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CENTRAL COUNCIL FOR RESEARCH IN UNANI MEDICINE
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Editorial

It is my privilege to be associated with the Central Council for Research in Unani Medicine (CCRUM) as its Director General. The CCRUM is the apex government organization established for fostering research and development in Unani Medicine. Since it came into being in 1978, the CCRUM has been busy in creating scientific evidences for this age-old system which has been treating and caring the mankind in a larger part of the world including India. Through its endeavors in the area of clinical research, preclinical research, survey and cultivation of medicinal plants, drug standardization and literary research, the CCRUM has been truly successful in increasing the system's acceptability among the modern and scientific society of the world, promoting its global visibility and developing viable solutions for health problems of the people.

Patents and publications are the end products of research activities. They are, in fact, the most important key performance indicators (KPIs) of any institution engaged in research and development activities. The CCRUM has been granted 15 patents for developing certain novel and therapeutic compositions prepared from commonly available herbal and mineral origin drugs providing effective treatment for diseases like Bronchial Asthma, Rheumatoid Arthritis, Constipation and Coryza. Some of the patents have been granted for developing SCAR primers which can be used to authenticate or confirm the presence of genuine and adulterant in the drug mixture. It is pertinent to note here that five of them have been granted in the current year only.

As far as publication is concerned, the CCRUM has been able to produce significant number of research publications and reproduce classical literature of Unani Medicine. The outcomes of literary research program have been commendable which can be seen in the forms of translation of voluminous Arabic and Persian books and development of literature for today's needs.

The Hippocratic Journal of Unani Medicine is a peer-reviewed quarterly journal of the CCRUM. In an effort to bring out the research outcomes to the scientific community, this journal came into being as a half-yearly in 2006. Due to overwhelming success and support from the scientific fraternity, it was made quarterly in 2008 and since then it has been published regularly as a quarterly. HJUM covers papers on clinical research on single and compound Unani drugs, validation of regimen therapy, experimental pharmacological studies, standardization of single and compound drugs, development of standard operating procedures, ethnobotanical studies 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, lifestyle disorders, sports medicine, etc. and other newer areas which are the outcome of modern day living.

In the days to come, we would strive to improve the quality of this journal, enhance its reach and make it easily accessible for researchers, academicians, students and general public. Efforts are on to bring out both electronic and print versions of this journal and adopt new technologies in order to adapt to the changing demands and mentality of readers.

I hope that the papers included in this issue would be welcomed by the scientists and readers. I sincerely thank the experts who scientifically scrutinized the papers and appreciate the authors who have contributed their papers. It would be encouraging and supporting us if we continue to get papers from the scientists, academicians and scholars from AYUSH as well as from allied disciplines for publication in this journal. I am also open to valuable ideas and feedback for its quality enhancement.

New Delhi
October 25, 2018

Prof. Asim Ali Khan
(Editor-in-Chief)

Contents

Evaluation of Anti-arthritic and Analgesic Effect of Unani Formulation Qurs-e-Mafasil Jadeed: A Pre-clinical Study

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Abstract

This study has been conducted to find out anti-arthritic and analgesic activity of Qurs-e-Mafasil Jadeed containing *Colchicun luteum, Curcuma longa* and gum of *Acacia Arabica*. In this study 2% aqueous suspension of qurs/tablet powder in gum acacia was used to determine its anti-arthritic and analgesic activity by Freund's adjuvant arthritis test, Eddy's hot plate test and Analgesiometer test. Efficacy of this Unani formulation was compared with standard referent drug, Diclofenac sodium. The findings of this study as per Freund's adjuvant arthritis test, the lower, medium and higher doses of Aq. susp. of the test formulation were found to decrease the hind paw volume and ankle joint thickness significantly ($p<0.01$) as compared to the control group. Therefore, the study shows that all the three doses of aq. susp. of the test formulation possess a significant anti-arthritic activity. In Eddy's hot-plate test and Analgesiometer test, the demonstration of a striking increase in reaction time shows that all the doses of compound formulation possess a good analgesic activity.

