed of layers of thin walled, lignified cells with polygonal cells of the mesocarp.

(d) Fragments of endosperm with aleurone grains and oil globules.

8. *Ustukhuddus*

Lavandula stoechas Linn. (Family : Lamiaceae)

Part used: Aerial parts

Important Formulations: Itrifal Khishneezi; Itrifal-e-Ustukhuddus; Khamira-e-Ustukhuddus; Majoon-e-Azaqui; Majoon-e-Zabeeb; Majoon-e-Najah; Tirvaq-e-Nazla (Anonymous 2006)

Powder study: Dull light brown powder with aromatic odour and slightly bitter taste.

Identifying features: (Fig. H1 – Fig. H6)

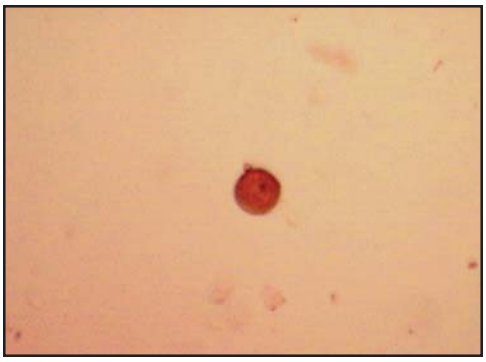

Fig. H1. Pollen grain of *Lavandula stoechas* Linn. x 40

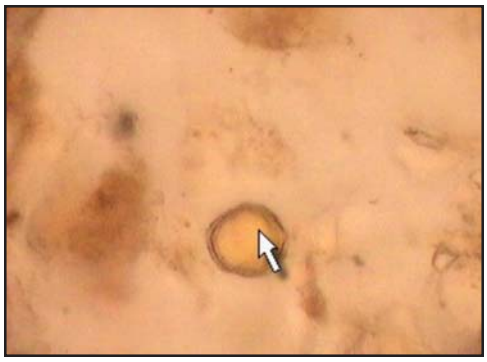

Fig. H2. Pollen grain of *Lavandula stoechas* Linn. x 100

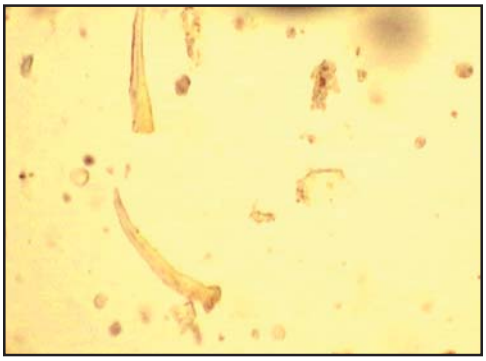

Fig. H3. Trichomes of *Lavandula stoechas* Linn. x 40

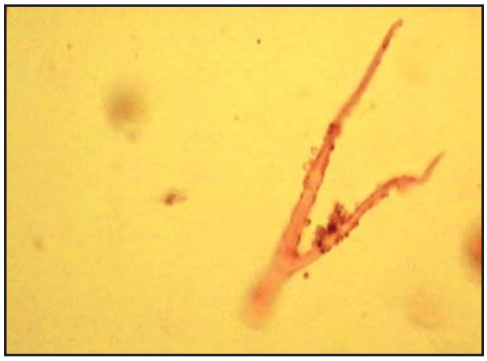

Fig. H4. Trichome of *Lavandula stoechas* Linn. x 40

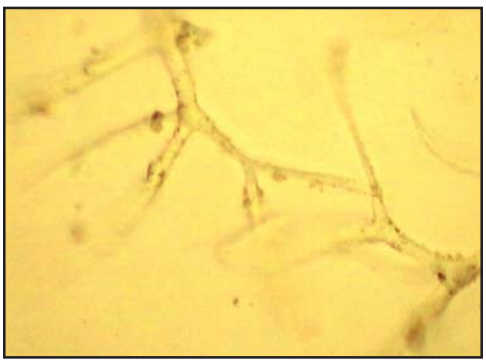

Fig. H5. Trichome of *Lavandula stoechas* Linn. x 40

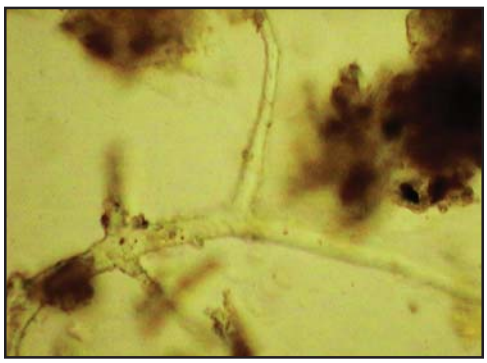

Fig. H6. Trichome of *Lavandula stoechas* Linn. x 40

(a) Spherial smooth pollen grains having diameter 39µ.

(b) Hairs of various kinds, mostly tufted and stellate, characteristic short stalked glands also present.

9. *Zafran*

Crocos sativus Linn. (Family : Iridaceae)

Part used: Dried stigma and tops of the style

Important Formulations: Habb-e-Hamal; Habb-e-Jawahir; Habb-e-Mudirr; Habb-e-Mumsik Qawi; Habb-e-Munaish; Habb-e-Nishat; Habb-e-Siyah Chashm; Habb-e-Surfa; Habb-e-Surfa Qawi; Qurs-e-Musallas; Jawarish-e-Ood Shireen; Jawarish Safarjil Qabiz; majoon-e-Antaki (Anonymous 2006)

Powder study: Pale reddish powder with aromatic odour and bitter taste.

Identifying features: (Fig. I1 – Fig. I4)

(a) Fragments of epidermal cells in surface view showing papillae.

(b) Fragments of thin walled, polygonal to sub-spherical parenchyma cells.

(c) Broken pieces of papillae.

(d) A few smooth, spherical pollen grains measuring 54µ - 126µ in diameter.

(e) Fragments of vessels with annular thickenings having width 7.75µ - 9µ and vessels with spiral thickenings having width of 11.25µ.

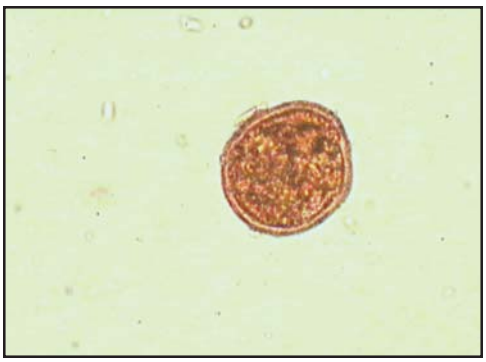

Fig. I1. Pollen grain of *Crocos sativus* Linn. x 40

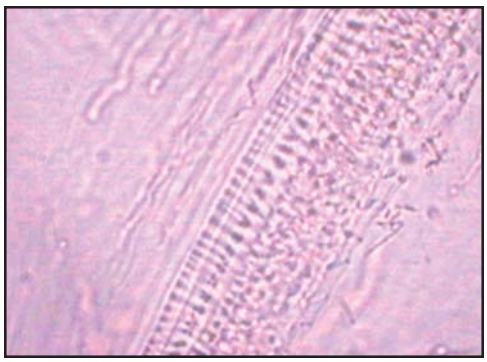

Fig. I2. Annular vessel in *Crocos sativus* Linn. x 100

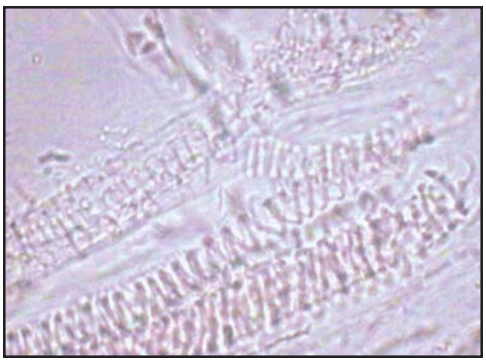

Fig. I3. Spiral vessel in *Crocos sativus* Linn. x 100

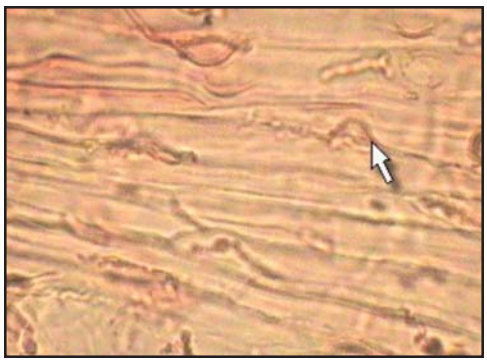

Fig. I4. Papillae in surface view of *Crocos sativus* Linn. x 100

10. *Zanjabeel*

Zingiber officinale Rosc. (Family : Zingiberaceae)

Part used: Rhizome

Important Formulations: Habb-e-Amber Momyaee; Habb-e-Hilteej;Habb-e-Hindi Mahallil; Habb-e-Kabid Naushadari; Habb-e-Miskeen Nawaz; Habb-e-Pachlone; Habb-e-Shifa; Habb-e-Papita Desi; Habb-e-Papita Wilayati; Habb-e-Tirsh Mushtahi; Jawarish-e-Bisbasa; Jawarish-e-Falafili; Jawarish-e-Fanjnosh-Zanjabeel; Majoon-e-Aqrab; Majoon-e-Fanjnosh (Anonymous 2006)

Powder study: A pale yellow to cream powder with agreeable aromatic odour and characteristic, pungent taste.

Identifying features: (Fig. J1 – Fig. J6)

(a) The abundant starch grains which are mostly simple, fairly large, flattened, oblong to sub-rectangular or sac shaped with terminal beak like projection in which eccentric hilum is situated. Vary in size from 9µ - 45µ in length and 5µ - 25µ in width.

(b) The fibres, usually occur in groups are fairly large, having width 31.5µ - 36µ, pitted, thin walled, septate, walls dentate on one side, unlignified.

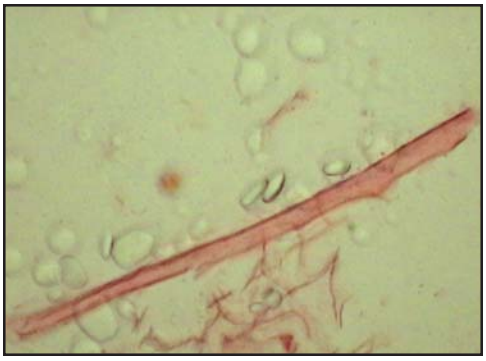

Fig. J1. Fibre of Zingiber officinale Rosc x 40

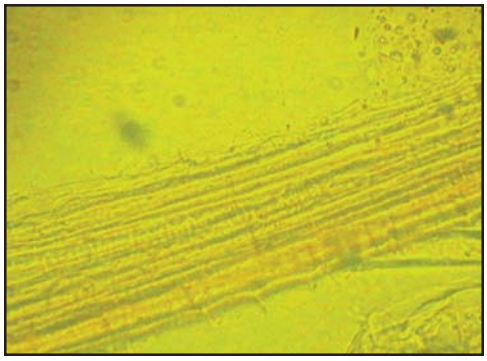

Fig. J2. Fibres in groups of Zingiber officinale Rosc x 40

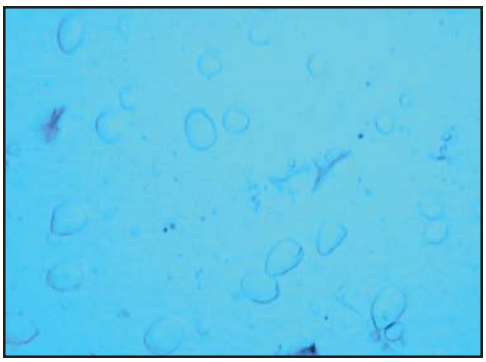

Fig. J3. Starch grains of Zingiber officinale Rosc x 40

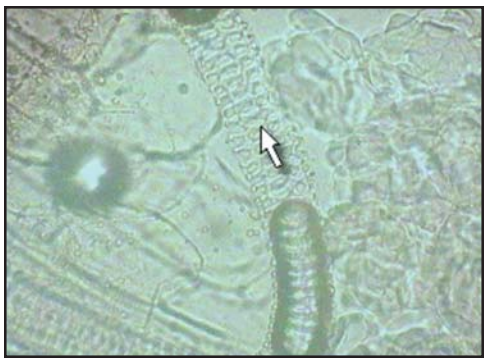

Fig. J4. Reticulate vessels of Zingiber officinale Rosc x 40

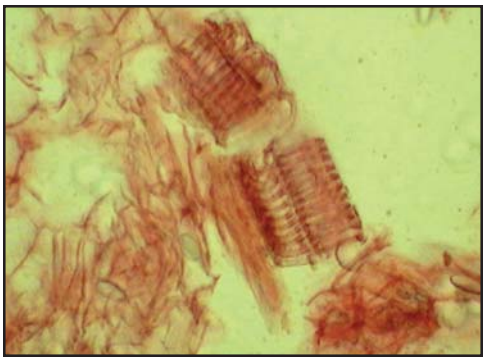

Fig. J5. Spiral vessels of Zingiber officinale Rosc x 40

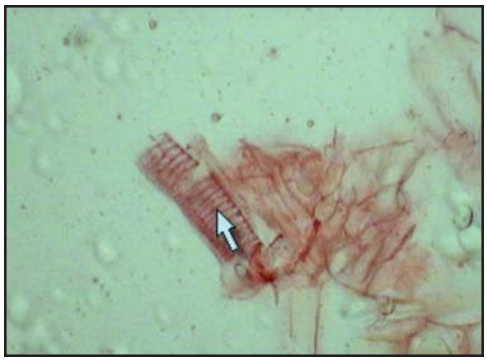

Fig. J6. Spiral vessel of Zingiber officinale Rosc x 40

(c) The vessels are of various sizes with their width varying from 22.50µ - 54µ having either spiral or reticulate thickenings.

(d) Abundant parenchyma cells which are thin walled; round to oval with intercellular spaces.

Results and Conclusion

Histological characteristics of the powdered drugs plays a crucial role in establishing the identity and determining the quality of the herbal drugs. Detection of various anatomical features such as tracheids, trichomes, fibers, glands, cork, stomata, pollen grains etc. provides important identification clues in case of powdered herbal drugs. Parenchyma cells are abundant in root and rhizome powders but infrequent in barks and woods. Similarly cork cells are absent in leaf, flower, seed or fruit powders. In case of floral powdered drugs pollen grains are frequently characteristic and enables plant identification.

Acknowledgement

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Comparative Chemical Analysis of Stem Bark and Fruits of *Caesalpinia coriaria* (Jacq.) Willd

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Abstract

India is one of the richest sources of medicinal and aromatic plants. Because of the rapid progress of the herbal drug industry in our country in the last quarter century, an increasing need is felt to standardize herbal drugs. The traditional system of medicine such as Ayurveda, Siddha and Unani as well as folklore remedies are based on herbal plants practicised by large number of people. In almost all the traditional systems of medicine, the quality control aspect has been considered. However, in modern concept it requires necessary changes in their approach for the quality control of traditional medicine and another important determination like toxicity of herbal medicines. Due to the lack of the scientific standardisation, the present investigations were made to determine physicochemical, heavy metal content such as lead, cadmium, mercury and arsenic and minerals like iron, copper, manganese, zinc, nickel, cobalt, chromium analysis using atomic absorption spectroscopy and the pesticide residues were carried out by GC-MS . Study reveals that heavy metals are present within the permissible limit and no organochlorine pesticide residues are detected in the species. TLC studies were carried out for the stem bark and fruit of *Caesalpinia coriaria* (Jacq.) Willd. The data evolved in the present work will aid in identifying these drugs in dry form and in standardisation of the drug.

Key Words: *Caesalpinia coriaria* (Jacq.) Willd., Physicochemical, Heavy metal, Mineral analysis, Pesticide residue, TLC studies.

Introduction

Caesalpinia coriaria (Jacq.) Willd. (Family: Caesalpiniaceae) is described as Sumaqueamriquah (Arabic) in the Unani, Kodivelam in Siddha. An exotic, medium-sized tree with a short, crocked bole and wide-spreeding, drooping branches; bark grey-brown, rough, corky, peeling off in small, irregular flakes. Leaves bipinnate, pinnae 3-9 pairs, 15 cm long; leaflets 15-28 pairs, oblong-linear, brownish-green or with black dots on lower surface and dark green above. Flowers pale green or yellow (sometimes white), fragrant, in short terminal and axillary panicles. Fruits and twisted, not covered with prickles, 1-10 seeded. Flowers from July to November and fruits in December (Parrotta, 2001, Chatterjee and Pakrashi, 1992; Gamble, 1979). It is a native of South America and west Indies. Introduced in India and almost acclimatized in South India and cultivated in Dharwar, Belgaum and Kanara. The pods are astringent, antiperiodic and tonic. Aecotion is used for washing bleeding piles and fruits used for semen coagulant. The bark is antiperiodic and used in chronic fevers (Kirtikar and Basu, 1998 and Bhattacharjee, 2000). The chemical constituents of the plant contains ellagic acid, gallic acid, catechol, tannin like gallotannin and ellagitannin, diphenylglucose, corilagin and chebulic acid (Khare, 2007 and Yoganarasimhan, 2000).

Materials and Methods

Collection of Plant Material

The stem bark and fruit of *C.coriaria* were collected from Chengalpattu District, Tamil Nadu, India and identified with the help of The Flora of the Presidency of Madras (Gamble, 1979).

Chemical Analysis

The analytical data like total ash, acid in-soluble ash, water soluble ash, alcohol and water soluble extractives were arrived at employing the standard procedure (Anonymous, 1998).

Preparation of Extracts for TLC

The collected stem bark and fruit of *C.coriaria* were air dried, coarsely powdered and stored in air tight container at 27º C. Powdered drugs of stem bark and fruit (2 g) was extracted with chloroform, concentrated and made up to 10 mL in a volumetric flask separately. These solutions were used for the TLC analysis.

Thin Layer Chromatography analysis

The TLC of chloroform extract of stem bark and fruit of *C.coriaria* were performed using aluminium plate precoated with silica gel 60 F_{254} (E.merck) employing CAMAG Linomat IV sample applicator. The chromatogram were developed using toluene: ethyl acetate (9 : 1) as the developing solvent. The plate was air dried at room temperature and observes the spots at UV-254 nm and UV-366 nm. The plate was dipped in vanillin-sulphuric acid and heated at 105° till coloured spots appeared. This showed in figure II and III (Wagner and Bladt, 1984).

Tannin Estimation

Quantitative estimation of tannin was carried out by Official methods of Analysis AOAC International (Anonymous, 2005).

a) Folin-Ciocalteu's reagent: 1 mL of Folin-Ciocalteu's reagent diluted with 2 mL of water.

b) Saturated sodium carbonate solution:

   35 g of anhydrous Sodium carbonate was dissolved 100 mL of water at 70-80º and cooled.

Fig. I. Stem barks of *C.coriaria*

Fig. II. Fruits of *C.coriaria*

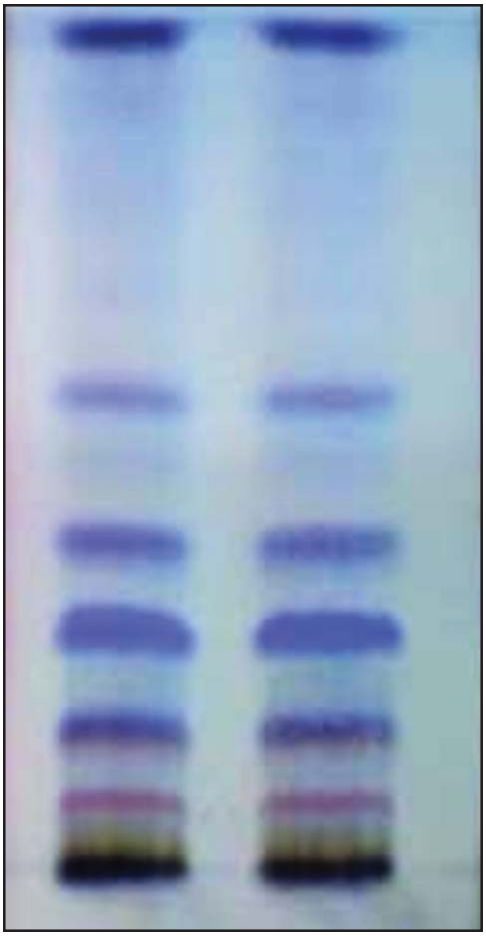

Fig. III. Chloroform extract of Stem bark Solvent system: Toluene: Ethyl acetate (9 : 1)

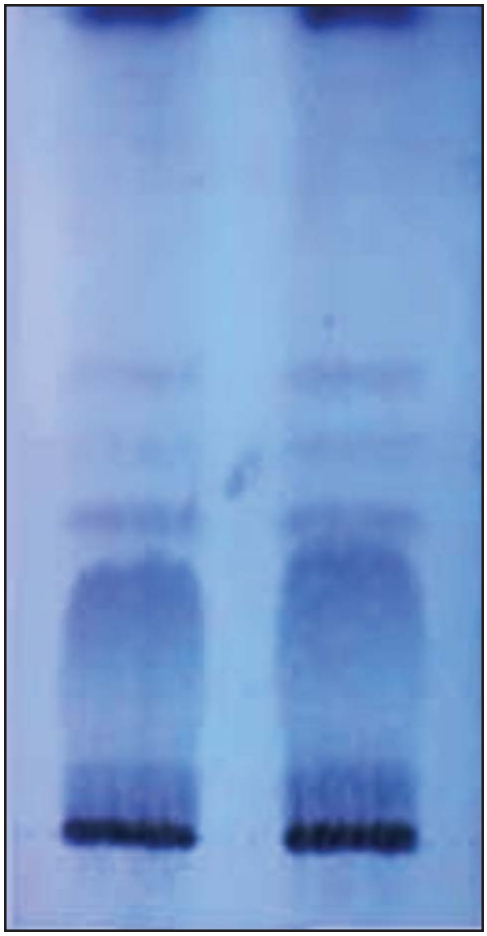

Fig. IV. Chloroform extract of Fruit Solvent system: Toluene: Ethyl acetate (9 : 1)

c) Tannic acid standard solution

100 mg of tannic acid was dissolved in 1 L of water (Fresh solutions were prepared for each determination, 1 mL = 0.1 mg of tannic acid).

d) Sample preparation

To 1 g of each powdered drugs, 80 mL of water was added separately and heated for 30 min, cooled and made upto 100 mL in a volumetric flask. Then filtered through ordinary filter paper, these filtrate were used for tannin estimation.

e) Preparation of standard curve

Zero to 10 mL of aliquot standard tannic acid solution was pippetted out into 10 mL of volumetric flask. To this 0.5 mL of Folin-Ciocalteu's reagent, 1 mL of sodium carbonate solution was added and made upto 10 mL with distilled water. Mixed well and the absorbance was measured after 30 min at 760 nm using Perkin Elmer UV-Visible spectrophotometer (Lambda EZ 201). Curve was plotted against the mg of tannic acid/10 mL. Percentage of tannin was calculated using the following relationship

$$\text{Tannin as Tannic acid (\%)} = \frac{\text{mg of tannic acid} \times \text{Dilution} \times 100}{\text{mg of sample taken for color development} \times \text{wt of sample taken} \times 1000}$$

Heavy metal and mineral analysis

Heavy metal and mineral analysis was carried out in Atomic Absorption Spectroscopy in Perkin Elmer-400, carrier gas-Argon and flow rate – 2ml/3min.

Sample preparation for AAS analysis

Accurately weighed 500 mg of the drug powders were taken in a round bottom flask separately. To this 5 ml of conc. nitric acid was added and refluxed for half an hour on a hot plate at 80-100ºC. It was then cooled; 5 ml of conc. nitric acid was added and warmed on water bath. Two ml of 30% hydrogen peroxide solution was added to the above mixture and warmed for 10 min. till clear solution was obtained. It was then cooled, filtered through Whatmann-42 filter paper, diluted with deionised water and made upto 100 ml in volumetric flask (Sahito *et al.,* 2001).