Keywords: *Acacia Arabica,* Analgesic Activity, Anti-arthritic Activity, *Colchicum Luteum*, *Curcuma Longa*, *Qurs-e-Mafasil Jadeed.*

Introduction

Arthritis is creating a serious health crisis that affects millions of people of all ages, genders, races and ethnic groups – and it's growing. In India Arthritis affects 15% people i.e. over 180 million people in India. This prevalence is higher than many well known diseases such as diabetes, AIDS and cancer. WHO estimates that 4 billion people all over the world use herbal medicine. The discovery of medicinal benefit of vegetable extract leads to the isolation of active principle and its subsequent chemical characterization (Shetty, et al., 2008). Despite the potential of the plants to provide us with useful pharmaceutical agents, the field is still poorly studied. Only an estimated 5-10 % of the approximately 3-5 lakh plant species world-wide have been screened for one or more bioactivities (Mpala, et al., 2010). The Unani System of Medicine, an Indian variant of Greco-Arabic system is being practised in India for centuries; not only its simple medicaments but also the poly-pharmaceutical preparations have great significance in the treatment of Arthritis. There are many pharmacopoeial and non-pharmacopoeial preparations which produce significant anti-inflammatory, analgesic and anti-arthritic activity but yet to be scientifically studied. So there is a need to standardize physico-chemically and pharmacologically those formulations which have particular effect on diseases. Therefore, in the present study, pharmacological characteristics of a Unani compound formulation Qurs-e-Mafasil Jadeed (QMJ) mentioned in "Qarabadeen-e-Majeedi" (Anonymous, 1986) was investigated on the parameters

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of Anti-arthritic and Analgesic activity. According to the "*Qarabadeen-e-Majeedi*" the QMJ contains (i) Haldi (*Curcuma longa* Linn., Dried Rhizome- 25 g), (ii) Colchicum (*Colchicum luteum Baker*, Dried Corm- 25 g) and (iii) *Samagh-e-Arabi/Gum acacia* (*Acacia arabica* Linn., Dried Fine powder- 5 g). Gum acacia powder of S. d. Fine Chemical Ltd. was used. Two ingredients *Suranjan* and *Haldi* possess anti-inflammatory and anti-arthritic properties; *Samagh-e-Arabi/ Gum acacia* possesses qabiz and demulcent property. Suranjan has purgative (*Mushil-e-Balgham*) property also and many more actions are attributed to these drugs (Avicenna, 1998; Chopra et al;. 1958; Ghani, et al.; 2005; Hakim, 2002)

Material and Methods

Collection of Plant Material

The raw materials were purchased from the local market of Aligarh and the samples were authenticated in Pharmacognosy section of the Department of Ilmul Advia, Faculty of Unani Medicine, AMU, Aligarh and found within the range of standards as mentioned in the API, 1999, 2001 and UPI, 2007 (Anonymous, 2007; Anonymous, 1999; Anonymous, 2001). The two ingredients of the formulation Suranjan talkh and Haldi were powdered in an electric grinder and Samagh-e-Arabi/Gum acacia is used as powder (S.D.Fine Chemical Ltd). All the three ingredients were mixed together in order to make Lubdi (dough). The mixture was dried in shed and then powdered in a mortar. This powdered material in the requisite degree of finesse mixed and damped with a moistening agent (purified water) in sufficient quantity (Q. S). The moistened material was made into granules by passing through a sieve (12 No.). In this formulation some excipients like Sang-e-Jarahat and Magnesium sulphate in fine powdered form and Liquid paraffin in minute quantities (0.25-0.50 % w/w) were mixed in granules before passing it to the dye of tablet making machine for the purpose of anticacking, preservation, drying and lubrication after that the processed drug was passed through the sieve and 500 mg tablets were made by automatic tablet making machine in Dawakhana Tibbiya College, AMU (Anonymous, 1968; Anonymous, 1970; Anonymous, 1986). After making the tablet, the formulation was subjected to pharmacological studies.