Analysis of pesticide residue

Pesticide analysis was carried out by Gas Chromatography-Mass spectra (GC-MS) (Instrument-Agilent, Detector-Mass selective detector, column specification-DB5MS, carrier gas- Helium, Flow rate-1ml/min, column length- 30 m, internal diameter-0.25 mm, column thickness-0.25 μm).

Preparation of sample

Accurately weighed 25 g of coarsely powered air-dried materials were taken in a conical flask separately. 65 mL of acetonitrile and 35 mL of deionised water were added. The mixture was shaken well and allowed it to stand for two hours with constant shaking. Filtered through Whatman-41 filter paper and filtrate was collected in a separating funnel. 3X65 mL of petroleum ether (Boiling point 60-80ú) was added and shaken vigorously and allowed to settle. The solvent layer was collected in the round bottom flask. Evaporated to dryness on the water bath. Then added 1 mL of acetonitrile to the residue. Injected these samples in the Gas Chromatography –Mass Spectra (GC-MS) (Anonymous, 2000).

Results and Discussion

Physico-chemical data of stem bark and fruit of the *C.coriaria* showed in Table-I. Total ash of stem bark showed 4.85 % and acid-insoluble ash of 0.58 % which are comparatively higher than that of fruit. The alcohol and water extractive values of 29.63 % and 34.85 % of fruit is comparable to higher than the stem bark, it is revealed the presence of the polar constituents and presence of acids and inorganic

Table-I. Analytical data of stem bark and fruits of *C.coriaria*

Parameters	Stem bark	Fruit
Total ash (% w/w)	4.84 ± 0.04	2.62 ± 0.02
Acid-insoluble ash(% w/w)	0.58 ± 0.05	0.46 ± 0.03
Water soluble ash(% w/w)	1.70 ± 0.13	1.19 ± 0.05
Loss on Drying at 105ºC (% w/w)	9.71 ± 0.09	8.21 ± 0.04
Alkalinity of water soluble ash (cc of 0.1N HCl/g)	2.35 ± 0.12	0.97 ± 0.09
Water soluble extractive (% w/w)	9.32 ± 0.05	29.63 ± 0.07
Alcohol soluble extractive (% w/w)	14.17 ± 0.03	34.85 ± 0.05
Successive extract values		
a. n-Hexane (% w/w)	4.69 ± 0.03	1.55 ± 0.04
b. Chloroform (% w/w)	0.50 ± 0.10	0.75 ± 0.08
c. Ethyl acetate (% w/w)	2.71 ± 0.06	10.13 ± 0.07
d. Ethanol (% w/w)	7.59 ± 0.13	19.11 ± 0.05
Tannin (% as tannic acid)	19.24 ± 0.07	38. 19 ± 0.03

The data is presented as mean ± SD, n=3

components respectively. Further tannin content was high in fruit compared to that of stem bark.

Pesticide residue analysis revealed that organochlorine pesticide residue such as o,p-DDD, p,p'- DDD, o,p-DDE, p,p'-DDE, o,p'-DDT, p,p'-DDT, Endosulfan, α-HCH, β-HCH, γ-HCH, δ-HCH were absent in the stem bark and fruit of the plant. Heavy metal content namely lead, cadmium and mercury of the drug were found to be within the permissible limits as per WHO guidelines given in Table II. It was concluded that the level of toxic elements was very low. Mineral elements such as iron, copper, manganese, zinc, nickel, cobalt, chromium are found in considerable amount and may be directly or indirectly helpful in the management of many diseases. Content of iron was present in higher in stem bark compared to fruit. The content of copper, manganese and nickel were present almost same in the both part. Zinc and cobalt contents were found to be higher in fruit than the stem bark. The content of the tannin was found toe be higher in fruits than the stem bark. TLC studies of the stem bark and fruit were shown in Table–III and IV.

The data generated from the present study would help in the authentification of the drug both in dry and powder form. Total tannin content and TLC studies will be definitely useful in dry form and in standardisation of the drug.

Table-II. Heavy metal and mineral analysis of stem bark and fruits of *C.Coriaria*

Heavy Metal	Stem bark	Fruit
Lead	0.1463	0.0830
Cadmium	0.1646	0.1570
Mercury	0.0079	0.0115
Arsenic	0.0141	0.0134
Mineral contents		
Iron	17.1816	9.8316
Copper	1.5200	1.8400
Manganese	0.5233	0.6733
Zinc	2.2723	1.9636
Nickel	0.1100	0.1233
Cobalt	0.1200	0.0833
Chromium	0.4906	1.6926

The data is presented as mean ± SD, n=3

Table-III. TLC data of chloroform extract of stem bark of *C.coriaria*

S.No.	Solvent system	UV-254 nm	UV-366 nm	v-s reagent
1	Toluene: Ethyl acetate (9:1)	0.96 Light pink	0.51 Fluorescence blue	0.97 Grey
2.		0.66 Light pink	0.46 Brown	0.54 Violet
3.		0.57 Pink	0.22 Brown	0.46 Light blue
4.		0.38 Light pink	0.12 Brown	0.37 Violet
5.		0.22 Pink		0.27 Blue
6.		0.14 Pink		0.16 Blue

Table-IV. TLC data of chloroform extract of fruits of *C.coriaria*

S.No.	Solvent system	UV-254 nm	UV-366 nm	v-s reagent
1	Toluene: Ethyl acetate (9:1)	0.97 Light pink	0.92 Blue	0.97 Violet
2.		0.59 Light pink	0.50 Fluorescence blue	0.5 Blue
3.		0.50 Light pink		0.45 Blue
4.				0.37 Blue
5.				0.32 Blue

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Some Unani Medicinal Plants Used for Hepatitis and Jaundice by Kanni Tribals of Kanniyakumari District (Tamil Nadu), India

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Abstract

Hepatitis and Jaundice are characterized by liver inflammation and liver injury which cause liver damage by toxins only. Ethanobotany is a rabidly expanding science. In the last three decades it has considerably expanded. Both in its concept and scope. It deals with the study of the natural and traditional inter relationships between man and plants. An Attempt to search for potential anti-hepatitis and jaundice herbal drugs used by many tribal/rural dominated area of Kanniyakumari district was made. Since 1980, herbal remedies used popularly by large section of kanni tribals for hepatitis and jaundice are discussed in this communication. A survey was undertaken and 25 ethnomedicinal plants species belonging to 22 families were collected from kanni tribal groups settled in the forest. A list of plant species along with the plant parts used and their mode of preparation for Hepatitis and jaundice were studied and presented in this communication.

Key Words: Hepatitis and Jaundice; Medicinal plants; Kanni tribe; Kanniyakumari.

Introduction

Ethnomedicine may be defined broadly as the use of plants by humans as medicine (Farnsworth, 1994), but this use could be called more accurately ethnobotanic medicine. Traditional medicine is a broad term used to define any non-Western medical practice (Bennevman *et al.,* 1983).

Plants have been used in traditional medicine for several thousand years (Abu-rabia, 2005). The knowledge of medicinal plants have been accumulated in the course of many countries based on different medicinal systems such as Ayurveda, Unani and Siddha. Globally, about 85% of the Traditional Medicines used for primary healthcare derived from plants (Farnsworth, 1988). In India, approximately two million traditional health practitioners belonging to 4635 communities used over 7500 medicinal plant species for human and veterinary healthcare (Frlth, 2002). Moreover, India is tenth among the plant rich countries of the world and fourth among the Asian countries (Hamilton, 1995).

The ethnomedicinal documentation of tribal health system will be of great advantage to our biochemists, pharmacist and biotechnologist to develop potential medicine for the treatment of several dreaded diseases. Eighty percent (80%) of the rural population still depend on herbal /tribal medicine for their treatment (Patil and Yadav, 2003, WHO, 1978).

Ethnomedicinal studies have become the subject of great medicinal importance. Frequent ethanobotanical surveys were made in forest areas of Kanniyakumari district, Tamil Nadu. This indigenous knowledge is of potential tool in searching for new medicinal plants for Hepatitis and Jaundice, obtained by personal interviews and field visit with inhabitant of particular locality. There are valuable regional records

of indigenous plant to treat Hepatitis and Jaundice, by tribal and villagers, but there is no specific study on medicinal plants used for Hepatitis and Jaundice in this district. Present study is based on this rationale.

Kanniyakumari district is the Southern most part of Tamil Nadu situated between 77°10' and 77°35' East longitude and 8°5' and 8°35' North latitude (Fig. 1). The Kanniyakumari forest division fall in the Southern most tip of the Western Ghats surrounded by Tirunelveli forest division in south by Kodayar left bank channel in South by Kerala state in West and by Tirunelveli district in East. The forest areas such as Veerapuli reserved forests in Kaliyal and Kulasekarm range, Balamore and Asampu forest area in Alagiyapandiapuarm range, Velimalai reserve forest in Velimalai range and Mahendra giri reserve forest in Bootha pandi range were surveyed for medicinal plants species used as anti hepatitis and jaundice. All the tribal folks played a significant role in the discussion since they possess more knowledge about utility of local herbs to treat this disease. Objective of this study was to interact with local traditional healers, tribals and document their knowledge on folk medicinal plants.

Methodology

Extensive and intensive survey was made frequently in rural and forest village peoples of Kanniyakumari district, During 2007 based on interviews, informal discussions and observations, through repeated interactions and participatory rural appraisal (PRA), details on the ethanobotany of the plants used by the folk population were gathered with villagers using the methods described by Jain (1983).According to Jain (1987). Samples of plants were collected, identified and voucher specimens were deposited in the Herbarium of Regional Research Institute of Unani Medicine, Chennai. The collected plants were identified using the flora of Presidency of Madras (Gamble and Fisher, 1915-1935).

Results and Discussion

Hepatitis is defined as liver inflammation resulting from alcohol use, toxic materials, or viral infection transmitted through food, liquids, bodily fluids and feces, or blood transfusions. In addition, there is autoimmune hepatitis and nonalcoholic steatohepatitis. Jaundice is not a disease but a sign that can occour in many different diseases. Jaundice is the yellowish straining of the skin and sclera (The white of the eyes) that is caused by high levels in blood of the bilirubin. The color of the skin and sclera vary depending on the bilirubin when the bilirubin level is mildly elevated, they are yellowish. When the bilurubin level is high they tend to brown (Wahab *et al.,* 2004).

During onset of jaundice a juice made from the black radish is effective as supplements. Some literature revealed that tomato juice, freshly prepared beet

juice is also recommended for liver support. However intake of these should be monitored based on the individual's triglyceride levels. One double-blind study found evidence that a beverage made from sweet potato could improve liver function in people with mild hepatitis of unspecified causes (Suda *et al.,* 2007). Despite early promise, the herb *Phyllanthus* does not appear to be helpful for viral hepatitis (Thiyagarajan, 1988, Milne *et al.,* 1994). Further more, high doses of the supplements beta-carotene and vitamin A containing plants thought to accelerate the progression of alcoholic liver disease in people who abuse alcohol (Leo *et al.,* 2001, Ni, 2001). Moreover Green tea has long been considered to play a protective role against liver disease (Jin *et al.,* 2008).

There is no unique treatment for hepatitis jaundice by prescribing modern allopathic medicines. Although different workers have documented medicinal plants form various regions of world. But to our knowledge no systematic investigation on antiviral application of medicinal plant against jaundice and hepatitis has been made which was based on ethnobotanical report of respondent communities of kanni tribals. As a result of survey, many interesting and useful information about the plants used for Hepatitis and Jaundice were recorded. More than 63 tribals and forest villagers were interviewed. A range of preparations are used to treat these diseases. Most popular medicinal preparations are plant extract, decoction, soaked extract and juice. Information on botanical name, family name, voucher specimen no, unani name, local name, part used and mode applicacation and dosage are given for each recipe (Table-1).

The leaves are chiefly used as antihepatitis and jaundice drugs, followed by fruit, root, seed, bark, tuberous root and stem. Mostly the medicine is taken in the form of decoction, paste, juice and soaked extract.

The species of *Adhatoda vasica* Ness, *Asparagus racemosus* Willd, *Cassia fistula* L, *Cuminum cyminum* L, *Cuscuta reflexa* Roxb, *Eugenia caryophyllata* Thunb, *Glycyrrhiza glabra* L, *Lawsonia inermis* L, M*yritica fragrans* Houtt, *Rauvlfia serpentine* Benth ex Kurz, *Terminalia bellirica* Roxb, *Terminalia chepula* retz. are used in the form of decoction. Some plants like *Abutilon indicum* L, *Boerhaavia diffusa* L, *Phyllanthus amarus* Schum. & Thorn, *Plumbago zeylanica* L, *Vetiveria zizaniodes* (L) Nash, are used in the form of paste, Such plants like *Aloe vera* L, *Cuscuta reflexa* Roxb, *Momordica charantia* L, *Punica granatum* L, *Rubia cordifolia* L and *Saccharum officinarum* L, are used in the form of juice, Whereas other plants used as soaked extract and in oil form. In most of the forest villages of Kanniyakumari district, normally there were one elder who was familiar with the traditional medicines. The tribal folk medicines are practiced mainly by persons of over 50 years age with their long experience and are capable of treating Hepatitis. For complete and full recovery from the effect of jaundice, it becomes necessary to detoxify the liver and the gall bladder in the body of the affected person.

These medicinal plants are used locally in villages of Kanniyakumari forests for Hepatitis because the people's average distance to a health care centre is 10-40

Table-1. List of Unani Medicinal Plants Used for Hepatatis and Jaundice in villages of Kanniyakumari District

S. No.	Botanical name/ Family Name/ Voucher specimen No.	Unani Name/ Local name	Part used	Mode of preparation
1	*Abutilon indicum* L./ Malvaceae, Voucher specimen No: 9026, RRUIM(M)	Konghi/ Thutthi	Leaf	10-20 g leaf paste with few drops of lemon orally given daily in the morning.
2	*Adhatoda vasica* Ness./ Acanthaceae, Voucher specimen No:7821, RRUIM(M)	Arusa/ Aadaathodai	Leaf	50-100 ml leaf decoction is orally given on empty stomach in morning for 9 days.
3	*Azadirachta indica* A. Juss./Meliaceae, Voucher specimen No:9107, RRUIM(M)	Neem/ Vembu	Seed oil	25-30 ml oil orally given morning on empty stomach daily.
4	*Aloe vera* L./ Liliaceae, Voucher specimen No: 8971, RRUIM(M)	Sibr-e-asaqoori/ Sotru Kattraazhi	Leaf	50-100ml leaf juice is orally given for 7 days.
5	*Asparagus racemosus* Willd./Liliaceae, Voucher specimen No: 4806, RRUIM(M)	Sataavar/ Thanneervittan Kizhangu	Tuberous root	10-20g root powder given with hot water daily thrice, before food.
6	*Boerhaavia diffusa* L H / Nyctaginaceae, Voucher specimen No:1288, RRUIM(M)	Safed santh/ Mookeratai	Root	Root paste 10g mixed with 10 no(s) of pepper powder is taken daily once in morning on empty stomach for a week.
7	*Cassia fistula* L/ Caesalpiniaceae. Voucher specimen No: 8923, RRUIM(M)	Amaltas/ Sarakkonrai	Leaf/ Flower	Equal parts of dried flower and leaf decoction (50-60 ml) orally given daily twice.
8	*Cuminum cyminum* L/Umbelliferaceae. Museum specimen No: 18, RRUIM(M)	Safed jeeraa/ Cheerakam	Seed	25-30ml decoction of seeds orally given morning on empty stomach.

S. No.	Botanical name/ Family Name/ Voucher specimen No.	Unani Name/ Local name	Part used	Mode of preparation
9	*Cuscuta reflexa* Roxb./ Convolvulaceae, Voucher specimen No: 8973, RRUIM(M)	Aftemoon/ Ottu cheedy	Whole plant	40-50ml fresh Juice orally given daily in morning on empty stomach.
10	*Eugenia caryophyllata* Thunb./Myrtaceae, Voucher specimen No: 8103, RRUIM(M)	Loung/ Kirambu	Bark	30-50ml Bark decoction orally given on empty stomach daily morning
11	*Glycyrrhiza glabra* L./ Papilionaceae, Museum specimen No: 23, RRUIM(M)	Mulethi/ Athimathuram	Root	40 - 50ml root decoction orally given morning on empty stomach.
12	*Lawsonia inermis* L./ Lythraceae, Voucher specimen No: 8259, RRUIM(M)	Henna/ Marithoni	Leaves	10g leaf powder orally given with hot water.
13	*Momordica charantia* L./ Cucurbitaceae. Voucher specimen No: 4835, RRUIM(M)	Karila/ Paharkai	Fruit	50-80ml fresh juice orally given morning on empty stomach.
14	*Myrstica fragrans* Houtt./Myristicaceae, Voucher specimen No: 9035, RRUIM(M)	Jauzbuwaa/ Jaathikkai	Seed	50-60ml decoction orally given morning on empty stomach.
15	*Phyllanthus amarus* Schum. & Thorn./ Euphorbiaceae, Voucher specimen No: 8903 RRUIM(M)	Buhi Aamalaa/ Keela nelli	Root	30 - 40g root paste given orally with 5g milk thistle.
16	*Plantago ovate* Forssk./ Plantaginaceae, Voucher specimen No: 4012, RRUIM(M)	Isbagol	Fruits and Seeds	100g of fruits and seeds husk are soaked in 400 ml water for a night. Two cup of this extract are mixed with sugar and taken orally in early morning on empty stomach for 20-25 days.

S. No.	Botanical name/ Family Name/ Voucher specimen No.	Unani Name/ Local name	Part used	Mode of preparation
17	*Plumbago zeylanica* L./ Plumbaginaceae, Voucher specimen No: 8977, RRUIM(M)	Sheetraj Hindi/ Chittraamoolam	Leaf	20 - 30ml leaf paste with few drops of ginger extract are orally given daily thrice after meals.
18	*Punica granatum* L./ Punicaceae. Voucher specimen No: 9011, RRUIM(M)	Anar/Maduli	Fruit	Equal parts of power of *Punica granatum* and *Emblica officinalis* are made into decoction and added required quantity of sugar, 100ml of this is taken twice a day for a week.
19	*Rauvolfia serpentina* Benth ex Kurz./ Apocynaceae, Voucher specimen No: 8959, RRUIM(M)	Asrol/ Pambukala	Root	10 - 20g root powder given orally with hot water.
20	*Rubia cordifolia* L./ Rubiaceae, Voucher specimen No: 7601, RRUIM(M)	Manjeeth/ Manjitti	Fruit	20ml fruit juice is orally given in morning on empty stomach.
21	*Saccharum officinarum* L./ Poaceae, Museum specimen No: 25, RRUIM(M)	Ganna/ Karumbu	Stem	Crushed stem juice (2 cups) orally given five times a day for one month.
22	*Tamarindus indica* L./ Caeselpinaceae, Voucher specimen No: 9031, RRUIM(M)	Tamar Hindi/ Pooli	Fruit/ Bark	100g equal parts of fruit and bark and fruits of *Prunus domestica* are soaked in 500ml of water for a night. One cup of this extract is given to patient daily two times 30 minutes before food for two weeks.

S. No.	Botanical name/ Family Name/ Voucher specimen No.	Unani Name/ Local name	Part used	Mode of preparation
23	*Terminalia bellirica* Roxb./Combretaceae, Voucher specimen No: 8924, RRUIM(M)	Balelaa/ Thaanrikkai	Fruit	20 - 30g powder with 10g fruit powder of Amla are orally given in hot water.
24	*Terminalia chebula* Retz./ Combretaceae, Voucher specimen No: 9083, RRUIM(M)	Halelaa/ Kadukkai	Seed	20 - 25g of powder with 5g poppy powder orally given in hot water.
25	*Vetiveria zizaniodes* (L) Nash./ Asclepidaceae. Museum specimen No: 27, RRUIM(M)	Khas/ Vetiver	root	20 - 30g root paste is orally given in morning on empty stomach.

kilometers. Plants are easily available, and with no side effect and so massively collected and used by tribals and urban dwellers. The allopathic treatment is so cost by and with adverse side effect.

In every ethnic group there exists a traditional health care system, which is culturally patterned. In rural communities health care seems to be the first and foremost line of defence. The WHO has already recognized the contribution of traditional health care in tribal communities. In the present work authors have collected 21 medicinal plant species from different study sites. These species contain valuable chemical substances and are useful to cure Hepatitis.

Conclusion

In the present investigation, 25 Unani medicinal plant species used to treat hapatatis and jaundice are reported. These demand urgent attention to conserve such vital resources so as to optimize their use in the primary health care system. It is, therefore, urgent to save the cultural heritage of this forest area, by conforming to the therapeutically used plants to scientific criteria. In this context, screening for active substances and testing their efficacy against hepatitis and jaundice form an interesting subject for the future studies.

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Fig. 1. Study area

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Evaluation of Pharmacog-nostical Standards on Leaves of *Couroupita guianensis* Aubl.

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Abstract

Couroupita guianensis Aubl. belongs to the family Lecythidaceae is commonly known as Cannon ball tree. It is native of South America and Trindad. In India it is planted near temples for its beautiful flowers. Different parts of this tree have significant medicinal value. As there was no report on pharmacognostic work on this plant, the present study was carried out. The paper deals with macroscopic, microscopic, quantitative microscopic, powder analysis, physico-chemical studies, fluorescence analysis and preliminary phyto-chemical analysis.

Key Words: Pharmacognosy, Physico-chemical, Fluorescence analysis.

Introduction

Couroupita guianensis Aubl. is s small genus distributed in South America and West Indies. *C. guianensis* Aubl. (Satyavati, 1976) locally known as "Kailaspati" and "Nagalingam". It is widely cultivated for its beautiful large showy flowers and reddish woody capsular fruits. The shells of the fruits are used as utensils and containers, the pulp eaten and made into beverage by the Negroes. In India and Sri Lanka the flowers are used for worship (Anonymous, 2007). The fruit pulp, bark and flowers are being used for medicinal applications. The juice of the flower is used for the treatment of various skin diseases. Various compounds such as flavonoid glucoside, terpenoids (Row *et al.,* 1966), steroids (Anjaneyulu, 1998), alkaloids (Bergman, 1977 & 1985; Rastogi and Mehrotra, 1993) have been reported from different parts of the plant.

The plant is used in the treatment of skin diseases such as sore, boils and itching (Anonymous, 1986; Uphoh and Crammer, 1968). The plant has antiparasitic promising activity against parasites *Plasmodium berghei* K-173 and *Salmonells typhi* NCTC 786 (Golatkar, 2001) and also shows some biological activities such as antimicrobial (Vahanwala, 2000), antibiotic (Khan *et al.,* 2003), antioxidant (Umachigi *et al*., 2007), analgesic, anti-inflammatory (Geetha *et al*., 2004), antifertility (Geetha *et al*., 2005) and larvicidal activity against *Culex quinquefasiatus* (Desai *et al*., 2003).

Other Names: Tamil – Naagalingam; Telugu – Nagalingam; Kannada – Lingada mara; Hindi – Nagalinga, Topegola; Sanskrit – Nagapushpam.

Description of the Plant

C. guianensis Aubl. is origin of French Guiana, Carribean, Tropical America. The Cannon ball tree is found in the canopies of tropical forests from Panama through northern South America and Amazonia. It grows well under dry conditions and

moist soils. *C. guianensis* Aubl. is large deciduous tropical tree which grabs attention with its distinctive hooded flowers and large globose fruits occur on a tangle of woody branches emerging from the trunk. The bark is rough, grey-brown and not fissured. The tree possesses a dense, often narrow crown and leaves clustered at the tip of branches. The plant bears large curiously formed pleasing combination of flowers in clusters on the upper trunk and main limbs of the tree with rosy purple 6 petaled white and yellow towards apices and pink to red towards bases and strongly perfumed. The stamens fuse together to form a band like structure which rising from the base of the ovary and bends over the central pistil.