Pharmacological Studies

Animal Maintenance

The present study was conducted on healthy albino rats of either sex weighing 150-200g. Animals were housed in groups of 6 animals in cages under hygienic conditions. All experiments were conducted during light phase between 8.00 and 13.00 hours. All the procedures were followed as per the guidelines of the International Association for the Study of Pain (Zimmernman, 1981). All the animals were fed standard animal diet and water, ad-libitum.

Drugs and Chemicals

Diclofenac sodium (Voveran, Novartis, India), Carrageenan Type II (Sigma chemical company, USA), Normal Saline (E. Merck Ltd, India) and 2% Aqueous Suspension of Qurs/tablets.

The present study was undertaken to evaluate the anti-arthritic and analgesic activity in healthy albino rats of either sex weighing 150-200g. Aq. Suspension (2%) of Qurs-e-Mafasil Jadeed was used for the study.

Preparation of Drug Suspension

The test formulation (tablets) was powdered and fresh suspension of tablet powder was prepared in distilled water with 2% gum acacia powder which was administered orally in the animal with the help of feeding canula after shaking the suspension well. The dose for the animal was calculated by extrapolating the human dose of test drug by conversion factor of 7 for rat (Frierich et. al, 1966). Hence, the three different doses selected for the study of aq. suspension of the test drug were 200 mg/kg, 300mg/kg and 400mg/kg.

Freund's Adjuvant Arthritis Test

It represents the chronic phase of inflammation. The effect of test drug for the established type of Adjuvant-induced arthritis was carried out by the method of Persico et al (1988). Albino rats (Wistar Strain) of same age, weighing 150 – 200 gm were divided into 6 groups of 6 animals each. The animals were maintained at uniform temperature, given standard diet and tap water, *ad libitum*. All the animals except in Group I were injected in the right hind paw, with 0.075 ml of Freund's Adjuvant, (1.0 mg of heat-killed and dried *Mycobacterium tuberculosis* (F-5881, 37H8910) in 0.85 ml of paraffin oil and 0.15 ml of mannide mono-oleate) (Difco Laboratories Detroit, Michigan, USA). The paw volume was measured with a digital plethysmometer on day 1 before injection of Freund's adjuvant and on day 11 and then on alternate days, from day 12 to 17 i.e. on 11^{th}, 13^{th} , 15^{th} and 17^{th} day. The thickness of the ankle joint was also measured by Digital Micrometer Screw Gauge according to a similar schedule. The animals in all the groups were administered with the treatment by oral route once a day for 5 days. Animals in Group I served as plain control while the animals in Group II were administered with 20ml/ kg distilled water. The standard drug Diclofenac Sodium was given to animals in Group III in a dose of 10 mg/kg. Group IV, V and VI were treated with 200 mg/kg, 300 mg/kg and 400 mg/kg of 2 % Aq. suspension of test formulation respectively. On the concluding day i.e. day 17, immediately after administering the treatment, the final measurements were taken. After one and a half hours of the treatment, the animals were sacrificed by cervical dislocation. The percentage of inhibition was found out by the following formula:

$$I = 100\left[1 - \frac{a - x}{b - y}\right]$$

Where

I = Percentage of inhibition

a = Mean right hind paw volume/ankle joint thickness of Test/Standard animals on Day 17.

b = Mean right hind paw volume/ankle joint thickness of control animals on Day 17

x = Mean right hind paw volume/ankle joint thickness of Test/Standard animals on Day 1.

y = Mean right hind paw volume/ankle joint thickness of control animals on Day 1.

The mean paw volume / ankle joint thickness was also compared statistically by one way ANOVA test followed by TUKEY.