Chemical Constituents

The following compounds were isolated eugenol, linalool (Lewis *et al*., 1969); anthocyanins, flavonols, quercetin, kaempferol (Indigotin) (Lewis, 1964) and stigmasterol (Rane *et al*., 1994 & 2001) from flowers; carotenoids, citric acid, malic acid, isocitric acid, phenolic substances (Nelson and Wheeler, 1937; Saraswati Bai, 1954), 6, 12-dihydro-6, 12-dioxoindolo (2, 1-b) quinqzoline (tryptanthrin) as well as indigo (7), couroupitine A, couroupitine B, stigmasterol and campesterol from fruits; á–amyrin, â-amyrin and â-sitosterol (Row *et al*., 1966) from bark and â-amyrin palmatate (Ahire and Latha, 2002) from leaves.

Methodology

The leaves of *C. guianensis* Aubl. were collected from Chennai and identified using the Flora of Mayuranathan (Mayuranathan, 1929). The leaves were shade dried and powdered for powder analysis and phytochemical screening. Free hand sections of the fresh petiole and leaves were taken and treated with various chemical reagents such as safranine, haematoxylin, pholoroglucinal + HCl and representative diagrams were made using a camera lucida. Powder analysis of the dried sample was treated with jeffrey's reagent and chloral hydrate for clearing the tissues to study the cell components (Johansen, 1940). Physico-chemical standards were analyzed according to the Pharmacopoeia of India (Anonymous, 1955) and phyto-chemical studies were evaluated by standard method (Harborne, 1974).

Results and Discussion

Macroscopic Characteristics

Leaves compound of multifoliate, single leaf oblanceolate in shape with undulate margin, acuminate apex, leaf base cuneate, petiole of upto 3cm, leaf length upto 22cm and breadth upto 8cm. Leaf powder green in colour with no characteristic odour and taste slightly mucilaginous.

Microscopic Characteristics

Petiole: T.S. of petiole shows epidermis single layered covered with cuticle, numerous unicellular trichomes present; collenchyma consisting of 2 to 3 layers followed 7 to 10 layers of chlorenchyma; ground tissue parenchymatous with intercellular spaces; vascular bundles arranged in a half ring scattered in the ground tissue; groups of sclerenchyma patches present in the upper and lower side; bigger vascular bundles in the centre, where as lateral bundles comparatively smaller in size; each bundle consists of xylem towards the upper side and phloem towards the lower side of the bundle; sclerenchymatous bundle sheath present; mucilaginous cavities present in the centre.

Leaf through Midrib: T.S. of leaf through midrib showed epidermis single layered with cuticle, numerous unicellular trichomes present; collenchyma consisting of 3 to 4 layers in both upper and lower epidermis; ground tissue parenchymatous with intercellular spaces; vascular bundles arranged in a half ring scattered in the ground tissue; patches of sclerenchyma present in the upper side; bigger vascular bundles in the centre, where as lateral bundles comparatively smaller in size; each bundle consists of xylem towards the upper side and phloem towards lower side of the bundle; sclerenchymatous bundle sheath present; mucilaginous cavities present in the centre.

Lamina: T.S. of leaf through lamina showed dorsiventral in structure, unicellular trichomes present in both upper and lower epidermis; single layer of palisade parenchyma followed by 5 to 6 layers of spongy parenchyma; epidermal cells in surface view more wavy; anomocytic stomata present only in the lower epidermis; stomatal number of the lower epidermis 50 to 55/sq mm and stomatal index of the lower epidermis 8.2 to 9.5/sq mm; palisade ratio 8 to 10; vein islet number 5 to 7 and veinlet termination number 9 to 11.

Study of the Powdered Drug

Greenish, upper epidermal cells in surface view with wavy walls, lower epidermal cells in surface view with numerous anomocytic stomata; epidermal cells in surface view with unicellular trichomes upto 500µ, vessels with spiral and pitted thickenings upto 50µ and fibres of length upto 2500µ and breadth upto 35µ.

Chemical Analysis

Physico-chemical data shows 8.76% of ash and 1.70% of acid insoluble ash. The alcohol soluble extractive 6.55% shows the extraction of polar constituents. The water soluble extractive 11.20% indicates the inorganic contents present in the drug (Table-1). The preliminary phyto-chemical analysis shows the presence of alkaloids, flavones, phenols, tannins, glycosides, steroids, coumarins, terpenoids and sugar in alcohol extract (Table-2). Behavior of fluorescence analysis of the drug with

different chemical reagents shows different colour due to presence of natural compounds (Table-3).

Table-1. Physico-chemical analysis of the *C. guianensis*

S.No.	Parameters	Values % (w /w)
1	Loss in weight on drying at 105°C	8.94
2	Total ash	8.76
3	Acid insoluble ash	1.70
4	Water soluble ash	2.65
5	Alcohol soluble extractives	6.55
6	Water soluble extractives	11.2
7	Alkalinity of water soluble ash	0.377cc of 0.1N Hcl/g

Table-2. Preliminary phytochemical test of *C. guianensis*

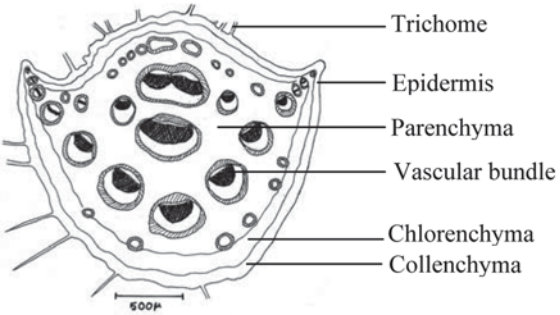
S.No.	Test	Alcohol extract
1.	Alkaloid	+ ve
2.	Quinone	–
3.	Coumarin	+ ve
4.	Flavone	+ ve
5.	Steroid	+ ve
6.	Phenol	+ ve
7.	Tannin	+ ve
8.	Glycoside/Sugar	+ ve
9.	Terpenoid	+ ve
10.	Iridoid	–
11.	Amino acids	–

Table-3. Fluorescence analysis of *C. guianensis*

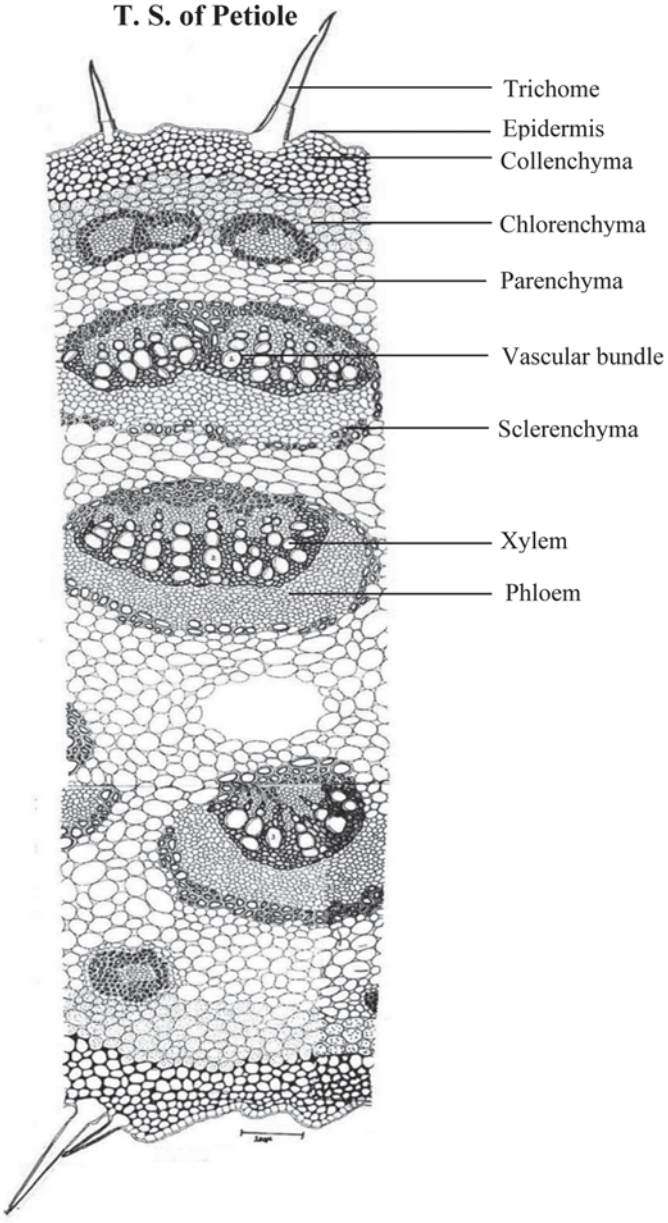
S.No.	Various chemicals	Day light	UV 254 nm
1	Powder	Green	Green
2	Powder + 1N. NaOH(aqueous)	Reddish brown	Reddish brown
3	Powder + 1N. NaOH (alcohol)	Green	Green
4	Powder + 50% H_2SO_4	Fade green	Fade green
5	Powder + Alcohol	Green	Green
6	Powder + 1N. HCl	Light green	Light green

T. S. of Petiole

A Diagrammatic Sketch



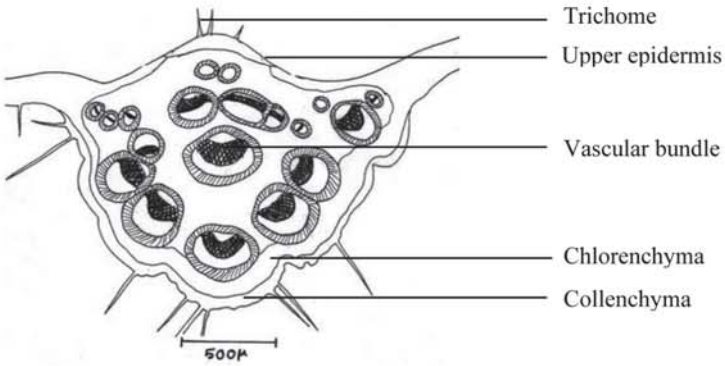
T. S. of Petiole



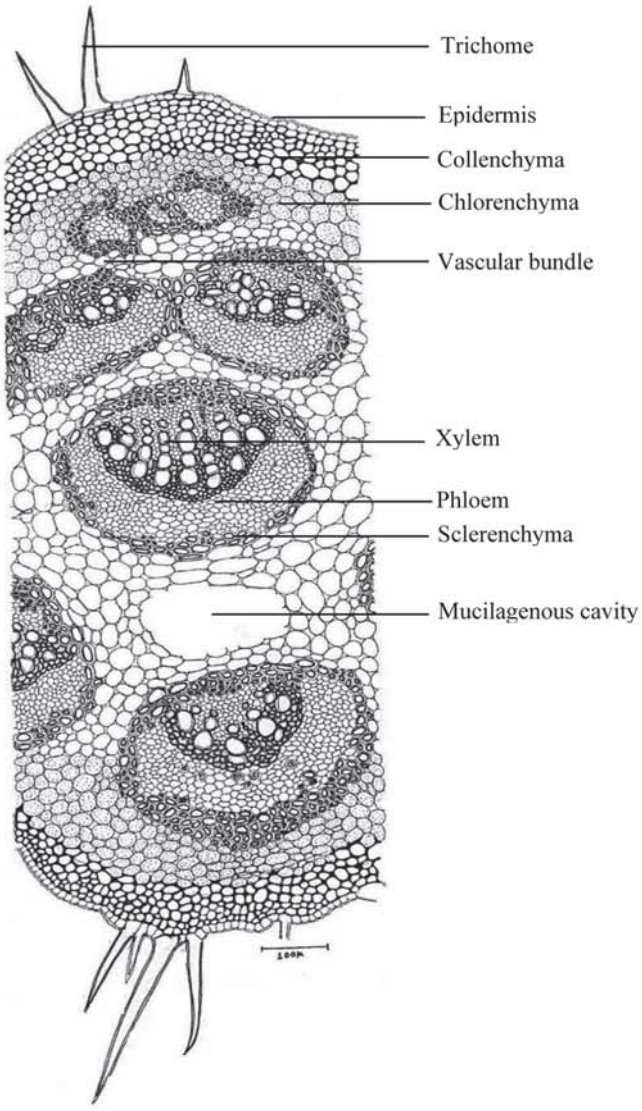
***Couroupita guianensis* Aubl.**

T. S. of Leaf

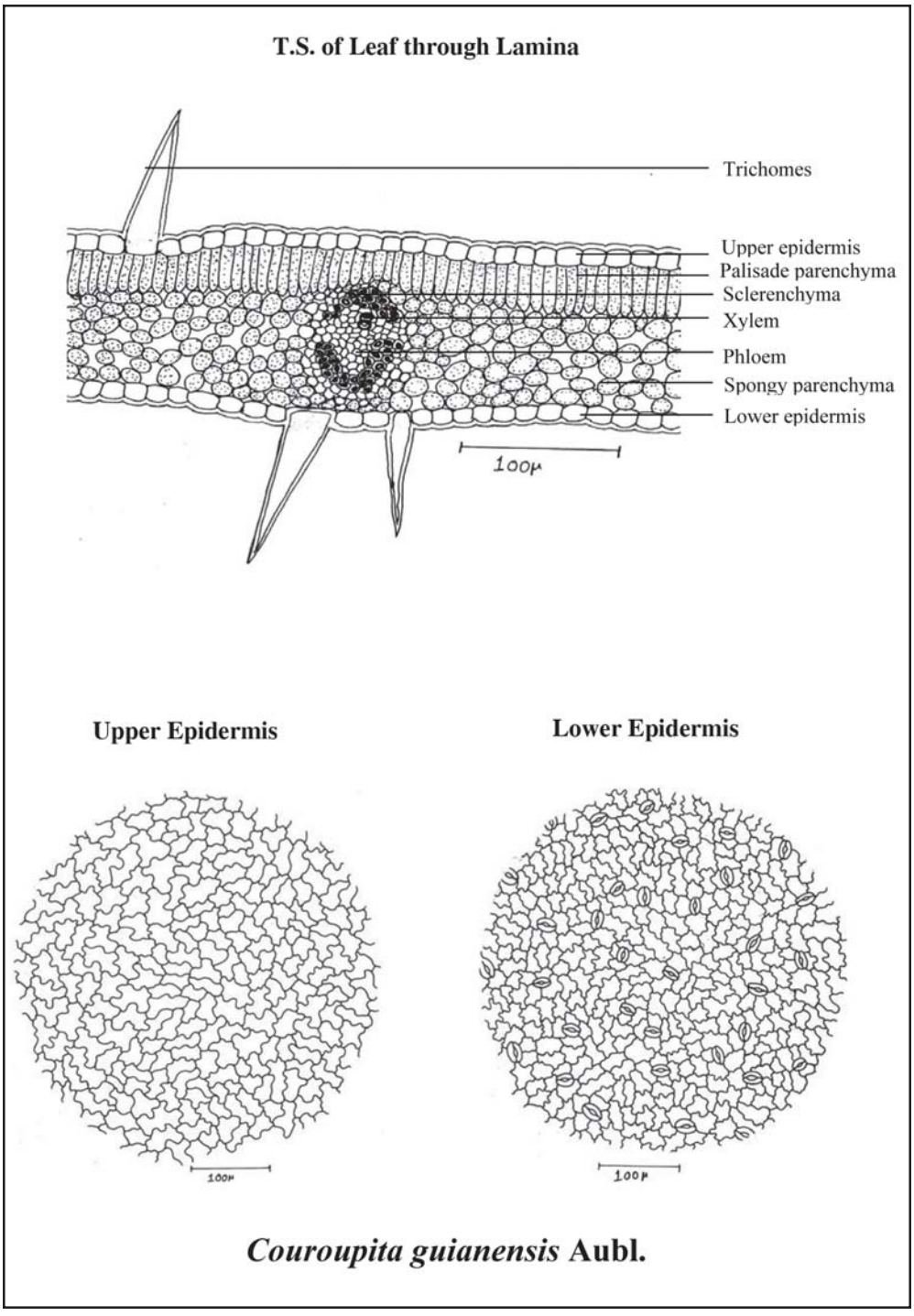
A Diagrammatic Sketch



T.S. of Leaf through Midrib

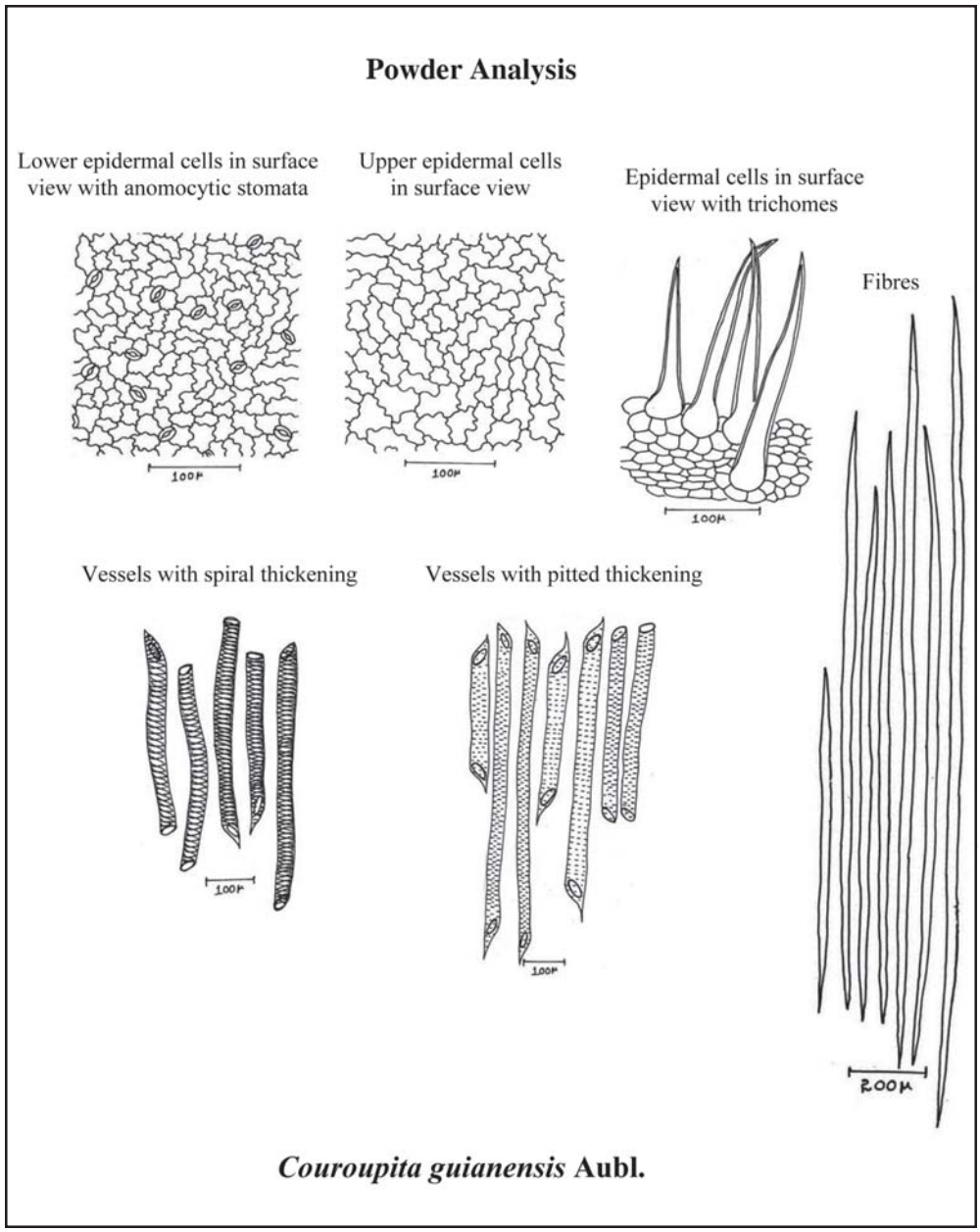


***Couroupita guianensis* Aubl.**



Conclusion

Macroscopic and microscopic data were obtained for the leaf of *C. guianensis* Aubl., will be useful in identification of the plant and thus may contribute towards botanical standardization. The physico-chemical and phyto-chemical studies will also be useful for monitoring the purity and quality of the drug.



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Useful Unani Medicinal Plants of Kodaikanal Forest Areas of Dindigul District – Tamil Nadu

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Abstract

Kodaikanal is a part of Pulni hills falls in the Western Ghats hill track of Dindigul district, Tamil Nadu. It is bounded by the Pulni taluk in North,by Dindigul district in the East, Madurai district in the South and by partly Coimbatore district and partly by Kerala state in the West. The forest areas viz Upper Pulni hills, Gundar vally, Berijam and Poomparai are rich in floristic wealth. To study the diversity of Unani medicinal plants a survey was under taken during 2001-2003 and 25 Unani plants were collected. The plants are arranged alphabetically providing information on Unani names, botanical name, family, vernacular name (Tamil name), short botanical descripition and their uses. Some of the medicinal plants such as Isphagol (*Plantago ovata* Forsk), Lodh pathani (*Symplocos racemosa* Roxb), Kafoor (*Cinnamomum camphora* (L.) Spr), Rasut (*Berberis aristata* DC), and Satawar (*Asparagus racemosus* Roxb) have become rare due to various factors like forest degradation, soil erosion and over exploitation. These important medicinal plants should be considerd for further propagation and conservation through modern agronomical techniques.

Key Words: Kodaikanal forests; Unani medicinal plants; Pulni hills; Western Ghats.

Introduction

Plants have been used in the treatment of various diseases from the time immemorial. The enumeration and survey analysis of medicinal plants in each district are highly needed to document the useful and economically important medicinal plants used in Unani, Ayurveda, and Siddha system of Medicines for research oriented programmes. Many important medicinal plants species are being used in health care systems in most developed countries because of their effective action in various ailments. It is reported that 1500 species of plant origin drugs were identified and used in the treatment of many diseases. Among these some of the important medicinal plants are being under severe threat and become rare and extinct due to various external factors like forest degradation, soil erosion and over exploitation etc.

Ethnobotanical studies have gained a momentum in the recent past and such studies have reveled vast traditional knowledge available with the tribal's (Nadanakujidam and Kannabiran, 2002). Globally, about 85% of the traditional medicines used for primary health care are derived from plants. Traditional medicine and ethnobotanical information play an important role in scientific research. In many countries and scientific investigations of medicinal plants have been initiated.

Further, the WHO has emphasized the need to revive the traditional systems of medicine with locally available herbs because of the toxicity and harmful side-effects of synthetic drugs in the prolong use. The traditional systems of medicine are still being practiced in the rural and urban areas by Hakims and Vaidyas.

Present work is based on the rationale and provides information on folk drugs particularly the Unani plants used by tribals in the study area.

Topography and Vegetation of Study Area

Kodaikanal is a hill area and tourist resort place about 540 km away from the Chennai, located between 10º12' and 10º15' North 77º31' East longitude apart of upper Pulni hills of Western Ghats. The forest division consists of 5 forest ranges such as Kodaikanal, Poomparai, Mannavanur, Berijam, and Perumpallam Ranges. Its altitude varies from1700 mts (Lower Pulnihills) to 2500 mts Upper Pulni hills. During summer season the climate of Kodaikanal region is pleasant and the temperature is about 20ºC maximum and 11ºC minimum. It is recorded that this region is getting annual rainfall about 165 mm by South West monsoon. In the natural vegetation the two locations such as lower Pulni hills and upper Pulni hills are the demarcated areas of vegetation zones. Evergreen, semi evergreen, deciduous, and shoal vegetations are covered all over the Kodaikanal forest division.

Areas Surveyed

Sl.No.	Forest Ranges	Forest Areas
1	Mannavanur	Kelanvayal RF
2	Poomparai	Poomparai, Gundur and Kookal RF
3	Kodaikanal	Bombay shoal, Tiger shoal and Arugan shoala
4	Preumpallam	Unjalnatchi, Arunganal and Moolayar

Methodology

The survey tours were conducted in different seasons at Kodaikanal forest division, Dindigul district, during the years 2001-2002. From this survey 170 species of plants have been collected and identified. Among these 25 species of Unani medicinal plants were identified having also folk medicinal value and are documented. The botanical identity of all the plants were confirmed at Botanical survey of India, Coimbatore.

Enumuration

The medicinal plants are arranged alphabetically according to their Unani names followed by botanical names, family in bract, vernacular name (Tamil Name) locality and short therapeutic uses based on Unani text.

Amla

Phyllanthus emblica L. (Euphorbiaceae) – Nelli, Perumal malai, Kodaikanal Range

Tree, leaves pinnate, fruits drupe, common. It is used in Zof-e-Dimagh (Weakness of Brain), Nisyan (Amnesia), Suda (Head ache), Quarha-e-Meda (Gastric Ulcer), Ishal (Diarrhoea) (Anonymous, 2007).

Aftemoon / Amarbal

Cuscuta reflexa Roxb. (Cuscutaceae) – Ottuchedi, Moolayar, Perumpallam Range

Parasitic, flowers small, common. Whole plant used in Malikhulia (Melancholia), Junoon (insanity), Deedan-e-ama (Intestinal worms) and ailments arising out of excessive sauda (Melanin) (Anonymous, 1997).

Amaltas

Cassia fistula L. (Caesalpiniaceae) – Konrai, Arunganal, Perumpallam range

Tree, flowers yellow, fruits pendulous and cylindrical, common. Fruit pulp, rind of the fruit and leaves are used in Warme-lauzatain Qubz, (Constipation), Sual, Zeequn-nafas (Asthma), Thejul Mefasul (Rheumatism) Quba (Ringworm), Laqwa (Facial paralysis), Wajul Mafasil (Rheumatism) and Qaba (Constipation) (Anonymous, 1992).

Brinjasif

Achillea millefolium L. (Asteraceae) – Gundar, Poomparai Range

Herb, leaves dissected, flowers white, not common. Leaves and flowering heads are used in Amraz-e-Kabid (Diseases of liver), Amraz-e-Meda (Diseases of liver and stomach), and general tonic (Anonymous, 1997).

Bisbasa

Myristica fragrans (L) Houtt. (Myristicaceae) – Jathikai, Gundar, Poomparai Range

Tree, leaves narrow-oblong, fruits globose, cultivated. It is used in Ishal (Diarrhoea), Falij (Paralysis) and Wajaul Mafasil (Arthritis) (Anonymous, 1997).

Chir

Pinus roxburghai Sang. (Pinaceae) – Kappalmaram, Allmost allthe Ranges

Tree, common on hilly slopes. Wood, resin used in Mudir-e-Haiz (Emmenagogues) (Anonymous, 1997).

Chironji

Buchanania lanzan Sprang. (Anacardiaceae) – Kattumundri, Unjalnatchi, Perumpallam Range

Trees, leaves coriaceous, fruits drub, black. Leaves and seeds are used in Zof-e-Bah (Sexual debility), Zof-e-Badan (Body weakness), (Farah Ahmed *et al.,* 2005).

Gul-e-Abbas

Mirabilis jalapa L. (Nyctanginaceae) – Anthimalli, Unjalnatchi, Moolayar, Perumpallam range

Herb, leaves cordate, flowers pink and white, roots tuberous, common. Leaves and roots are useful in Amraz-e-Masana (Uterine diseases) (Anonymous, 1997).

Gulchin

Plumeria rubra L. (Apocynaceae) – Malaiarali, Moolayar, Perumpallam Range

Tree, leaves larger, flowers white with yellow center, common. Used as Mus-hil (Purgative) (Ahmed *et al.,* 2005).

Halela

Terminalia chebula Retz. (Combretaceae) – Kadukai, Arunganal, Perumpallam Range

Tree, leaves ovate-oblong, glands on each side at the base of the petiole, fruits drub, common. It is used in Istirkha (Pralysis) Azm-e-Tehal (Splenomegaly), Bawaseer, (Piles), Malikhuliya (Melancolia), Juzam (Leprosy), coarsely powered fruit with almond oil is Mulayyin (Laxative) (Anonymous, 1987).

Sudab

Ruta graveolens L. (Rutaceae) – Aruvathamthalai, Gundar, Poomparai Range

Herb, leaves segmented, flowers yellow, common. Whole plant is used in Laqwa (Facial paralysis), Nisyan (Amnesia), Wajul Mafasil (Rheumatism), Sual, Zeequn-nafas (Asthma) (Anonymous, 1997).

Ispaghol

Plantago ovata Forsk. (Plantaginaceae), Gundar, Poomparai Range

Herb, leaves linear-lanceolate, trinerved, spikes solitary, terminal, flowers numerous. It is used in Zaheer (Dysentery), Qabz (Constipation), Sual-e- Yabis (Dry cough) Qulanje-Qurohi (Ulcerative colitis) and Iltehab (Inflamation) (Anonymous, 1992).

Lajwanti

Mimosa pudica L. (Mimosaceae) - Thottal surungi, Almost in all Ranges

Diffuse under shrub, prickly, leaves sensitive, flowers pink. Roots are used in Dafa-e-Tashannuj (Antispasmodic) and Muqawwi-e Bah (Aphrodisiac) (Anonymous, 1997).

Kafoor

Cinamomum camphora Nees & Eberm (Lauraceae) - Sampurani, Gundar, Poomparai Range

Tree, leaves, trinerved, common. Leaves are used as Mohallil-e-Warm (Anti-inflammations) (Ahmed *et al.,* 2005).

Majeed

Rubia cordifolia L (Rubiaceae) – Manjitti, almost in all the forest Ranges

Herb, leaves cordate, Flowers white, fruits berry, common. Roots are used in Ehtabas-e-Baul wa Haiz (Retention of Urin), Bawseer-e-Khooni (Bleeding Hamorrhoids) and Mudir-e-Haiz (emmenagogue) (Anonymous, 2007).

Makku

Solanum nigrum L. (Solanaceae) – Manathakkali Almost in all Ranges

Herb, leaves ovate-lanceolate, flowers white, common. Leaves and fruits are used in Humma (Fever), Ishal (Diarrhoea), Auram-e-Ahsha (Inflammation of Visceral organs) and Waeme Halaq (Phyringgitis) (Anonymous, 1987).

Marorphali

Helicteres isora L. (Sterculiaceae) - Valmpuri Idampuri, Unjalnatchi – Perumpallam Range

Shrub, leaves oblong, cordate, flowers red, fruits twisted, common. Root and bark are used in Waj-ul-Meda (Stomachache, Gastralgia), Sual (Cough), Zaheer (Dysentery) (Anonymous, 2007).

Naspati

Pyrus communis L. (Rosaceae) – Peri, Gundar - Perumpallam Range

Tree, leaves ovate, flowers white, fruit turbinate, common, cultivated. Fruits are used for Wajul Mafasil (Rheumatism) and Soo-e-Hazm (Indigestion) (Anonymous, 2007).

Neembu

Citus limon (L) Linn. of (Rutaceae) – Elumichai, Unjalnatchi, Perumpallam Range

Small tree, leaves ovate-oblong, flowers whitish yellow, common and cultivated. Fruits are used as Zuaf-e-Ishteha (Appetiser) and Amraz-e-Meda (Diseases of stomach) (Anonymous, 1997).

Rasaut

Berberis aristata DC (Berberidaceae), Moolayar, Perumpallam Range

Spinous shrub, flowers golden yellow, common. It is used in Amraz-e-chashm (Eye diseases), Yerqan (Jaundice), Warm-e-Tihal (Enlarged spleen) and Bawaseer (Piles) (Anonymous, 1997).

Sahajn

Moringa oleifera Lam (Moringaceae) – Murungai, Almost in all Ranges

Small tree, leaves tri pinnate, flowers white, common, cultivated. Roots are used as Mukhri-e-Janeen wa Masheema (Abortifacient), Sara (Epilepsy), Moarriq (Diaphoretics) (Anonymous, 2007).

Satawar

Asparagus racemosus L. (Liliaceae) -Thaneervitan kizhangu, Unjalnatchi, Poomparai and perumpallam Ranges

Strugling climbing shrub, flowers white, not common. Tuberous roots are used as Wajul Mafasil (Rheumatism), Muqawwi-e-Bah (Aphrodisiac), Sual, Zeequn-nafas (Asthma), Sailan-ur Reham (Leucorrhoea) and Mudir-e-Haiz (Emmenagogue) (Anonymous, 2007).

Sheetraj Hindi

Plumbago zeylanica L. (Plumbaginaceae) – Kodiveli, Molayar, Poomparai and Perumpallam Ranges

Shrub, leaves ovate, flowers white, axillary and terminal racems. Roots and leaves are used in Waj-ul-Mafasil (Arthritis), Falij (Hemiplegia), Laqwa (Facial paralysis) (Anonymus, 2007).

Shrifa

Annona squamosa L. (Annonaceae), Seetha

Tree, leaves oblong, flowers solitary, pale green, fruits globose, common, cultivated. Medicinally used in Mukhri-e-Janeen wa Masheema (Abortifacients) (Anonymous, 2007).

Waj-e-Turki

Acorus calamus L. (Araceae), Vasambu, Kookal – Poomparai Range

Semi aquatic herb, rhizomes thick, common and cultivated. Rhizomes are used in Mudir-e-Haiz (Emmenagogue), Mulattif (Demulscent) (Ahmed *et al.,* 2005).

Conclusion

The Kodaikanal forest division is apart of Western Ghats hill track. About 10 forest areas belong to 5 forest ranges were surveyed and 170 species of plant specimens have been collected and identified. Among these 30 species of Unani medicinal plants were identified and have been documented with their important uses. The survey team observed that many of the medicinal plants are being used by the tribals and village peoples to cure various ailments such as fever, cold, dysentery, jaundice, stomach disorders, rheumatism, and skin diseases. Among them some of the species are Amla (*Phyllanthus emblica* L), Brinjasif (*Achillea millefolium* L), Halila (*Terminalia chebula* Retz), Marorphali (*Helicters isora* L) and Sheetraj hindi (*Plumbago zeylanica* L) etc., apart from this some of the species like *Symplocos racemosa* Roxb), *Elaeocarpus tectorious* (Lour) Poir, *Maesua indica* (Roxb) DC, *Michelia champaca* L etc., are propagated and conserved through medicinal plants nurseries by the forest department at Poomparai, Gundar and Berijam ranges. Some plant species like Biabasa (*Myristica fragrans* (L) Hott), Brinjasif (*Achillea millefolium* L), Chironji (*Buchanania lanzan* spreng), Isphagol (*Plantago ovata* Forsk), Kafoor (*Cinnamomum camphora* Nees & Eberm, and Pathani Lodh (*Symplocos racemosa Roxb*) are very much restricted in their distribution.

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Pharmacognostic Study of *Hypericum perforatum* Linn. – An Anti-Depressant Drug

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Abstract

Hypericum perforatum Linn (St. John's Wort) is a herbaceous, perennial plant of Family Hypericaceae, widely distributed in temperate region of Europe, Asia, North Africa, USA and it is also cultivated in India in Himalayas at higher altitudes. St. John's Wort is an important medicinal plant contains Hypericin and Hyperforin. Nowadays, it is largely used in treatment of depression and is being researched in treatment of AIDS. In nineteenth century, it was used for wound healing, especially for lacerations involving damaged nerves, and as a diuretic, astringent and mild sedative. It can be characterized by solid, dark red stem; sessile, glabrous, smooth-edged leaves with numerous, scattered pellucid dots; yellow flowers; anomocytic stomata; secretory cavities in mesophyll of leaf and cortex & phloem of stem; presence of carbohydrate, sugar, protein, oil, alkaloid and flavon and absence of saponin and steroid.

The study also includes some other characters like stomatal index, palisade ratio, vein-islet number etc. TLC, fluorescence behaviour, extractive values, ash values. The aim of the study is to provide distinguishing pharmacognostic characters for its easy identification to check adulteration.

Key Words: Pharmacognostic, Hypericine, Hyperforin, Anti-depressant.

Introduction

Hypericum perforatum Linn., commonly known as St. John's wort is an important medicinal plant contains highly active compounds including rutin, pectin, choline, sitosterol, pseudohyupericin, hypericin & hyperofin. It is a herbaceous, perennial plant of family Hypericaceae widely distributed in temperate region of Europe, Asia, North Africa and USA. It is also cultivated in India in Himalayas at higher attitudes and in the hills of central part of the country. The flowers contain a group of reddish fluorescent dianthrone pigments with biological activities (Wagner, 1994) & it is also reported that biosynthesis of hypericins is connected with morphogenesis and formation of dared coloured oil glands on the leaves (Zdunek, 1992).

The plant was widely used in European countries as an analgesic, antiseptic, antispasmodic, astringent, expectorant, anitiphlogistic in inflammation of bronchi and urogenital track, in hemorrhoid treatment, a healing agent in the treatment of traumas, burns, scads, and ulcer. In nineteenth-century, it was also used by American physicians for wound healing especially for lacerations involving damaged nerves, and as a diuretic, astringent and mild sedative (Steven Foster, 1998). In Homoeopathic system of medicine, it is very good remedy for nerve injury (Boericke, 1927). Now days, this drug is little used for these traditional purpose but it is largely used in treatment of depression and is being researched in treatment of AIDS. Hypericine in a standardized extract has shown a significant antidepressant activity by inhibiting the enzyme mono-amino oxidase (MAO) (Muldner, 1984).

MAO is responsible for breakdown of two brain chemicals – serotonin and norpinephrine. By inhibiting MAO and increasing nor epinephrine, may exert an anti-depressive action. The anti depressant or mood elevating effects of *Hypericum perforatum* were originally thought to be due to solely to Hypericin, but hypericin does not act alone, it relies on the complex interplay of many constituents such as xanthones and flavonoids for its antidepressant action (Muruganandam *et al.,* 2000). *Hypericum perforatum* may also block the receptors that vind serotonin and so maintain normal mood and emotional stability. Hypericin is also known as photo sensitizing agent used in the photodynamic therapy of cancer and viral infections (Lavie *et al.,* 1998).

Detailed histo-pharmacognostic studies have been carried out on whole plant drug with a view to check adulteration and laying down correct botanical identification for its world wide value as a crude drug.

Material and Methods

Seeds of *Hypericum perforatum* were procured form France & Germany (under seeds exchange programme), germinated and grown in our "Experimental Herb Garden". Plant materials were also collected from CSIR, complex, palampur (H.P.) & Jammu Tavi, Kashmir. Conventional method of hand section cutting was taken up for anatomical studies; chemical analysis were done following Johansen (1940), Youngken (1951), Cormwell (1956), Trease and Evans (1972) and for determing physical characters I. P. (1970) was followed. Plants were extracted with ethanol at room temperature in soxhlet apparatus for 24 hours. TLC of extract of whole plant in flowering was carried out on silica gel 'G' coated plates using butanol : acetic acid : water (4:1:1) and plates were developed by exposing them to iodine vapors.

Observations

Macroscopical Evaluation

A perennial herb with woody branched root system produces many round, erect; stems branching at the leaf axis, which are covered with dark red dots. Stem is solid, dark red at base, 30 cm. or more in height; leaves sessile, opposite, smooth edged, oblong to linear, 2 to 4 cm. long, light green, smooth with numerous scattered pellucid dots (oil glands), connate-perforate. The cymes of yellow flowers, grow atop of each stem; flowers 1.25 to 2.50 cm. across; sepals 5, narrowly lanceolate, acuminate, 4 to 6 mm long; petals 5, oblong, 8 to 10 mm long, black-dotted near the margin; ovary is surrounded by many stamens, causing it to appear furry, (Fig.1); stamens in 3 fasciles, ovary 3-locular, styles 3. The fruit is three celled capsule containg small dark brown seeds.

Fig. 1. *Hypericum perforatum* Linn (Flowering Plant).

Microscopical Evaluation

(a) Leaf: Transection of Leaf shows single layer of epidermis; upper one is pappilose; stomata anomocytic, confined to the lower surface; (Fig. 2, C); mesophyll differentiated into single layer of palisade & 4 to 5 layered sprongy parenehyma; secretory cavities present in mesophyll (Fig. 2, B); midrib more protuberated on lower side, almost triangular in shape; ground tissue parenchymatous; meristele arc-shaped having phloem on the lower side & xylem on upper side (Fig. 2, A). Stomatal index is 11.63 to 28.24 & palisade ratio 5.0 to 7.9 (Fig. 2, C & D).

(b) Stem: In transection young stem is quadrangular in outline with four ridges, containing collenchyma (Fig. 2, E). Epidermis Single layered followed by 1 to 2 layers of collenchymatous hypodermis; cortex 3 to 4 layers of parenchymatous cells having secretory cavities; endodermis & pericycle are not well distinguished; xylem & phloem arranged in a continuous ring. Phloem contains secretory cavities, uniseriate rays, phloem parenahyma, Seive tubes & companion cells; xylem with xylem parenchyma, vessels, tracheids & uni-biseriate medullary rays. Pith is parenchymatous.

In mature stem, transection shows a few layers of tin walled, brown colour cork cells; sec. cortex small, parenehymatous containg secretory cavities; xylem & phloem in close ring; phloem also containg secretory cavities, specially just above the xylem rays; phloem rays not distinct; pith small made up of thin walled parenchynatous cells or hollow.

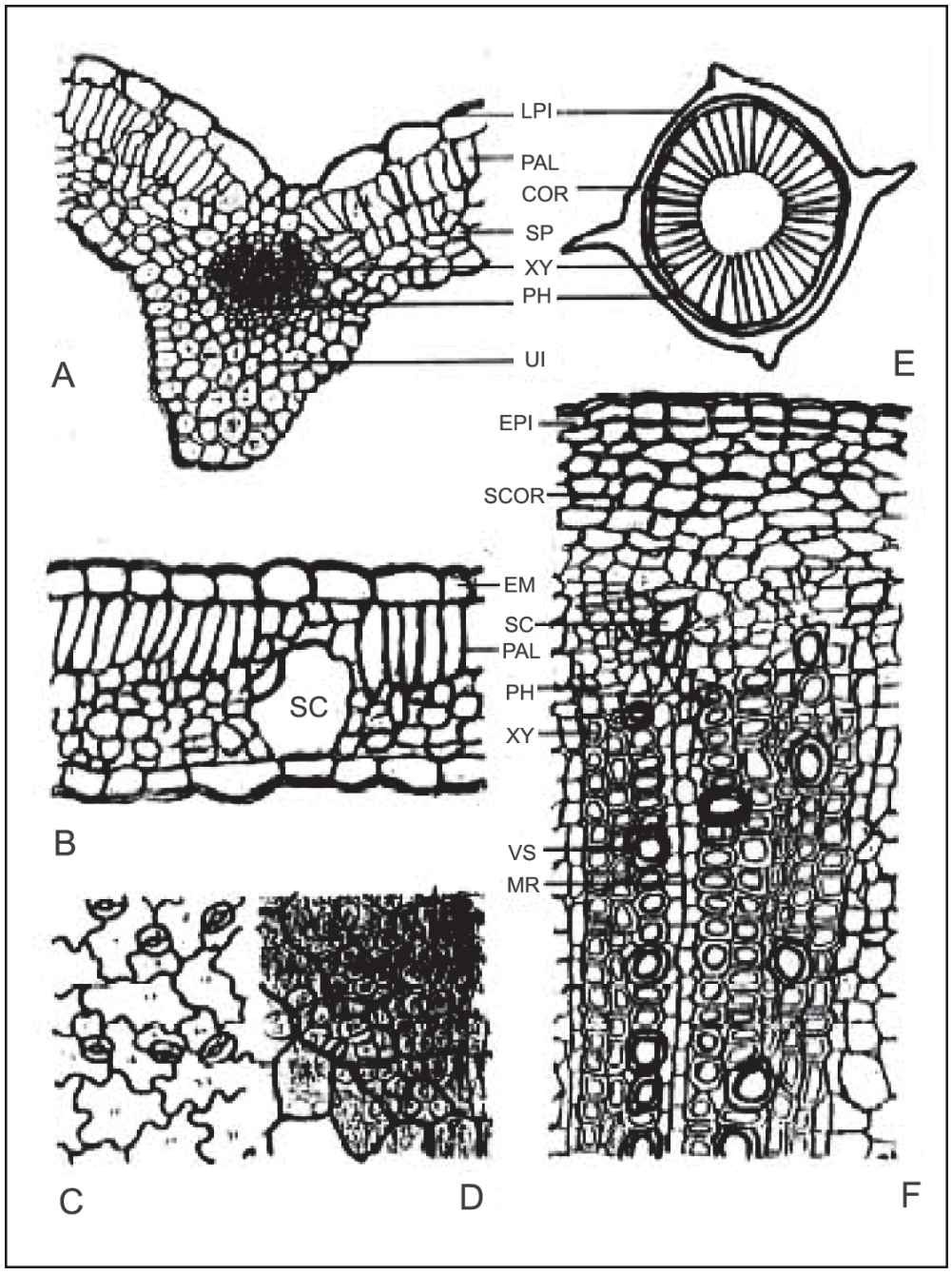

Fig. 2. (A) T.S. of leaf through midrib. (B) T.S. of Lamina. (C) Anomocytic stomata in surface view. (D) Palisade Cells in surface view. (E) T.S. of stem (Diagrammatic representation). (F) T.S. of stem (Cellular).

Chemical Evaluation

(a) A preliminary chemical analysis reveals presence of Alkaloids, Carbohydrates, Sugar, Lignin, Subernin, Glycosides, Oils, proteins and flavons and absence of saponin & steroids (Table-1).

Table-1. Phytochemical / Preliminary Colour Reaction Test

S.No.	Reagent	Test Performed	Result
1.	Dragendorff's reagent	Alkaloid	+Ve
2.	Phloroglucinol+HCl	Lignin.	+Ve
3.	$FeCl_3$	Tanin	+Ve
4.	Molisch's Test	Carbohydrate	+Ve
5.	Heating With Strong KOH+H_2SO_4	Subernin	+Ve
6.	Molisch Test after Hydrolysis	Glycosides	+Ve
7.	Alcoholic Ext.+Acetic anhydride+H_2SO_4	Saponin	-Ve
8.	Mg. powder + Conc. HCl	Flavons	+Ve
9.	Libermann Buchard	Steroids	-Ve
10.	Sudan IV	Oils	+Ve

(b) TLC: Thin layer chromatographic studies of alcoholic extract was carried out using butanol : acetic acid : water (4:1:1, V/V) as solvent system and observed under UV light, five spots appeared, which are sown in Table-2.

When sprayed with aluminium chloride and observed under UV light, four yellow colour spots appeared at Rf 0.45, 0.60, 0.80 and 0.90.

Physical Evaluation

(a) Fluorescence behaviour: Various flurorescense behaviour are tabulated in Table-3.

(b) Extractive Values:

Alcohol soluble extractive - 17.9%

Water (pH 7) soluble extractive - 6.7%

Table-2. Rf Values (Mobile phase butanol : acetic acid : water (4:1:1, V/V)

S.No.	Rf Value	Colour
1.	0.60	Brown
2.	0.80	Brown
3.	0.85	Bright Red
4.	0.90	Brownish Yellow
5.	0.95	Red

Table-3. Flurorescence Behaviour of Powder of *Hypericum perforatum* Linn.

S.No.	Material	Colour in day light	Colour in Fluorescence Light
1.	Powder as such	Yellowish Green	Light Green
2.	Powder rubbed on filter paper	Light Olive Green	Pale Green
3.	Aqueous extract of powder	Light Brown	Apple Brown
4.	Alcoholic extract of powder	Olive Brown	Light Brown Green

(c) pH of alcoholic extract:

pH of alcoholic extract at 25^0C is 5.6 to 5.7

(d) Spectrometer Characteristic of drug:

max – 275 nm

(e) Total Solids: Not less than 0.6 percent w/v

(f) Ash Values:

Total ash determined of powder is 7%

& Acid soluble ash is 2%.

Discussion

Above mentioned distinguished characters give easy clue to detect out the drug from other common species like *Hypericum elodieoides*, having sepals and bracts with long stalked marginal glands & petals glandular while in *Hypericum* perforatum sepals without marginal glands & petals with black dots.

Acknowledgement

Author is grateful to the Director, Homoeopathic Pharmacopoeia Laboratory, Deptt. of AYUSH, Ministry of Health & Family Welfare, Ghaziabad (U.P.) for providing facilities.

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Some Important Unani Crude Drugs from Apiaceae – A Comparative Study

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Abstract

A comparative study of the cremocarpic fruits of six most frequently consumed drugs of the Unani system of medicine, all derived from family Apiaceae has been carried out in detail. Botanically the well known crude drugs having high medicinal values are *Anethum sowa* Kurz (Dill), *Carum carvi* (Caraway), *Cuminum cyminum* (Cumin), *Coriandrum sativum* (Coriander), *Foeniculum vulgare* (Fennel) and *Trachyspermum ammi* (Ajowain).

Although they belong to same morphological group (fruit) but despite being derived from entirely different genus, show much similarity in their general structure, organoleptic characters and the therapeutic property. However, each of these could be easily distinguished on the basis of some diagnostic characters.

Key Words: Apiaceae, Cremocarp, Crude drugs.

Introduction

Apiaceae, a well known family of spices and condiments is a vast group of herbaceous plants, comprising about 200 genera and 2700 species. Cremocarps, the characteristic fruits of this family hold a significant role as a safe and quick crude drug remedy in the indigenous systems of medicine. Besides being consumed frequently in our daily food items, the six raw drugs prescribed either singly or in combination are highly reputed for their three chief therapeutic actions i.e. Carminative (Kasir-e-Riyah). Digestive (Hazim) and stomachic (Muqawwi-e-Meda) as reported by Ali (1979), Nadkarni (1976), Rafiquddin (1985), Youngken (2004) and Ahmad *et al.*, (2005).

A screening of literature was carried out with reference to the previous work already reported about the fruits of these six crude drugs viz. *Anethum sowa* Kurz, *Carum carvi* L., *Cuminum cyminum* L., *Coriandrum sativum* L., *Foeniculum vulgare* Mill and *Trachyspermum ammi* (L.), Sprague. (Fig. 1-6) Based on the survey it appeared that certain aspects related to the chemistry and pharmacology have already been worked out (Chopra *et al.*, 1956; Watt, 1972; Asolkar *et al.*, 1992; Rastogi and Mehrotra, 1993-1998; Capizza *et al.*, 2001; Zafar *et al.*, 2001; Trease & Evans, 2002; Jagtap & Shirke, 2002; Masoudi *et al.*, 2002; Meena & Singh, 2008; Singh *et al.*, 2008). However, no such attempt appears to have been made thus far, in this context. Therefore, detailed comparative study of some cremocarpic fruits was done and the key characters defined which may help not only in their identification but also to check adulteration, if any.

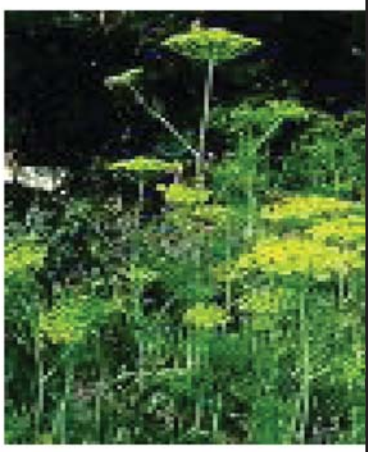
Material and Methods

Two samples of each of the six crude drugs (Fig. 1) selected for present study were procured from Dawakhana Tibbiya College (A.M.U.) Aligarh, and from the local market as well and subjected initially to a gross macroscopic examination.

Ajwain Plant

Fennel Plant

Coriander Plant



Dill Plant

Cumin Plant

Caraway Plant

The samples of each drug thus procured from two different sources appeared to be the same except a slight variation in their colour. Sufficient quantity from each drug sample was grinded and a powder was prepared for study through Mesh No 60 as per Jackson & Snowdon (1968). Cross sections were also prepared for their comparative study.

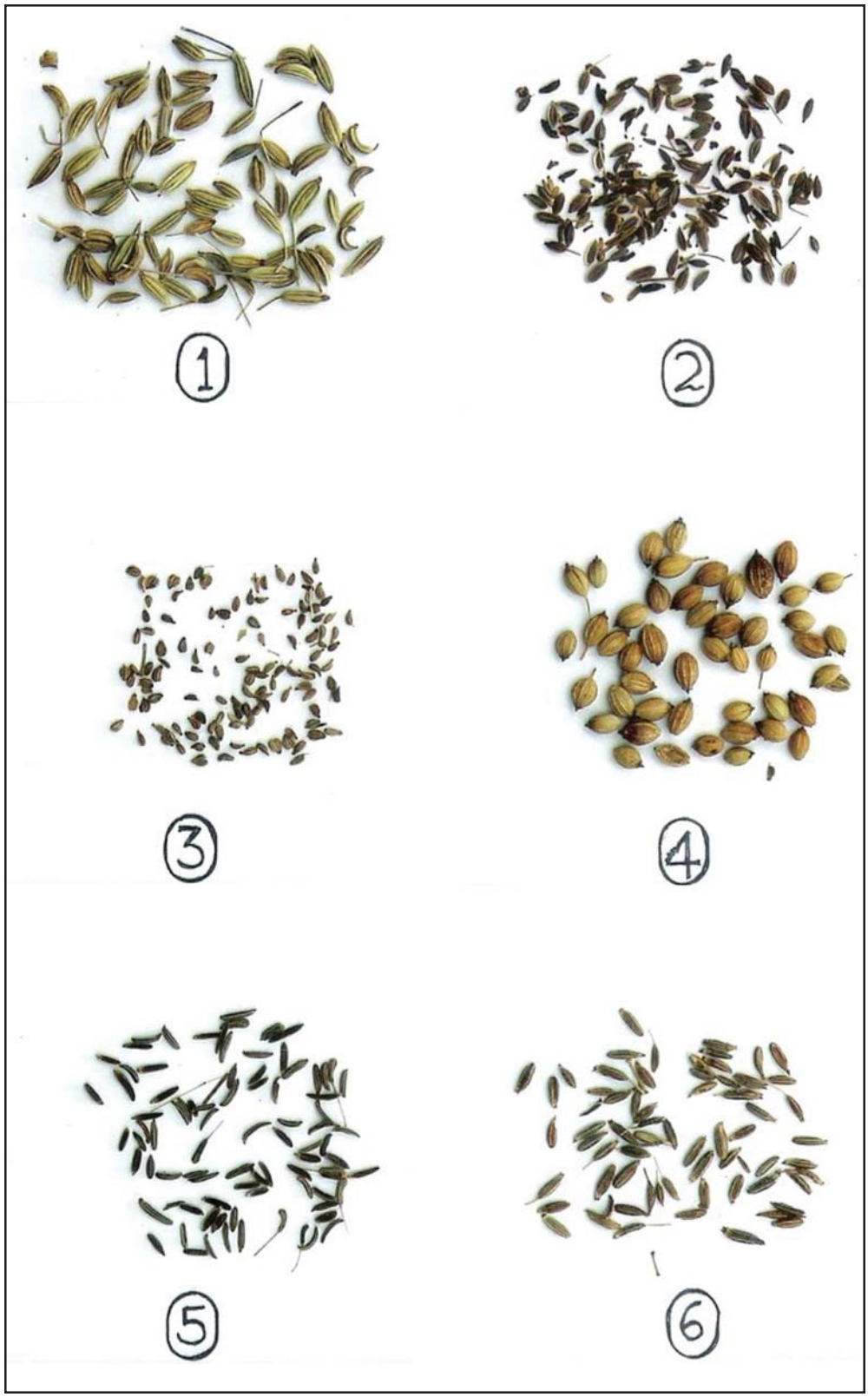


Fig. 1: 1. Fennel (*Foeniculum vulgare* Mill.) 2. Dill (*Anethum sowa* Kurz.) 3. Ajowan (*Trachyspermum ammi* Sprague) 4. Coriander (*Coriandrum sativum* L.) 5. Caraway (*Carum carvi* L.) 6. Cumin (*Cuminum cyminum* L.)

Observations

The six crude drugs derived from family Apiaceae (earlier referred as Umbelliferae) belong to same morphological group i.e. fruits which are characteristically an indehiscent cremocarp. It consists of two vertical halves called the mericarps and each mericarp is one seeded having a flat surface (commissural side) and a rounded surface (dorsal side). The seeds are abundantly endospermic made up of cellulosic polyhedral cells rich in small aleurone grains and fixed oil. A fine thread like structure called carpophore lies in between the two mericarps but basically attached to the pedicel. The seed in each mericarp is found totally attached to the pericarp by its testa. The seeds contain a small embryo at the apical end embedded in an abundantly oily endosperm. The schizogenous ducts called vittae, extending through the mesocarp from the base to apex is another important feature of the cremocarps, though variation in their number, distribution and arrangement provides character for their identification.

Based on detailed study of six crude drugs on a comparative basis, the observations are recorded accordingly in Table 1 and 2.

Results and Discussion

The six crude drugs being most widely used as spice not only in India but all over the world, hold a significant place both in the Ayurvedic and the Unani System of Medicine due to their high therapeutic efficacy for a number of common human ailments. As all these herbal drugs come from the same family Apiaceae and belong to same morphological group (fruit), they share a number of characters common to all such as the indehiscent cremocarpic fruit, each consisting of two mericarps and a carpophore, prominent stylopod, mesocarp containing the vittae, seeds endospermic, one in each mericarp, completely fused to the pericarp, starch totally lacking and the endocarp with a characteristic parquetry arrangement of cells.

However, the present comparative study revealed that the six crude drugs may be identified correctly and easily distinguished from the others on the basis of some diagnostic characters. Thus, the **Dill** fruits may be identified by presence of reticulate and lignified mesocarp parenchyma, striated cuticle but no trichomes, **Caraway** by absence of trichomes and reticulate mesocarp parenchyma but cuticle striated, **Cumin** by presence of branched pluriseriate trichomes and a non-stratified cuticle, **Coriander** by absence of trichomes and striated cuticle but sclerenchymatous cells in mesocarp arranged in sinous rows often crossing at right angles, **Fennel** by absence of trichomes and striated cuticle but abundant reticulate lignified parenchyma in mesocarp; **Ajowan** by presence of club shaped unicellular trichome and a non-striated cuticle.

Table-1. Some important information about the six crude drugs from Apiaceae

Plant Name	Habit & Habitat	Nomenclature			Therapeutic property	Temperament
		Hindi	Urdu	English		
Anethum sowa Kurz	Small aromatic herb, found throughout tropical and subtropical parts of India.	Sowa	Shibbat	Dill	Carminative and stomachic	Hot & Dry (2º)
Carum carvi L.	Biennial herb (30-90 cm), cultivated in plains but grows wild in North Himalayan region	Kalazira	Zeera siyah	Caraway	Carminative, Stomachic and Lactogogue	Hot & Dry (3º)
Cuminum cyminum L.	Small (30-90 cm) annual herb, cultivated throughout India	Jira	Zeera safed	Cumin	Carminative, Stomachic, Stimulant and Astringent	Hot & Dry (2º)
Coriandrum sativum L.	Small (20-30 cm) annual herb, cultivated all over India	Dhania	Kishneez	Coriander	Carminative, Stomachic, Stimulant, Tonic and Diuretic	Cold & Dry (2º)
Foeniculum vulgare Mill.	Annual herb (1-1.5 m high), extensively cultivated all over India	Saunf	Badiyan	Fennel	Carminative, Stomachic and Stimulant	Hot & Dry (2º)
Trachyspermum ammi (L.) Sprague	Annual herb (1 m high), cultivated throughout India	Ajowan	Nankhawh	Bishop's weed	Carminative, Stomachic, Stimulant and Anti-spasmodic	Hot & Dry (3º)

Table 2. Comparative morphology of six crude drugs from Apiaceae

Character	Dill	Caraway	Coriander	Cumin	Fennel	Ajowan
	1	2	3	4	5	6
Cremocarp						
i) Shape	Broadly ovate	Elongated and curved	Globular	Elongated but straight	Ellipsoidal	Ovoid and compressed
ii) Size	3-4 mm long, 2-3 mm wide	4-6 mm long, 1 mm wide	3-6 mm long, 2-3 mm wide	4-6 mm long, 2 mm wide	5-8 mm long, 1-2 mm wide	2 mm long, 1 mm wide
iii) Colour	Dark brown	Blackish brown	Yellowish brown	Light brown	Greenish yellow	Greyish brown
Mericarp						
i) Status	Usually separated	Usually separated	Not separated	Both separated & entire	Not separated	Usually separated
ii) Surface Trichomes	Absent	Absent	Absent	Branched, pluriseriate	Absent	Club shaped, unicellular
iii) Ridges	Five primary ridges, the lateral ones extended as wings	Five primary ridges, No wings	Ten primary ridges and eight secondary, No wings	Five primary ridges & four secondary, No wings	Five primary ridges, No wings	Five primary ridges, No wings

Character	Dill	Caraway	Coriander	Cumin	Fennel	Ajowan
	1	2	3	4	5	6
Pericarp						
i) Epicarp	Single layered with striate cuticle	Single layered with striated cuticle	Single layered with smooth cuticle	Single layered with non striated cuticle	Single layered with non striated cuticle	Single layered with non striated cuticle
ii) Mesocarp Vittae	Four dorsal, two commissural in each mericarp	Four dorsal, two commissural in each mericarp	Only two on commisural surface in each mericarp	Four dorsal, two commissural in each mericarp	Four dorsal, two commissural in each mericarp	Four dorsal, two commissural in each mericarp
iii) Endocarp	Parquetry arrangement prominent	Weak parquetry arrangement	Parquetry arrangement prominent	Prominent	Parquetry arrangement of cells	Weak parquetry arrangement
Seed	Orthospermous	Orthospermous	Coelospermous	Orthospermous	Orthospermous	Orthospermous
Oil content	2-3.5%	3.5 – 7%	0.8 – 1%	3 – 4%	4 – 5%	4 – 6%
Taste and odour	Agreeable aromatic	Agreeable aromatic	Spicy, Aromatic	Spicy, Aromatic	Sweetish, Aromatic	Pungent, Thymolic

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A Contribution to the Ethnomedicinal Flora of the Pithoragarh Forests of Kumaon Region, Uttarakhand

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Abstract

An ethnobotanical survey of the Pithoragargh forests has yielded useful information on folk medicinal claims prevalent among the tribal communities, dominated by *Bhotiya, Bora, Raji* (*Van Rawat*), and *Shanka*. Based on this field study the present paper deals with 32 plant species belonging to 28 families that are used as folk drugs for treatment of various humans and cattle disease and conditions. For each species are given the correct botanical and popular local names, part used, claimed medicinal use (s) and the manner of using crude drug. This report lists many new phytotherapeutic application and preparations from the area.

Key Words: Ethnobotanical survey, Folk drugs, Pithoragarh, Kumaon, Uttarakhand.

Introduction

Pithoragarh forest division (29º32'–30º09'N latitude and 79º50'–80º42'E longitude) forms a part of North Kumaon Forest Circle of Uttarakhand. The entire division is mountainous and situated in Pithoragarh, the easternmost hill district of this state, bordering Tibet and Nepal (Fig. 1). In major part of the year, areas at higher elevations remain under snow cover. The area has mainly a temperate type of vegetation. Forests of this division are floristically rich and inhabited by several cultural and ethnic groups. Among them *Bhotia, Bora, Raji* and *Shanka* are predominant. This particular hill region was selected for an extensive ethnobotanical survey of the medicinal plants because it is remote from the industrial centers and posses an interesting climate, landscape and vegetation (Singh and Singh, 1971; Pangtey, 1984; Pangtey *et al.,* 1988; Samant *et al.,* 1993). Moreover, available published ethnobotanical reports were encouraging (Bhatt and Gaur, 1992; Datt and Lal, 1993; Garbyal *et al.,* 2005; Singh *et al.,* 1980; Upreeti *et al.,* 2000). In this communication an enumeration of the plants of ethnomedicinal utility is presented. The study enriches our existing traditional knowledge on medicinal flora of this region of Uttarakhand.

Methodology

The study area was surveyed in February and March 2008. During the course of fieldwork (between the latitudes from 600-2700 m), a number of tribal settlements located in different forest ranges viz. Berinag, Didihat, Gangolihat, Munsiyari and Pithoragarh were visited and data were obtained by interviewing local healers and other knowledgeable village elders. The information collected includes local name, claimed medicinal use(s), part used, other ingredients added (if any), method of preparing the medicine and mode of administration. Plant specimens were collected and identified by the senior author with the help of pertinent floras (Osmaston,

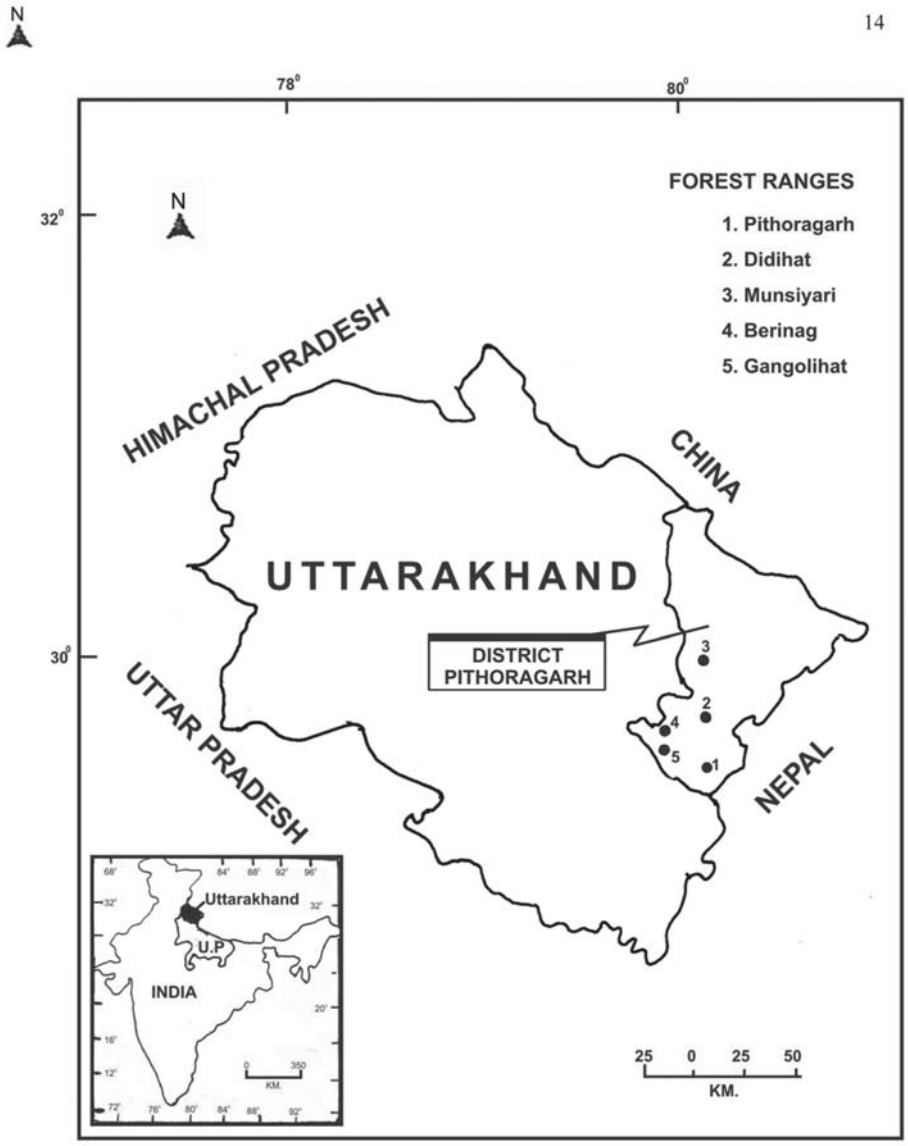

Fig. 1. Map of Pithoragarh district showing the areas surveyed.

1927; Rau, 1975). All voucher specimens were prepared and deposited in the herbarium of the Survey of Medicinal Plants Unit, Regional Research Institute of Unani Medicine, Aligarh (UP), India. In the following listing the plants are arranged in alphabetical order by their scientific names. Each entry provides information on correct botanical name, family in parenthesis, local name, locality, collector's name and field book number followed by medicinal use(s) and mode of administration.

Observations

Ageratina adenophora (Spr.) King & Rob. (Asteraceae), *Akalighas*, Didihat (*ZAA 8121*). Fresh leaves are washed and squeezed to obtain the juice. It is poured over the cuts to stop the bleeding.

Allium wallichii Kunth (Liliaceae), *Vanlehsan*, Shandev (*ZAA 8096*). Bulbs are crushed and made into fine paste which is given orally in the dose of 10 g twice daily for 15 days to treat joint pain.

Artemisia nilagirica (Clarke) Pamp. (Asteraceae), *Pati*, Bhanara (*ZAA 8101*). Aqueous decoction of the leaves is drunk in common fever.

Berberis asiatica Roxb. ex DC. (Berberidaceae), *Kilmora*, Thalkedar (*ZAA 8034*). Dried root pieces are soaked overnight in water, the infusion thus obtained is given once daily in the morning to control diabetes.

Bergenia ciliata (Haw.) Sternb. (Saxifragaceae), *Silphora*, Bhanara (*ZAA* 8094). The paste of 10 g root obtained by grinding in water is given orally for treatment of renal calculus and jaundice. It is also administered orally for controlling diabetes.

Centella asiatica (L.) Urban (Apiaceae), *Brahmi*, Thal (*ZAA 8185*). Leaf paste is applied locally on head in epileptic fits. It is also used as brain tonic.

Citrus medica L. (Rutaceae), *Jamir*, Pankhu (*ZAA 8187*). Sap of fresh root of this cultivated species is given orally for worm infestation.

Cuscuta reflexa Roxb. (Cuscutaceae), *Banwar*, Nainipatal (*ZAA 8045*). Fresh plant is fed to cattle for treating turgid stomach due to gastric troubles.

Dioscorea bulbifera L. (Dioscoreaceae), *Mithigethi*, Chobati (*ZAA 8073*). Potato like bulbils are cut into pieces and cooked. These are taken as pot herb for common cold, cough and fever.

Equisetum arvense L. (Equisetaceae), *Hadjojan*, Shantikunj (*ZAA 8097*). Stem paste mixed with powdered alum is plastered around the fractured limb. Splints and bandages are used to hold the bones and plaster in position.

Ficus auriculata Lour. (Moraceae), *Timul*, Chobati (*ZAA 8110*). Receptacles are boiled, crushed and mixed with curd. This preparation is given in the treatment of abdominal pain due to diarrhoea and dysentery.

Fig. 2. *Bergenia ciliata* (Haw.) Sternb.

Hedychium spicatum Buch.-Ham. ex Sm. (Zingiberaceae), *Kapoor Kachri*, Thalkedar (*ZAA 8037*). Lukewarm paste of the rhizome is applied locally for treating traumatic pain and inflammation.

Leucas lanata Benth. (Lamiaceae), *Pipshosha*, Bhanara (*ZAA 8088*). Leaf poultice is applied on boil to speed up suppuration and healing.

Mahonia acanthifolia G. Don (Berberidaceae), *Bhensi Kilmora*, Chandak (*ZAA 8082*). Extract of stem bark is applied in the eye to remove redness.

Mallotus philippensis (Lam.) Muell.-Arg.. (Euphorbiaceae), *Roli*, Chandak (*ZAA 8075*). Fresh leaf paste is rubbed locally in skin allergy. This species is commonly found in hot valleys.

Myrica esculenta Ham. ex D. Don (Myricaceae), *Kaphal*, Chobati (*ZAA 8106*). Powder of stem bark is boiled in water and cooled. The resulting decoction is given to drink for treating urticaria.

Neolitsea pallens (D. Don) Momiyama & Hara (Lauraceae), *Chater*, Munsiyari (*ZAA 8156*). The oil, extracted by crushing the dried seeds, is applied locally to treat scabies.

Opuntia vulgaris Mill. (Cactaceae), *Nagphun*, Thal (*ZAA 8184*). Paste prepared by pounding the phylloclade is applied locally in mastitis in cases of cow.

Osmanthus fragrans Lour. (Oleaceae), *Siling*, Didihat (*ZAA 8099*). Fresh stem bark is ground with water and filtered. It is applied in the eye for redness. It is also recommended for pterygium and to prevent the cataract.

Peperomia tetraphylla (Forst. f.) Hook. & Arn. (Piperaceae), *Koili*, Shandev (*ZAA 8103*). Leaf paste is applied on abscesses to drain off pus.

Pyracantha crenulata (D. Don) Roemer (Rosaceae), *Ghingaru*, Sornlekh (*ZAA 8054*). Paste of the edible fruits is recommended as cardiac tonic.

Fig. 3. *Myrica esculenta* Ham. ex D. Don

Fig. 4. *Osmanthus fragrans* Lour.

Rhododendron arboreum Sm. (Ericaceae), *Burans*, Didihat (*ZAA 8095*) Chopped stem bark is boiled and beverage drunk to control diabetes.

Roylea cinerea (D. Don) Baillon (Lamiaceae), *Titpati*, Pankhu (*ZAA 8191*). Leaf sap is applied locally for furunculosis. It is also recommended for eczema.

Rubia cordifolia L. (Rubiaceae), *Majeeshtha*, Thalkedar (*ZAA 8023*). Root is crushed and boiled in water; the liquid is strained and given in common fever.

Swertia ciliata D. Don (Gentianaceae), *Chiraita*, Thalkedar (*ZAA 8025*). Leaf decoction mixed with little crystalline sugar is given for fever.

Fig. 5. *Rhododendron arboreum* Sm.

Taxillus vestitus (Wall.) Danser (Loranthaceae), *Bana*, Chandak (*ZAA 8080*). Dried leaves are powdered and applied in the mouth for stomatitis.

Taxus baccata L. (Taxacaceae), *Luvent* and *Thuner*, Munsiyari (*ZAA 8100*). Chopped stem bark and leaf powder are boiled in water and liquid is strained. This preparation is given to prevent from cold in winter.

Thalictrum foliolosum DC. (Ranunculaceae), *Mameesha*, Shandev (*ZAA 8026*). Root is crushed and made into fine paste which is given orally to the children suffering from worm infestation.

Tinospora cordifolia (Willd.) Miers (Menispermaceae), *Gurji*, Thal (*ZAA 8200*). Stem-bits are crushed and given in the doses of 10 g two to three times a day for 2-3 week for leucorrhoea.

Viola pilosa Bl. (Violaceae), *Nirbhishi*, Thalkedar (*ZAA 8029*). Fresh leaf paste is placed over the boil to suppurate.

Zanthoxylum armatum DC. (Rutaceae), *Temur*, Chandak (*ZAA 8049*). Tender twig of the stem is used as tooth brush for oral hygiene.

Results and Discussion

This report documents some traditional and contemporary knowledge of the medicinal use of plants employed by the indigenous people of Pithoragarh forests. A total of 32 plant species from 28 families were recorded for curing or alleviating various diseases and conditions viz. abscess and boils, bone fracture, common cold and fever, cough, diabetes, eczema, jaundice, joint pain, kidney stones, leucorrhoea, scabies, stomachache, stomatitis, traumatic pain, urticaria, worm infestation, and many complaints of domestic animals. This ethnobotanical knowledge is exists as oral among the indigenous societies. The data were collected from highly reputed traditional healers who have long been using these plants with positive response in health care. These ethnomedicinal uses were compared with the pertinent literature (Ambasta, 1986; Anonymous, 2001; Chopra *et al.,* 1956; Jain, 1991; Kirtikar and Basu, 1935; Nadkarni, 1954) and it was found that uses of many plant species (e.g. *Ageratina adenophora*; *Artemisia nilagirica, Bergenia ciliata, Citrus medica, Dioscorea bulbifera, Hedychium spicatum, Rhododendron arboreum*, *Swertia ciliata, Taxus baccata, Tinospora cordifolia, Zanthoxylum armatum*, etc.) were similar and reported in the literature. Furthermore, many phytotherapeutic applications coincide with those of other parts of Kumaon (Ali *et al.,* 2008; Arya and Prakash, 1999; Gupta, 1960; Kalakoti and Pangtey, 1988; Shah, 1982; Shah and Jain: 1988; Singh and Ali, 1998; Singh *et al.,* 1997). Uses of other plants seem to be new or imperfectly known. All such medicinal uses suggested by these elderly people seem to be reliable and deserve further scientific investigations.

It was emphatically noted during the current survey that some important medicinal plants have become scarce in the area due to illegal and continued over exploitation as well as habitat destruction. Similarly, local traditional medicine men now represent a disappearing tradition because the younger generations usually consider about the traditional phytotherapy nothing more than a superstitions or dogma. Moreover, Primary Health Care Centers are now accessible to the rural populace. So, gradually this art of folk medicine is disappearing with every passing day. It is, therefore, desirable to conduct survey of other ethnobotanically under explored and unexplored important areas of the state before this traditional knowledge is lost permanently with the ever dwindling number of folk medicine men, the rapid devastation of natural plant habitats and cultural changes among the tribal communities due to the effect of modernization. Through such observations, based on properly designed field studies, many more reliable folk medicinal uses of plants may be revealed which may yield useful leads needed in the search of newer and potent pharmaceuticals of plant origin to the well being of human health.

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Pharmacognostical and Phyto-Chemical Studies on *Commelina benghalensis* L.

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Abstract

Commelina benghalensis L. belongs to the family Commelinaceae is commonly known a Tropical spiderwort and Bengal day flower. This plant is listed as one of the noxious weed that has become increasingly common in agronomic production systems. In India also it grows as common weed in crop fields particularly in rice fields. This plant is popularly used as folk medicine in many countries for various ailments. Attempt has also been made to develop the Pharmacognostical, preliminary phytochemical, physicochemical parameters and TLC studies of the whole plant of *Commelina benghalensis* L. The study ensures that the quality control parameters do help in the proper standardization of the crude drugs in drug development process for global acceptance. The study revealed that, the alcohol extract gave positive tests for the presence of the alkaloid, flavonoid, phenol, tannin, glycoside and sugar, whereas steroid and terpenoid are found in chloroform extract. Further the TLC studies revealed specific identities for the particular crude drug which will be useful in standardisation of the raw drug.

Key Words: *Commelina benghalensis* L., Pharmacognosy, Physico-chemical, Thin layer chromatography.

Introduction

Kanavazhai is botanically equated to *Commelina benghalensis* L., a creeping or procumbent herb with 60 – 90cm long, dichotomously branched stems and diffuse branches, often rooting at nodes. Leave 2.5-7.5 cm long and 1.3-3.8 cm wide, ovate or oblong, apex obtuse, base unequal-sided, rounded, cuneate or cordate, sessile or short-petioled, pubescent or hirsute; both aerial and underground flowers present; aerial flowers blue, borne in branched cymes; sepals small, oblong, pubescent; larger petals orbicular or transversely oblong, underground flowers white very small and cleistogamous flowers (Budd *et al.,* 1979); fruits (capsule) 0.6 cm long, pyriform, membranous; four types of seeds, large and small aerial seeds in addition to large and small underground seed. A genus of about 185 species of annuals or perennial herbs distributed in tropical and subtropical regions. More than 20 species of the genus have been reported to occur in India of which 6 species are extensively distributed in moist habitats throughout tropical and subtropical India, Sri Lanka, South east Asia and Africa (Anonymous, 1950 and Parrotta, 2001). The whole plant is considered as bitter, demulcent, emollient, laxative and cooling. The drug used in the ailment of leprosy and hemorrhage in Ayurveda; dysuria, fever and mastitis in Siddha and sore feet, sore throat, burns, eye irritation, thrush in infants and in stomach irritation. In southern Africa, it is used to combat infertility (Anonymous, 1950; Kritikar and Basu, 1998; Chopra *et al*., 1956). The chemical constituents of the plant contain n-octasanol, n-triacontanol, n-dotriacontanol and sterols such as stigmasterol, β-sitosterol and campestrol (Chopra *et al*., 1956, Asolkar *et al*., 1992). It also contains higher level of both lutein and β-carotene in

the range of 84 to 187 and 50 to 115mg/100g of dry weight respectively (Raju *et al*., 2007).

Materials and Methods

Collection of Drug

The fresh plants were collected from Chennai and it was identified with help of The Flora of the Presidency of Madras (Gamble, 1980) by the botanist. Shade dried and coarsely powdered plant materials were used for this study.

Pharmacognostical Study

The fresh plant materials were taken and free hand sections were made, stained with safranine and fast green and mounted in glycerine. While the powder drug was treated with various chemical reagents such as chloral hydrate, phloroglucinol + HCl and jeffrey's reagent for clearing the tissues to study the various elements. Drawings were made with the help of camera lucida (Johansen, 1940).

Chemical Analysis

Physico-chemical studies like total ash, acid insoluble ash, alcohol and water solubility and loss on drying at 105ºC methods were carried out as per the WHO guidelines (Anonymous, 1998). Preliminary phytochemical tests were done as per the standard methods (Harborne, 1973, Lala, 1993, Overton, 1963). The fluorescence behavior of the powdered drug in the day light and ultra violet light were carried out by moistening the powder in different solutions and viewing under the light of different wavelengths in a UV - chamber (Brain and Turner, 1975; Trease and Evans, 1989).

Thin Layer Chromatography

Preparation of Extract

The powder of the drug (2g) was extracted using 30ml of chloroform, alcohol and the extracts were concentrated upto 10ml in a standard flask. These solutions were used for the TLC studies.

TLC analysis

The TLC profile of chloroform and ethanol extracts were performed using precoated silica gel 60 F_{254} TLC plate (E. Merck) as adsorbent. TLC studies of these extracts were carried out using solvent systems like toluene : ethyl acetate, 9 : 1 and 1 : 1.3 respectively for the above extracts. After drying the plates were examined under UV – 254nm and 366nm and observed the spots. Further the plates were dipped in vanillin-sulphuric acid reagent following by heating at 105ºC till the bright spots appeared (Wagner and Bladt, 1984).

Result and Discussions

Root: T.S. of root shows circular in outline, epidermis consisting of single layer of parenchyma cells some of the cells elongated to tubular unicellular root hairs; exodermis consisting of 1 to 3 layers of sclerenchyma cells with thick outer and lateral walls; cortex consisting of parenchyma cells of which inner 3 to 4 layers of cells of uniform size and arranged uniformly; endodermis consisting of a single layer of barrel shape compact cells with thick inner and lateral walls; pericycle consisting of a single layer of thin wall parenchyma cells; vascular bundle consisting of alternating strands of xylem and phloem; xylem form discrete strands alternating with phloem; pith large consisting of sclerenchyma cells.

Stem: T.S. of stem shows circular in outline, epidermis consisting of single layer parenchyma cells; uniseriate trichomes present; cortex very narrow and inconspicuous and sharply marked off from the stele; cortex consisting of three different regions; the collenchyma of 2 to 3 layers; the chlorenchyma of 3 to 4 layers and parenchyma of 2 layers; vascular bundle scattered throughout the stele; vascular bundle are oval shaped; peripheral series of vascular bundle lying embedded in sclerenchyma band with xylem towards the center and phloem towards the periphery; each vascular bundle more or less completely surrounded by a sheath of sclerenchyma cells

Petiole: T.S. of petiole shows upper and lower epidermis consisting of single layer parenchyma cells; uniseriate trichomes present; cortex consisting of few cells of collenchyma on the upper side and 1 to 2 layers on the lower side; the chlorenchyma consisting of parenchyma cells filled with chloroplast; vascular bundle in the middle with xylem towards the upper side and phloem towards the lower side.

Leaf-Midrib: T.S. of leaf through midrib shows upper and lower epidermis consisting of single layer of parenchyma cells; uniseriate trichomes present; cortex consisting of collenchyma of few cells on the upper side and 1 to 3 layers on the lower side; the chlorenchyma consisting of parenchyma cells filled with chloroplast; vascular bundle in the middle with xylem towards the upper side and phloem towards the lower side.

Leaf-Lamina: T.S. of leaf through lamina shows outer and inner epidermis consisting of single layer of parenchyma cells; uniseriate trichomes (upto 6 cells present); single layer of palisade parenchyma cells followed by 2 to 4 layers of spongy parenchyma cells with intercellular spaces; vascular bundle in the centre with xylem towards the upper side and phloem towards the lower side; epidermal cells in surface view with straight wall with tetracytic stomata consisting of a pair of bean shaped guard cells surrounded by 6 subsidiary cells of which 4 lie parallel to the guard cells (2 on either side) and 2 lie terminal to them (one on each side); the stomatal number of the upper epidermis 3 to 6/sq mm and lower epidermis 20 to 25/sq mm; the stomatal index of the upper epidermis 5 to 7/sq. mm and lower epidermis 8 to 10/sq mm and palisade ration 30 to 35.

Powder

Light green; epidermal cells in surface view with tetracytic stomata and uniseriate trichomes upto 1200µ; fibres of length upto 2800µ and breadth upto 35µ; reticulate vessels upto 80µ; spiral vessels upto 40µ; cortical parenchyma cells and palisade parenchyma cells.

Chemical Analysis

Analytical data shows 10.85% of moisture content. Ash content of 14.42% and 1.07% of acid in-soluble ash shows the siliceous matter in the plant. Alcohol soluble extractive value represents the extraction of polar constituents like sugars, phenols, tannins, glycosides, alkaloids and flavanoids from the plant. The water soluble extractive value of the plant denotes the presence of inorganic contents. The data are shown in Table-1. The alcohol extract of the plant show positive results for alkaloid, flavonoid, phenol, tannin, glycoside and sugar, whereas steroid and terpenoid are found in chloroform extract shown in Table-2. In fluorescence analysis, the

Table-1. Physico-chemical parameters of *C. benghalensis*

S.No.	Parameters	Results (n=3) ± S.D
1.	% Foreign matter	Nil
2.	% Loss on drying at 105ºC	10.85 ± 0.04
3.	% Ash	14.42 ± 0.07
4.	% Acid insoluble ash	1.07 ± 0.11
5.	% Solubility at room temp. a. Ethanol b. Water	 12.52 ± 0.13 30.26 ± 0.09

Table-2. Preliminary phytochemical test of *C. benghalensis*

S.No.	Test	Chloroform extract	Alcohol extract
1.	Alkaloid	-	+ ve
2.	Quinone	-	-
3.	Coumarin	-	-
4.	Flavone	-	+ ve
5.	Steroid	+ ve	-
6.	Phenol	-	+ ve
7.	Tannin	-	+ ve
8.	Glycoside/Sugar	-	+ ve
9.	Terpenoid	+ ve	-
10.	Iridoid	-	-

powdered sample was treated with various chemical reagents to give different colours shown in Table-3. The R_f values of the TLC analysis of chloroform and alcohol extracts were shown in Table-4 and 5. The plates were visualized using vannilin-sulphuric acid and heated at 105º till appears colored spots (Fig. 1 & 2).

Table-3. Fluorescence analysis of *C. benghalensis*

S.No.	Powder	Day light	UV 254 nm	UV 366 nm
1.	Powder as such	Light green	Light green	Violet
2.	Powder + Water	Brown	Yellowish green	Blue
3.	Powder + 1N NaOH	Dark brown	Blue	Violet
4.	Powder + 1N HCl	Yellow	Yellow	Dark green
5.	Powder + 50% H_2SO_4	Brown	Green	Brownish green
6.	Powder + Petroleum ether	Yellowish green	Yellow	Blue
7.	Powder + Chloroform	Dark green	Light green	Brown
8.	Powder + Ethyl acetate	Light green	Yellowish green	Dark brown
9.	Powder + Ethanol	Dark green	Yellowish green	Brown

Table-4. TLC data of the chloroform extract of *C. benghalensis*

Solvent system	Rf Values		
	UV 254 nm	UV 366 nm	V. S. Reagent
	0.65 Blackish green	0.66 Dark red	0.91 Violet
	0.57 Yellowish green	0.57 Red	0.63 Green
Toluene : Ethyl acetate (9 : 1)	0.44 Blackish green	0.44 Red	0.57 Yellowish green
	0.14 Yellowish green	0.34 Pale violet	0.52 Violet
		0.21 Pale violet	0.39 Violet
		0.14 Blackish brown	0.28 Grey
			0.14 Grey

Table-5. TLC data of the alcohol extract of *C. benghalensis*

Solvent system	Rf Values		
Toluene: Ethyl acetate (1 : 1.3)	UV 254 nm	UV 366 nm	V. S. Reagent
	0.91 Yellowish green	0.97 Red	0.91 Blue
	0.83 Yellowish green	0.87 Brownish red	0.85 Violet
	0.71 Yellowish green	0.80 Red	0.79 Blue
	0.50 Greenish yellow	0.71 Red	0.51 Grey
	0.15 Light pink	0.50 Red	0.26 Blue
		0.21 Pink	0.15 Yellowish green
		0.15 Pink	

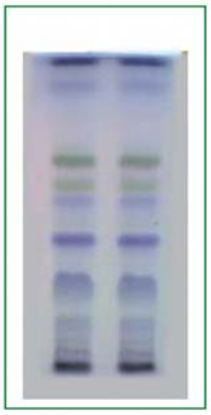


Fig. 1
Chloroform Extract
Solvent System: Toluene : Ethyl acetate 9 :1

Fig. 2
Alcohol Extract
Solvent System: Toluene : Ethyl acetate 1 : 1.3

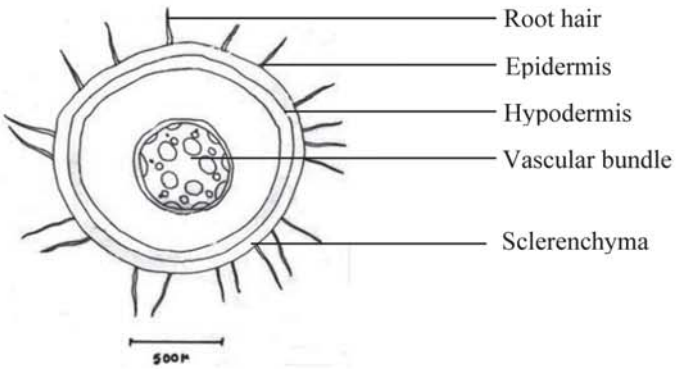
Conclusion

The pharmacognostical, preliminary phytochemical and fluorescence analysis may help to identify and purity of the drug. The results of various types of ash may provide a basis to identify the quality and purity of the drug. The extracts of the drug in different solvents like n-hexane, chloroform, ethyl acetate and alcohol exhibits

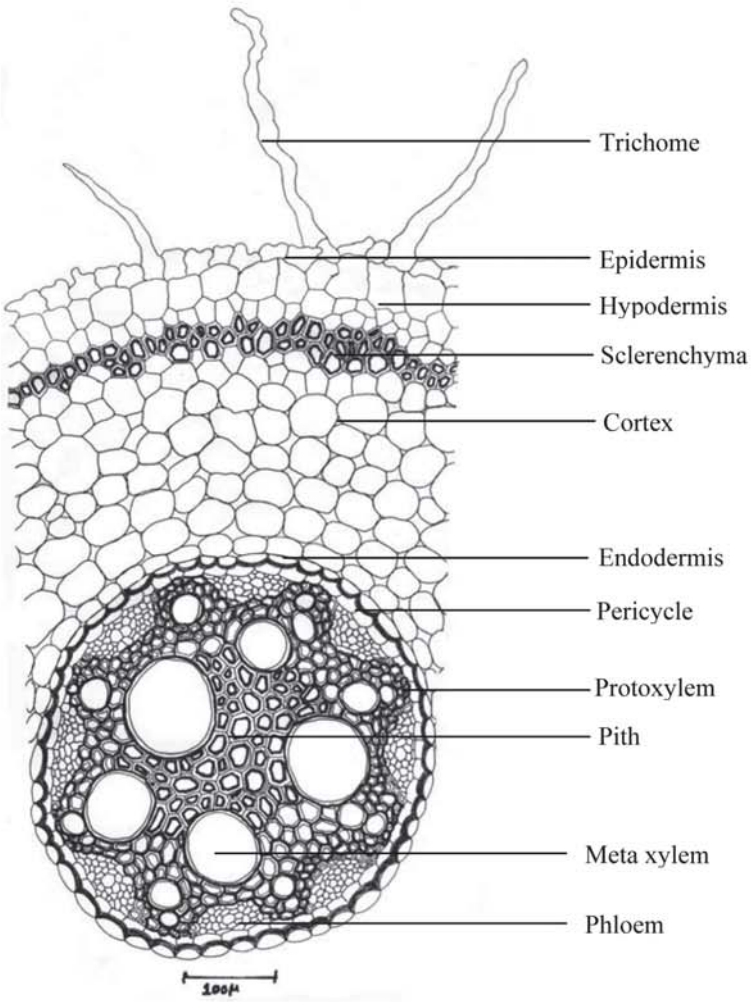
Commelina benghalensis Linn.

T. S. of Root

A Diagrammatic Sketch



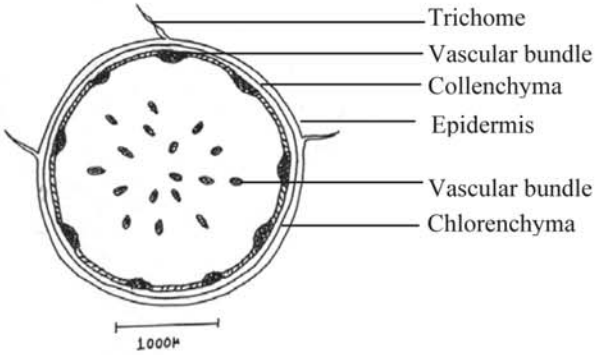
T.S. of Root



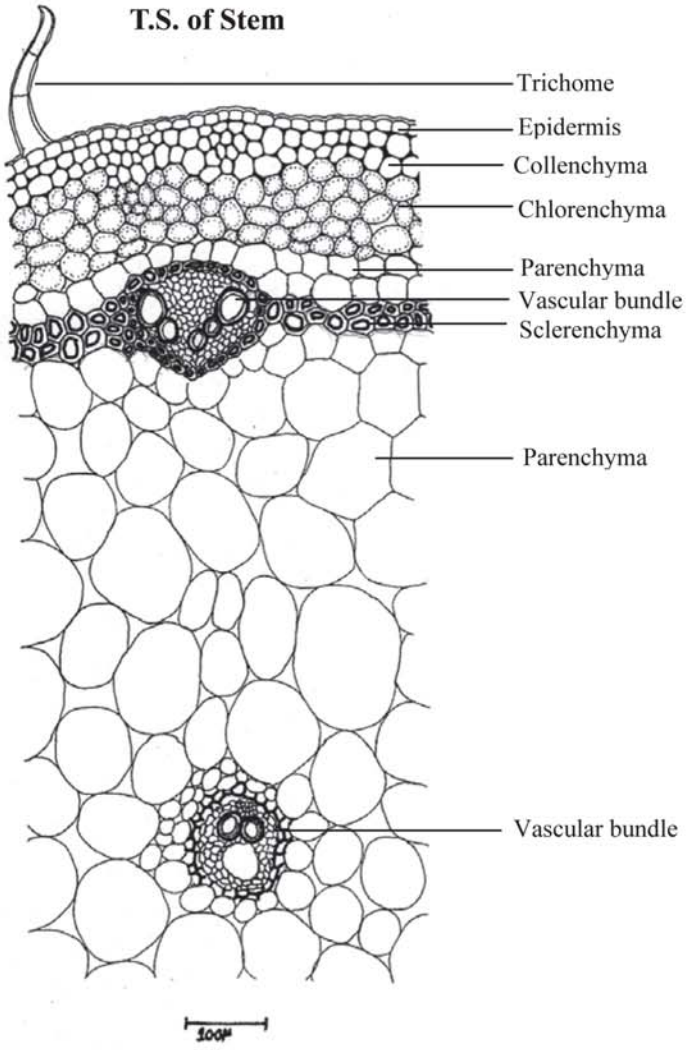
Commelina benghalensis Linn.

T. S. of Stem

A Diagrammatic Sketch



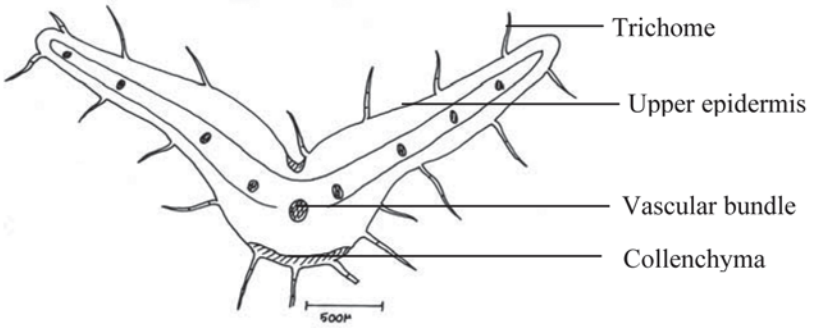
T.S. of Stem



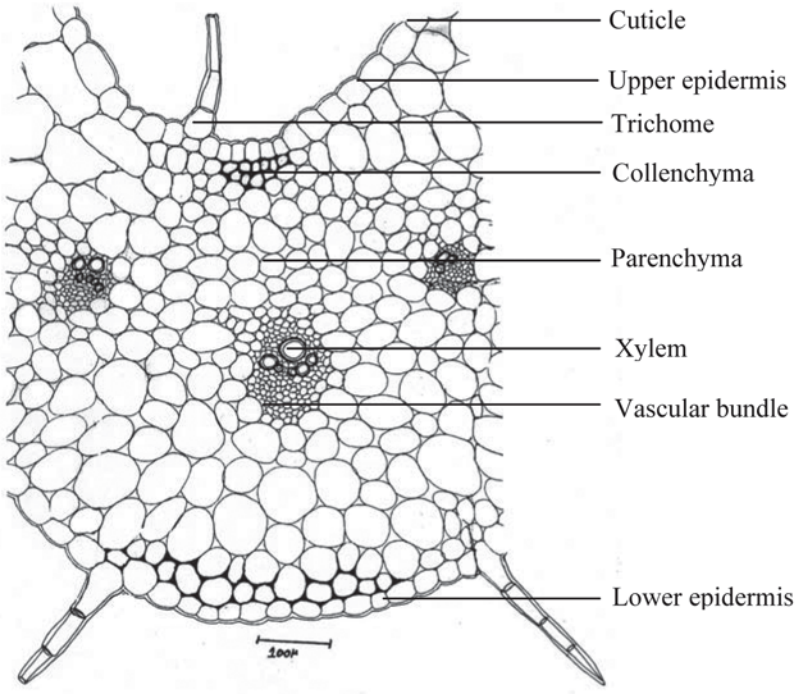
Commelina benghalensis Linn.

T. S. of Petiole

A Diagrammatic Sketch



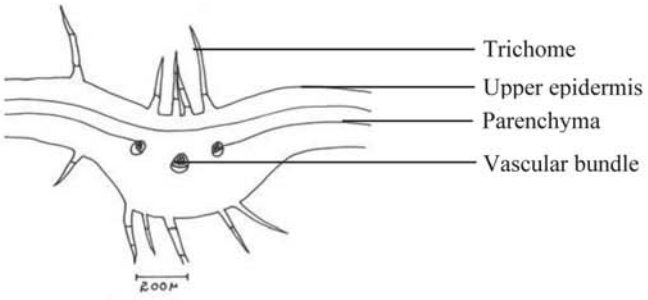
T. S. of Petiole



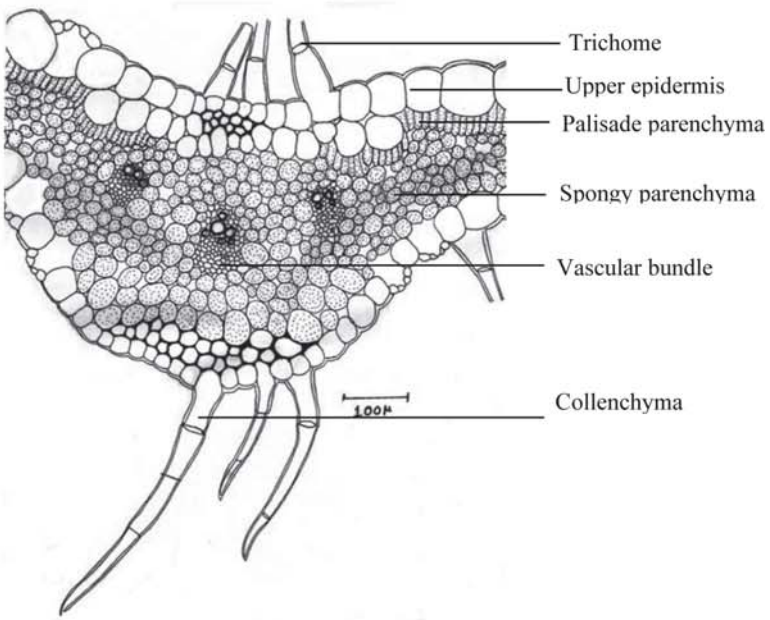
Commelina benghalensis Linn.

T. S. of Leaf

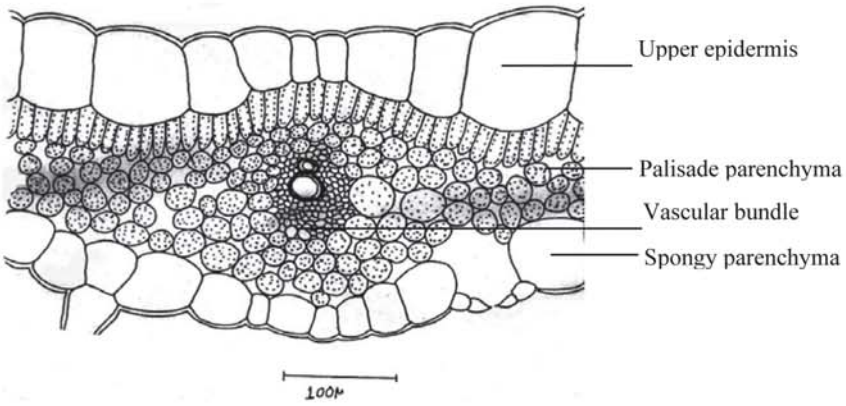
A Diagrammatic Sketch



T.S. of Leaf through Midrib

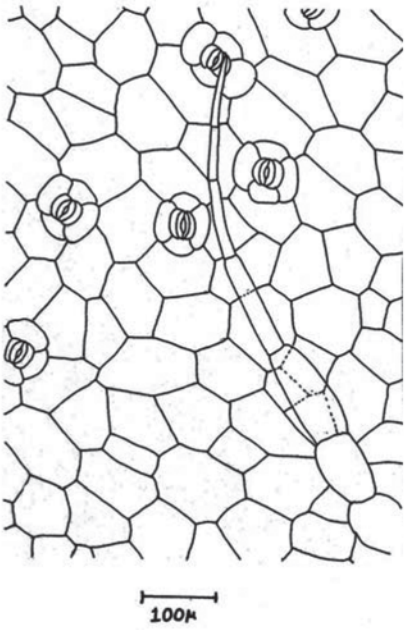


T.S. of Leaf through Lamina

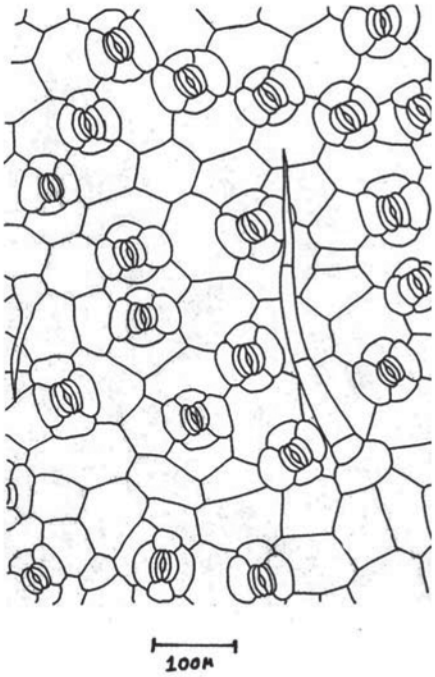


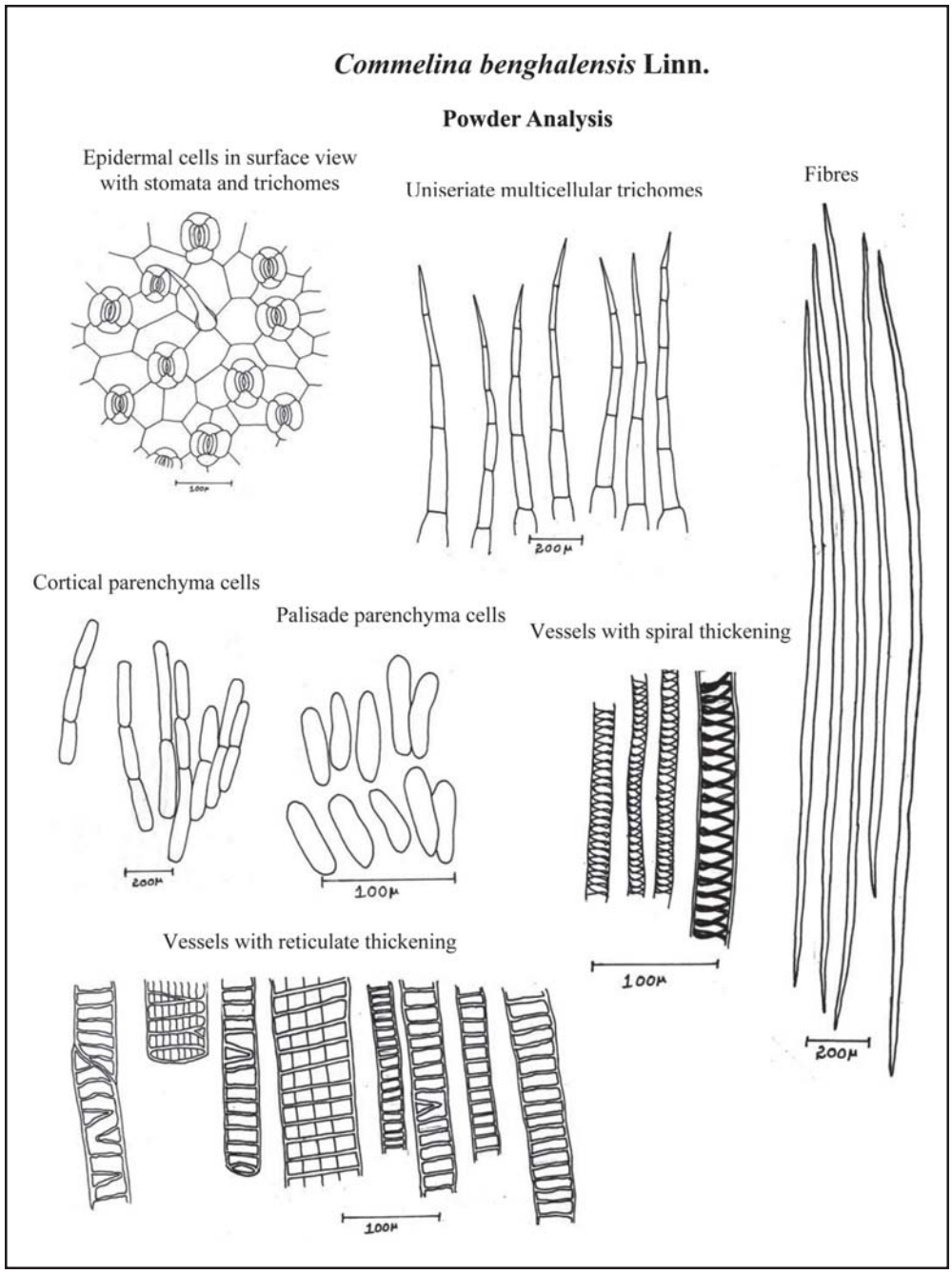
Commelina benghalensis Linn.

Upper Epidermis



Lower Epidermis





specific colour reactions when mixed with different reagents, thereby indicating the presence or absence of certain phytochemicals in the drug. These data will be much helpful to identify the purity of the drug.

Acknowledgement

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Adulterants and Substitutes of Herbal Drugs Used in Unani System of Medicine – A Review

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Abstract

The medicinal plants constitute an effective source of Unani systems of medicines and have played a key role in human health in this country. Due to recent popularity of herbal medicine the demand for medicinal plants/herbal drugs have rise significantly worldwide and it resulted into adulteration and substitution of medicinal plant/herbal drugs. Consequently, the safety and efficacy of herbal medicines have also degraded significantly and it become an important issue for the quality assurance of medicine of herbal origin. Thus, the correct botanical identification of the herbal drugs is utmost necessity for assuring the safety and efficacy of the herbal preparations. This communication provide comprehensive data on adulterants and substitutes of medicinal plants used in Unani System of Medicine which can be a useful guide for researchers and quality control personals in selecting the correct botanical source of a particular herbal drug.

Key Words: Unani medicines, Adulterants and substitutes, Botanical identification Pharmacognostic identification.

Introduction

Plants have been used since ancient times as medicines for the treatment of a range of diseases. In spite of the great advances observed in modern medicine in recent decades, plants still make an important contribution to human health care. The medicinal plants constitute an effective source of Unani systems of medicine and have played a key role in human health. In fact today, approximately 70% of "synthetic" medicines are derived from plants. In India, about 80% of the rural population depends on medicinal herbs and/or indigenous systems of medicine. In recent years, however, the popularity of herbal medicine worldwide and increasing demand of medicinal plants/herbal drugs has led to adulteration and substitution of medicinal plant/herbal drugs. Consequently, the safety and efficacy of these medicines have degraded significantly and become an important issue for the health professionals.

Herbal adulteration is one of the common malpractices in herbal raw material trade. Adulteration is an intentional substitution with another plant species or intentional addition of a foreign substance to increase the weight or potency of the product or to decrease its cost. In general, adulteration is considered as an intentional practice. However, unintentional adulterations also exist in herbal raw material trade due to various reasons. Owing to collection of herbal drugs by unskilled workers from natural habitats lead to unintentional adulteration. India has a number of vernacular languages in different regions and hence, this causes a lot of confusion in the identity of the drug viz. *Eclipta alba* Hassk. known as 'Bhangra' in Unani system of medicine is substituted or adulterarted with *Wedelia calendulacea* Less. due to identical vernacular names for both the plants beside common morphological features. Hence, adulteration or substitution of the genuine raw material is the main cause

of degradation of the desired therapeutic effect of a particular drug used in Unani System of Medicine. Therefore, the correct taxonomic identification of botanical drugs is necessary for their quality, safety and efficacy. This communication is comprehensive reviewed information on adulterants and substitutes of medicinal plants used in Unani System of Medicine (Table 1) with the scope that the data can be useful guide for identifying the correct botanical source of a particular herbal drug.

Conclusion

Due to growing human population and increasing interest in herbal medicines, the demand for medicinal plants has rise significantly in recent years and it has led to overexploitation of medicinal plants from the natural habitats and many of the medicinal plants become endangered and rare in wild. Consequently, to meet the increasing demand of pharmaceutical industries and medical practitioners, the adulteration and substitution of herbal drugs also increased significantly. Since, the pharmaceutical industries and herbal practitioners depend largely upon crude drug markets for the supply of raw plant materials, the safety and efficacy of the herbal medicines is therefore also degraded considerably.

Though, in recent years, a great emphasis has been given to validate the pharmacological effects of the herbal drugs used in Unani systems of medicine for various ailments, a least attention given to their botanical authentication. The herbal drugs generally collected by the unskilled collectors who may not be a botanist or taxonomist and sometime purchased from market, are based on the trade or vernacular names and taken granted without subjecting the plant material for stringent method of botanical identification. Hence, the correct taxonomic identification and botanical source of many herbal drugs still remain ambiguous. Thus, the botanical authentication of plant material taken up for research or medicinal use is utmost necessary to achieve satisfactory results and also to maintain efficacy and therapeutic property of the herbal preparation.

The botanical authentication of herbal drugs is achieved by employing taxonomical and pharmacognostical techniques. Taxonomical identification is restricted to morphological characters of plant species and needs specimen having floral components. Since herbal drugs are derived from different morphological parts viz. whole plant, stem, root, barks (stem and root), rhizome, leaf, flowers, fruit etc., pharmacognostical approach is employed for authentication of herbal drugs. Quality standards for herbal drugs used in unani medicine are available in Unani Pharmacopoeias (Anonymous 1998b; 2007a,b,c; 2008d) and other publications (Anonymous 1981, 1999, 2001b, 2002c and Anonymous 2003; 2005b,c; 2006; 2008a,b,c). This communication provides a comprehensive data on the adulterant and substitutes of herbal drugs of Unani System of Medicines and it is hoped that the information will be useful for researchers and quality control professional in selecting a herbal drug from correct botanical source.

Table-1. Adulterants and Substitutes of Herbal Drugs Used in Unani Systems of Medicine.

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
1.	*Abrus precatorius*	Ghongchi	–	UPI - IV	–	*Glycyrrhiza glabra*	Anonymous 2000a
2.	*Achyranthes aspera*	Chirchita	–	UPI - IV	–	*Achyranthes bidentata* *Cyathula prostrata*	Anonymous 2002c
3.	*Aconitum chasmanthum*	Beesh	–	UPI - IV	*A.balfourii,* *A. falconeri* *A. deinorrhizum,* *Delphinium denudatum*	*A. balfourii,* *A. palmatum,* *A. deinorrhizum,* *A. ferox,* *A. laciniatum,* *A. luridum,* *A.spicatum*	Anonymous 2000b; Chopra *et al.,* 1958; Kirtikar and Basu, 1933; Mehra and Puri, 1967; Mukerji, 1953
4.	*Aconitum heterophyllum*	Atees	NFUM-I: 27	UPI - I	*Asparagus racemosus,* *A. gonocladus,* *A. palmatum,* *Delphinium denudatum,* *Chaerophyllum villosum*	*Aconitum kashmericum,* *A. spicatum*	Anonymous 2002c; Anonymous 2005a
5.	*Acorus calamus*	Waj Turki	NFUM-I: 329	UPI - V	*Alpinia officinarum* *Alpinia galangal*	–	Anonymous 2000a
6.	*Aegle marmelos*	Belgiri	NFUM-I: 57	UPI - I	–	*Feronia limonia* *Garcinia mangostana*	Anonymous 2000a

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
7.	*Alangium salvifolium*	Ankol	–	UPI - V	–	*Alangium salvifolium*	Anonymous 2005a
8.	*Allium sativum*	Seer	NFUM-I: 289	UPI - V	–	*Allium porrum*	Anonymous 2004
9.	*Aloe barbadenis*	Sibr	NFUM-I: 298	UPI - I	*Acacia catechu*	–	Anonymous 2000a
10.	*Amomum subulatum*	Heel Kalan	NFUM-I: 117	UPI - IV	*Heracleum rigens Peucedanum grande A. subulatum*	*Amomum dealbatum*	Anonymous 2000a
11.	*Areca catechu*	Fufal	NFUM-I: 89	UPI - I	*A. calisa, A. concinna, A. laxa, A. nagensis, A. triandra, Bombax ceiba, Caryota urens, Ipomoea batata, Metroxylon sagu, Phoenix dactylifera*	*A. calisa, A. concinna, A. laxa, A. nagensis, A. triandra. Actinorhytis calapparia, Artocarpus lakoocha, Calamus erectus, Choreospondias axillaris, Dendrophothoe falcate, Gnetum montanum, Heterospathe elata, Horsfieldia kingie, Pinanga dicksonii, Santalus album.*	Anonymous 2002a

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
12.	*Aristolochia indica*	Zarawand Hindi	–	UPI - V	–	*A. bracteata, A. tagala A. serpentaria*	Anonymous 2001a
13.	*Azadirachta indica*	Neem	NFUM-I: 237	UPI- II, III, IV, V	*Melia azadirach*	–	Garg, 1992
14.	*Bacopa monnieri*	Jal brahmi	–	UPI- IV	–	*Centella asiatica*	Anonymous 2000a
15.	*Berberis aristata*	Rasaut, Darhald	NFUM-I: 262	UPI- II, IV	–	*Curcuma longa, Berberis lyceum, Cossinium fenestratum*	Anonymous 2000a
16.	*Brassica campestris*	Sarson	NFUM-I: 283	UPI- V	*Argemone maxicana Eruca sativa*	*Eruca sativa*	Anonymous 2000b; Mukerji, 1953
17.	*Caesalpinia bonduc*	Karanjwa	NFUM-I: 167	UPI- V	–	*Pongamia pinnata Derris indica*	Anonymous 2000a
18.	*Calotorpis procera* sub. sp. *hamiltonii*	Aak, Gul-e-Madar, Madar	–	UPI- I, II, IV	–	*C. gigantea*	Anonymous 2001a
19.	*Carthamus tinctorius*	Qurtam	NFUM-I: 258	UPI- III	*C. lanatus, C. oxycantha*	–	Anonymous 2004

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
20.	*Carum carvi*	Zeera Siyah	NFUM-I: 341	UPI- I	*C. gracile, Bunium persicum, B. cylindricum, Cuminum cyminum, Bupleurum lenceaolatum, C. villosum, Amethum sovwa, A.graveolens. Foeniculum vulgare, Borreria articularis, Aegopodium podograria, Buplerum falcatum, Plantago exigua*	*C. gracile, Bunium persicum, B. cylindricum, Cuminum cyminum, Bupleurum lenceaolatum C. villosum, Amethum sovwa, A. graveolens. Foeniculum vulgare, Borreria articularis, Aegopodium podograria, Buplerum falcatum, Plantago exigua*	Anonymous 2004
21.	*Cassia fistula*	Khiyar Shambar	NFUM-I: 12	UPI- I	–	*C. grandis*	Anonymous 2001a
22.	*Cassia tora*	Panwar	–	UPI- II	–	*C. occidentalis*	Anonymous 2001a
23.	*Celastrus paniculatus*	Malkangni	NFUM-I: 207	UPI- IV	–	Clove oil	Anonymous 2001a
24.	*Cinnamomum tamala*	Sazaf Hindi	NFUM-I: 287	UPI- I	*C. bejolghota*	–	Anonymous 2004

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
25.	*Citrullus colocynthis*	Hanzal	NFUM-I: 115	UPI- II, IV	*Cucumis callosus* *C. pseudocolocynthis* *C. hardwickii* *C. prophetarum* *Trichosanthes palmata*	–	Anonymous 2005a
26.	*Commiphora wightii*	Muqil	NFUM-I: 222	UPI- I	*Boswellia serrata* *C. roxburghii*	–	Anonymous 2001a
27.	*Croton tiglium*	Hab-us-Salateen	NFUM-I: 111	UPI- IV	*Baliospermum montanum* *Croton oblongifolius*	*Baliospermum montanum Croton oblongifolius*	Anonymous 2000b; Dey and Rai Bahadur, 1984; Garg, 1992
28.	*Cymbopogon martini*	Izkhar	–	UPI- V	*Pelargonium sp.*	*C. schoenanthus* *Aeollanthus myrianthus*	Anonymous 2001a
29.	*Datura metel*	Dhatura	–	UPI- IV	–	*D. stramonium*	Anonymous 2001a
30.	*Dalbergia sissoo*	Sheesham	NFUM-I: 295	UPI- V	–	*D. latifolia*	Anonymous 2001a
31.	*Eclipta alba*	Bhangra	NFUM-I: 59	UPI- IV	–	*Wedelia chinensis* *W. calendulaceae*	Anonymous 2001a

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
32.	*Elettaria cardamomum*	Heel Khurd	NFUM-I: 118	UPI- I	*E. cardamomum* var. *major, Amomum kepulaga, A. korarima, A. aromaticum, A. xanthioides*	*Amomum subulatum*	Anonymous 2002b
33.	*Embelia ribes*	Baobarang	NFUM-I: 142	UPI- I	*Embelia tsjeriam-cottam*	*Myrsine africana*	Anonymous 2002b
34.	*Fagonia cretica*	Dhamaya	NFUM-I: 79	UPI- V	–	*Fagonio cretica, Alhagi pseudalhagi*	Anonymous 2001a
35.	*Ferula assa-foetida*	Hilteet	NFUM-I: 120	UPI- I	–	*Ferrula alliacea F. persica F. joeschkeana F. rubricaulis F. galbanifula F. narthex F. szowtzianaoe*	Anonymous 2000b; Guha Bakshi et al., 2001; Mukerji, 1953
36.	*Foeniculum vulgare*	Badiyan	NFUM-I: 32	UPI- I	*Echinochloa crus-galli, Illicium griffithii*	*Illicium griffithii*	Anonymous 2005a
37.	*Glycyrrhiza glabra*	Asl-us-soos	NFUM-I: 26	UPI- I	*G. uralensis Abrus precatorius*	–	Anonymous 2001b

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
38.	*Gymnema sylvestre*	Gurmar buti	NFUM-I: 104	UPI- II	*Helictaris isora Dolichandrone falcata*	*Gymnema hirsutum G. montanum*	Anonymous 2005a
39.	*Hyoscyamus niger*	Ajawain Khurasani	NFUM-I: 47	UPI- V	*Hyoscyamus muticus, H. reticulates, Althea officinalis, Hyoscyamus squarrous, Hyoscyamus albus, Taraxacum officinale*	*Cleome viscosa, Althea officinalis, Hyoscyamus squarrous, Hyoscyamus albus, Taraxacum officinale*	Anonymous 2005a
40.	*Jasminum officinale.* var. *grandiflorum*	Chanbeli	NFUM-I: 68	UPI- IV	–	*Jasminum sps.*	Anonymous 2001b
41.	*Juniperus communis*	Abhal	NFUM-I: 4	UPI- IV	*Tamarix gallica, Flueggea leucopyrus, J. macropoda, J. oxyeedrus*	*J. macropoda*	Pruhti, 1976; Watt, 1972
42.	*Lawsonia inermis*	Hina	NFUM-I: 121	UPI- II	*Oryza sativa, Cajanus cajan, Vigna mungo*	–	Anonymous 2000a
43.	*Mallotus philippensis*	Kamila	NFUM-I: 160	UPI- I	*Bixa orellana, Carthamus tinctorius, Caseria tomentosa, Ficus bengalensis, Flemingia macrophylla*	*Carthamus tinctorius, Caseria tomentosa, Ficus bengalensis, Flemingia macrophylla*	Anonymous 2002b

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
44.	*Melia azardirach*	Bakayin	NFUM-I: 35	UPI- III	–	*Azadirachta indica*	Anonymous 2001a
45.	*Mesua ferrea*	Narmushk	NFUM-I: 235	UPI- IV	*Mammea suriga, Calophyllum inophyllum*	*Calphyllum inophylum, Cinnamomum wightii, Ochrocarpus longifolius, Cinnamomum tamala, C. wightii, Dillenia pentagyna*	Anonymous 2000a
46.	*Mucuna pruriens*	Konch	–	UPI- II	–	*Mucuna utilis*	Anonymous 2000a
47.	*Myrica esculenta*	Kaifal	NFUM-I:154	UPI- II, IV	–	*Carreya arborea*	Singh and Chunekar, 1972
48.	*Myristica fragrans*	Jauzbuwa	NFUM-I: 141	UPI- I	*Myristica malabarica*	–	Anonymous 2002a
49.	*Nardpstachys grandiflora*	Sumbul-ut-teeb	NFUM-I: 303	UPI- I	*Selinum vaginatum, Selinum tenuifolium*	*Cymbopogan sehoenanthus Nymphoides macrosperma*	Anonymous 2005a Warrier *et al.* 1994
50.	*Nerium indicum*	Kaner	NFUM-I: 162	UPI- I, IV	–	*Nerium indicum, Thevetia neriifoila*	Anonymous 2001a

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
51.	*Nigella sativa*	Kalonji	NFUM-I: 159	UPI- I	*Allium cepa*	–	Anonymous 2004
52.	*Ocimum sancntum*	Rehan	NFUM-I: 261	UPI- V	*Ocimum sp.*	–	Anonymous 2001a
53.	*Operculina turpethum*	Turbud	NFUM-I: 318	UPI-V	–	*Marsdenia tenacissima, Argyreia speciosa*	Anonymous 2000a
54.	*Papaver somniferum*	Khashkhaash	NFUM-I: 184	UPI- II	*Euphorbia royleana, Hypecoum procumbens, Maduca longifolia, Scoparia dulcis Sophora japonica*	*Lactuca indica, Saussurea lappa, Scoparia dulcis, Sterculia alata, Mitragyna speciosa*	Anonymous 1996; Anonymous 2000b; Garg, 1992
55.	*Picrorrhiza kurroa*	Kutki	NFUM-I: 198	UPI- IV	*Latotis cashmiriana*	*Gentiana Kurroo, Helleborus niger, Picrorrhiza scophularia, Actaea spicata, Cincifuga foetida, Coptis teeta, Coscinium famestratum, Swertia chirata*	Anonymous 2005a
56.	*Pinus roxburghii*	Sanobar	NFUM-I: 279	UPI- V	–	*P. wallichiana*	Anonymous 2004

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
57.	*Piper cubeba*	Kababchini	NFUM-I: 145	UPI- I	*Piper ribesiodes, P. sumatrana, P. crassipes P. cannum, P. baccatum, P. clusii, P. guineense, Litsea cubeba, Pericampylus glaucus, Schinus molle, Embelia ribes*	*Piper ribesiodes, P. sumatrana, P. crassipes, P. cannum, P. baccatum, P. clusii, P. guineense Litsea cubeba, Pericampylus glaucus, Schinus molle, Vitex altissima, Embelia ribes*	Anonymous 1969; Anonymous 1998; Anonymous 2000b; Garg, 1992
58.	*Piper nigrum*	Filfil Siyah	NFUM-I: 87	UPI- IV	*Aframomum melegueta, Lantana camera, Polygonum amphibium, Seshnus molle, Vitex agnuscastus, Vitex altisimma, Carica papaya*	–	Anonymous 2002b
59.	*Plantago ovata*	Aspaghol	NFUM-I: 25	UPI- II	*P. major, P. media*	*P. major, P. lanceolata, P. arenaria, P. psyllium, Salvia aegyptica*	Anonymous 2005a
60.	*Plumbago zeylanica*	Sheetraj	NFUM-I: 297	UPI- I	–	*Plumbago indica*	Anonymous 2000a
61.	*Portulaca oleracea*	Khurfa	NFUM-I: 190	UPI- IV	–	*Portulaca oleracea, P. quadrifolia*	Anonymous 2001b

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
62.	*Psoralea corylifolia*	Babchi	NFUM-I: 29	UPI- I	–	*Cassia tora*	Anonymous 2001a
63.	*Pterocarpus santalinus*	Sandal Surkh	NFUM-I: 276	UPI- V	–	*Adenanthera pavonina*	Anonymous 2005a
64.	*Rauvolfia serpentina*	Asrol	NFUM-II: 23	UPI- V	*R. cansencens, R. densiflora, R. parakensis, R. micrantha, R. beddomei, Ophiorhiza mungos*	*R. cansencens, R. densiflora, R. parakensis, R. micrantha, R. beddomei, Ophiorhiza mungos, R. vomitoria*	Anonymous 2005a; Datta and Mukerji, 1949; Iyenger and Nayak, 2001
65.	*Saussurea lappa*	Qust	–	UPI- I	*Saussurea hypoleuca, Inula royleana, I. racemosa, I. grandiflora, Euphorbia thomsoniana, Salvia lanata, S. ligularia, Aconitum heterophyllum, Senecio jaquemontianus, Costus speciosus, Arctium lappa, Kyllinga triceps*	–	Anonymous 2005a Ojha *et al.*, 1993; Singh *et al.*, 1981

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
66.	*Strychnos nux-vomica*	Azaraqi	NFUM-I: 28	UPI- II	*S. potatorum, S. nux-blenta*	–	Anonymous 2002b
67.	*Swertia chirata*	Chiraita	NFUM-I: 71	UPI- I	*Swertia alata, S. angustifolia, S. bimaculata, S. ciliata, S. densiflora, S. lawii, S. minor, S. paniculata, Rubia cordifolia, Andrographis paniculata, Clerodendrum infortunatum, Nymphoides cristata*	*S. purpuranscence, S. decussate, S. chinensis, S. paniculata, S. perennis, S. corymbosa, S. affinis Exacum bicolor, E. pendunculatum, E. tetragonum, Erthraea roxburghii, Enicostemma littorala, Canscora decussata, C. diffusa, Centaurium meyeri, Gentiana argenta, G. pedicellata, Jaeschkea oligosperma, Rubia cordifolia, Andrographis paniculata, Clerodendrum infortunatum, Nymphoides cristata*	Anonymous 1976; Anonymous 2005a; Prashad *et al.* 1960

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
68.	*Symplocos racemosa*	Lodh Pathani	NFUM-I: 201	UPI- I	*S. laurina, S. paniculata, S. sumunita*	–	Anonymous 2002b
69.	*Syzygium aromaticum*	Qaranful	NFUM-I: 254	UPI- I	Exhausted material	–	Iyenger, 2001
70.	*Terminalia belerica*	Balela	NFUM-I: 38	UPI- I	*T. arjuna*	*T. chebulla*	Anonymous 2001b
71.	*Terminalia chebula*	Halela Zard	NFUM-I: 113	UPI- I	*T. citrina*	–	Anonymous 2001b
72.	*Tinospora cordifolia*	Gilo	NFUM-I: 97	UPI- I	*T.sinensis,T. cripsa*	*T. sinensis,T. cripsa*	Anonymous 2001b
73.	*Tribulus terrestris*	Khar-e-Khasak Khurd	NFUM-I: 178	UPI- I	*Pdealium murex*	*Acanthospermum hispidum*	Anonymous 2001b
74.	*Valeriana wallichii*	Tagar	NFUM-I: 306	UPI- I	*Veratum album*	*Nymphoides macrospermum, Nardostachys jatamansi, Valeriana hardwikii, V. officinalis, V. leschenaultia, V. pyrolaefolia*	Agarwal, 1997; Garg, 1992; Mukerji, 1953; Wallis, 1967

Sr. No.	Botanical Name	Drug Name	Formulary Reference	Pharmacopoeial Standard	Adulterant	Substitute	Reference
75.	*Vetiveria zizanioides*	Khas	NFUM-I: 183	UPI- IV	–	*Coleus vettiveroides*	Anonymous 2002b
76.	*Vitex negundo*	Sambhalu	NFUM-I: 273	UPI- III, V	–	*V. trifolia*	Anonymous 2001b
77.	*Withania somnifera*	Asgand	NFUM-I: 24	UPI- I	–	*Lilium polyphyllum, Withania coagulans*	Anonymous 1976; Anonymous 2001b
78.	*Zingiber officinale*	Adrak, Zanjabeel	NFUM-I: 6, 333	UPI- I, IV	*Z. mioga, Z. zerumbet*	*Z. casummar*	Anonymous 2002b

Abbreviations: NFUM – National Formulary of Unani Medicines, UPI – The Unani Pharmacopoeia of India

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Ethnobotanical Survey of Anantapur Forest Division and Nallamalla Forest Range of Andhra Pradesh

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Abstract

Based on an ethnopharmacological survey of Anantapur Forest Division and Nallamalla Forest ranges of Andhra Pradesh conducted during July, 2009, the paper presents some 45 contemporary folk recipes comprising 45 taxa of folk medicinal plants used by various tribes e.g. Koyas, Chenchus and Telaga agriculturist etc. 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. And, there is a need for pharmacological studies and clinical trials on the said folk medicines which can be used for the benefit of ailing humanity after investigations on their medical efficacy & safety.

Key Words: Tribal medicine, Ananthapur & Nallamalla Forests, 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 unexplore areas particularly those unhabited by tribals and rural population. Numerous ethnopharmacoligal studies aimed at identifying new pharmaceutical products have, therefore been initiated in recent past in India 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 Anantapur forest division and Nallamalla forest ranges 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 13º-41º to 16º-15º and between East longitudes of 76º-47º and 79º. The areas explored included Ananthapur, Dharmawaram, Puttaparthi, Kadiri, Bukkapatnam, Kalyandurg, Gooty, Pendukonda, Atmakur, Durnala, Srisailam, Sunnipenta, Bairluty, Nagluty, Pacheru, Shikaram and Rolepenta. In the forests of Nallamalla range, the largest hill tribe is Chenchus which is one of the most primitive tribal group of Andhra Pradesh and are still at the food gathering and hunting stage of economy.

The study presents 45 folk medicinal species used by the tribals and other ethnic groups for various ailments among local population in the areas surveyed. The area has not been investigated exhaustively earlier in this direction except for some sporadic reports on medicinal uses of plants (Hemadri, 1987, 1988, 1991; Vijay Kumar & Pullaiah, 1998; Nagaraju & Rao, 1990; Balaji Rao *et al.,* 1995; Gupta

et. al., 1997, 2003, 2005, 2007 & 2009; VedaVathy, 1986; Kapoor & Kapoor, 1973; Khan, 1953; and Pullaiah & Yashoda, 1989).

Methodology

An ethnopharmacological Survey of Anantapur forest division and Nallamalla forest ranges was conducted during July 2009 with a view to study the medicinal herbs of the area and also record the folk wisdom of tribals known as Chenchus, Koyas and Telaga agriculturists who have since long settled in the river side of villages. The date on folk medicinal uses of plants were collected from 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 herbs 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;

Alangium salvifolium (L.F) Wang *(Alangiaceae)*; CRI 9028; Uduga Chettu; Akola; Root bark; Skin troubles; Powder of the root bark is applied for skin problems for one week.

Artocarpus heterophyllus Lam (Moraceae); CRI 9075; panasa; kathal; root; Diarrhoea; Root extract is given orally two times for 2 to 3 days.

*Bambusa arundinacea (*Retz.) Willd. (Poaceae); CRI 9095; Bongu-veduru Bans; Roots; Diabetes; Decoction of the root-powder is given for diabetes.

Borassus flabellifer L. (Arecaceae); CRI 9091; Thadi-Chettu; Tad; fruits; purgative; fruits are useful in constipation.

*Bridelia retusa (*L.) Spreng. (Euphorbiaceae); CRI 9107; Bontha-yepi kasi; leaves; Diabetes; Decoction of the leaves powder is given for diabetes, two times a day for 15-30 days.

Canavalia gladiata (Jacq) DC (Fabaceae); CRI 9016; Yerra – tamma; Bara-sem; leaves; Abdominal pain; Decoction of the leaves powder given for abdominal pain.

Caryota urens L. (Arecaceae); CRI 9101; Jelluga; Shankarjata; Toddy; Body pains; today is taken to control body pains and cooking effect.

Cassytha filiformis L.(Lauraceae); CRI 9057; Nulutega; Amarvela; whole plant; Urinary infections; decoction of the whole plant is used for urinary infections

Celosia argentea L. (Amaranthaceae); CRI 9055; Gonugu; sufaid murgha; sees; Diarrhoea; Seeds powder is mixed with water and decoction is given for diarrhoea 2-3 times a day.

Chloroxylon swietenia DC. (Rutaceae); CRI 9013; Billu; Billydu; leaves; Joint pains; leaves powder is given for joint pains.

Cocculus hirsutus (L) Diels. (Menispermaceae); CRI 9001; Dusara teega; jamti-ki-bel; leaves; Eczema; leaf juice is applied on the affected areas of eczema till cure.

Cochlospermum religiosum (L.) Alston; (Cochlospermaceae) CRI 9004; Konda-gogu; tanakku; stem bark; Bone-fractures; stem bark paste is applied over the bone fractured areas which gives good response.

Croton bonplandianum Baill. (Euphorbiaceae); CRI 9115; Kukka-tulasi; kukka-mirapa; leaves; skin diseases; leaves paste is applied externally for skin disease.

Desmodium triflorum (Retz.) Merr. (Fabaceae); CRI 9018; Tige-kranuga; Jangli-methi; leaves; diarrhoea & dysentery; leaves juice is given for diarrhoea & dysentery 2-3 times which gives a very good relief.

Diospyros melanoxylon Roxb. (Ebenaceae);CRI 9039; Tumki; Tendu; stem bark; Diarrhoea; Decoction of stem bark is given for diarrhoea.

Flacourtia indica (Burm.F) Merr. (Flacourtiaceae); CRI 9007; Mandiakodi; Talisha; leaves; Jaundice; leaves juice is given for Jaundice.

Grewia tiliaefolia Vahl. (Tiliaceae); CRI 9002; Charachi; Dhamni; Stem bark; Dysentery; Stem bark is used for dysentery.

Gmelina asiatica L. (Verbenaceae); CRI 9064; Nela-gummadu; Shriparni; roots; joint paint; decoction of the roots is given for joint pains.

Heliotropium indicum L. (Boraginaceae); CRI 9071; Nagadanthi; Hathi-sura; whole plant; skin diseases; decoction of the whole plant is given for skin disease.

*Holarrhena antidysentrica (*Roth.) DC. (Apocynaceae); CRI 9041; aakupala; indrajau – Talkh; stem bark; Diarrhoea & amoebic dysentery; powder of stem bark is used in amoebic dysentery.

Leptadenia reticulata (Retz.) Wt. Arn (Asclepiadaceae); CRI 9033; Mukku- Tummudu; Dodi; leaves; eczema & scabies; leaf past is applied on the affected areas of eczema and scabies.

Merremia tridentata (L.) Hallier.f. (Convolvulaceae); CRI 9049; Sitasevaram; prasarini; roots; urinary disorders, roots are used for urinary disorders.

Opuntia dillenii Haw. (Cactaceae); CRI 9025; Nagajemudu; nagphana; phyllode & stem bark; snake bite; paste pf phyllode & stem bark is applied on the area of snake bite.

Pergularia daemia (Forssk.) Chiou; (Asclepiadaceae); CRI 9035; Juttipaku; utarni; roots Helminthiasis; roots powder mixed in water is given for Helminthaisis.

Plumeria alba Linn. (Apocynaceae); CRI 9037; Nooru-varahalu; Gulchin; Latex; scabies; Latex is applied to treat scabies.

Premna tomentosa Willd (Verbenaceae); CRI 9061; Nagaru; Chambara; leaves; Diuretic; decoction of the leaves are given for diarrhoea and kidney problems.

Quisqualis indica Linn(Combretaceae); CRI 9020; Tige-ganneru; Rangoon-ki-bel; seeds; Helmenthiasis; seeds are used for helmentihasis.

Sansevieria roxburghiana Schult.f.(Haemodoraceae); CRI 9085; Gajukura; murva; roots; snake bite; root paste is applied at the area of snake bite.

Scoparia dulcis L. (Scrophulariaceae); CRI 9053; Goddu – tulasi; jasti madhu; leaves; dysentery; leaf paste is given orally for dysentery.

Solanum surattense burm.F. (Solanaceae); CRI 9141; Vakudu; katai- kurd; whole plant; bronchitis; decoction of the whole plant is given for bronchial asthama.

*Stachytarpheta indica(*L.) Vahl. (Verbenaceae); CRI 9143); medabalaku; uttirani; whole plant; diarrhoea and dysentery; decoction of the whole plant is given for diarrhoea and dysentery.

Sterculia urens Roxb. (Sterculiaceae); CRI 9145; Tapasi; karaya gum; gum; cooling the stomach; little gum kept for the night in a glass of water and taken on empty stomach with sugar for acidity and stomach problems.

Thespesia populnea(Linn) Soland. (Malvaceae); CRI 9123; Gangaravi; Paraspipal; seeds; skin problems; oil from seeds is used for all types of skin problems externally.

Tinospora cordifolia (Willd) Hook. F. & Thoms; (Menispermaceae); CRI 9133; Tippa-tiga gulbel; whole plant; general tonic & urinary diseases; decoction of the whole plant is given for general tonic and urinary disease.

Trianthema portulacastrum Linn. (Aizoaceae); CRI 9135; Galizeru; Bishkapra; Whole plant; Diuretic; decoction of the whole plant is given for kidney problems.

Trichodesma indicum (L.) Lehm. (Boraginaceae); CRI 9139; Guvva gutti; Chhota-kulpha; whole plant; dysentery; decoction of the root is given for dysentery.

Triumfetta rhomboidea Jacq. (Tiliaceae); CRI 9174; Marlabanda; Chitki; leaves & roots; Diarrhoea & Dysentery; decoction of the leaves & roots is used for diarrhoea & dysentery.

*Tylophora indica (*Burm.f.) Merrill. (Asclepiadaceae); CRI 9149; Mekamaeyaniaku; anantamul; leaves; asthma & joint pains; decoction of the leaves is given for Asthma and joint pains.

Urena lobata Linn. (Malvaceae); CRI 91951; Nallabanda; unga; roots; diuretic; decoction of the roots is given for kidney troubles.

Wattakaka volubilis (L) Stapf. (Asclepiadaceae); CRI 9155; Bondi guriginja; nak-chikni; leaves; skin problems; decoction of the leaves given orally for boils and skin problems.

Woodfordia fruiticosa (L.) Kurz. (Lythracaea); CRI 9023; Jaji; Gul-dhawi; flowers; menorrhagia; decoction of the flowers is given in menorrhagia.

Wrightia tinctoria R. Br. (Apocynaceae); CRI 9031; Palaankudu; indrajau-sharien; stem bark; stomach pain; a decoction of stem bark is administered during stomach pain.

Discussion

In the present study some traditional therapeutic methods employed by the natives of Anantapur forest division and Nallamalla forest ranges have been discussed. Out of 125 taxa of medicinal plants collected and identified from the study area 45 are used locally in folk medicines by local tribals and other ethnic people viz. Chenchus, erukas, koyas and Telaga agriculturist etc. for the treatment of various common ailments; including cough & cold, fever, diarrhoea and dysentery, ulcers, skin diseases, cardiac troubles and rheumatic arthritis.

From the enumeration it is clear that tribals of Anantapur forest division and Nallamalla forest ranges 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 & Venkat Ratnam, 2009).

Pharmaceutical researchers acknowledge that screening plants on the basis of information derived from traditional knowledge saves billion dollars in time and resources (Hafeel and Shanker, 1999). 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 ethno-botanical knowledge in Iban community in Sarawak Malaysia (Jarvie and Perumal, 1994) and Rajitribal community of Central Himalaya, India (Negi *et al.,* 2002.)

The data on folk medicinal uses have been compared with recent available literature. (Anonymous, 1948-1976; Anonymous 1987; 1992, 1997; Hussain *et al.,* 1992; Jain *et al.,* 1991; Rastogi and Mehrotra 1996-1998; Chetty & Rao 1989; Hemadari 1987,

Abelmoschus moschatus Linn. (Kasturi Bhenda)

Huts of the shelter of tribals of Pacheru Village.

Nymphaea alba Linn. (Nilofar)

Costus speciosus (Koenig) Sm. (Pushkarmula)

Tribals in Nallamalla forests and their habitat.

Fig. 1. Some folk medicinal plants from the study area.

1988, 1991; Vijaykumar & Pullaiah, 1998; Nagaraju & Rao, 1990; Balaji Rao *et al.,* 1995; Gupta *et al.,* 1997, 2005, 2007, 2008 & 2009; Suryanarayana 1996; Shaik Imam *et al.,* 2007; Hussain *et al.,* 2000 and Vedavathy, 1986) 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.

The collection, identification and documentation of ethno-medicinal data on biological resources are inevitable steps for bioprospecting. These plants may serve as source of some important medicine against some major diseases. Therefore, these tribal claims should be further validated scientifically.

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