Tests for Analgesic Activity

Eddy's Hot Plate Test

Eddy's Hot-plate Test was carried out by the method of Eddy and Leimbach (1952). Albino rats of either sex, weighing 150-200g were divided into 4 groups of 6 animals each. Animals in group I served as standard and was administered with Diclofenac Sodium in a dose of 10 mg/kg orally. Second, third and fourth group were treated with 200 mg/kg, 300 mg/kg and 400 mg/kg of 2 % Aq. Suspension of the tablets respectively. The initial reaction time of each rat was determined by putting the rats on Eddy's hot plate at 55-55.50°C. The time between placing of the animals on the hot plate and their jumping or licking of paws was taken as reaction time. The reaction time of each animal was recorded after 1 hour of drugs administration at 15-minute intervals for 90 minutes. The reaction time at each post treatment interval within a group was statistically compared with the initial reaction time by one way ANOVA test followed by TUKEY.

Analgesiometer Test

Analgesiometer test was carried out by the method of Davies (1946). Albino rats of either sex, weighing 150-200g were divided into 3 groups of 6 animals each. First, second and third group were treated with 200 mg/kg 300 mg/kg and 400 mg/kg of 2% Aq. suspension of test formulation respectively. The initial reaction time of each rat was determined by putting the tail on nichrome wire of Analgesiometer by putting the rat into rat holder. The variac was adjusted at a point where the reaction time was found to be 3-6 seconds and the corresponding variac reading was noted. The variac was set at the same point for subsequent

testing of a particular animal. The reaction of each animal was recorded at intervals of 15 minutes for 120 minutes. The reaction time at each post treatment interval within a group was statistically compared with the initial reaction time by one way ANOVA test followed by TUKEY.

Observations and Results

Freund's Adjuvant Test

The test for the established type of Adjuvant-induced arthritis was carried out on albino rats of both sexes, weighing 150-200 gm divided into 5 groups of 6 animals each. The groups were categorized as follows:

Group I- Control (Adjuvant + 20ml/kg distilled water)
Group II- Standard (Adjuvant + 10mg/kg Standard drug Diclofenac sodium)
Group III- Aq. Susp. 200 (Adjuvant + 200mg/kg Aq. Susp. of tablet)
Group IV- Aq. Susp. 300 (Adjuvant +300mg/kg Aq. Susp. of tablet)
Group V- Aq. Susp. 400 (Adjuvant + 400mg/kg Aq. Susp. of tablet)

All the animals were injected in the left hind paw with 0.075ml of Freund's adjuvant. The paw volume and ankle thickness were measured on day 1 and day 11 and after that on alternate days i.e. on Day 13, 15 and 17. The treatment was given from day 12 to 17, once a day, after overnight fasting. Mean increase in Paw volume and Ankle thickness with reference to initial volume and thickness and percentage of inhibition were calculated. The findings were compared statistically by ANOVA test followed by TUKEY.

Paw Volume

On 17^{th} Day the increase in paw volume was found to be 0.55±0.05ml in the Control Group while it was significantly reduced to 0.21±0.05ml ($P<0.01$) with standard (Diclofenac sodium). Increase in paw volume was also significantly reduced in the group treated with Aq. Susp. of tablet with 200 mg/kg, 300 mg/kg and 400mg/kg and it was found to be 0.29±0.07ml ($P<0.01$), 0.25±0.06ml ($P<0.01$) and 0.20±0.05ml ($P<0.01$) respectively. The percentage of inhibition of increase in paw volume was found to be 61.82% with standard drug; whereas in the test drug treated groups 47.28%, 54.55% and 63.64% of Aq. Susp. of compound formulation, respectively. The results are presented in Table 1 and Fig. 1.

Ankle Thickness

On Day 17, the increase in ankle thickness was found to be 2.96±0.34mm in the Control Group while it was significantly reduced to 1.10±0.15mm ($P<0.001$) with Diclofenac sodium. Increase in ankle thickness was also significantly reduced in the group treated with Aq. Susp. of tablet with 200mg/kg, 300 mg/kg and 400

mg/kg and it was found to be 1.60±0.35mm (P<0.001), 1.32±0.27mm (P<0.001) and 1.17±0.34mm (P<0.001) respectively. The percentage of inhibition of ankle thickness was found to be 62.84% with standard drug; whereas in the test drug treated groups it was found to be 45.95%, 55.41% and 60.48% with 200mg/kg, 300 mg/kg and 400 mg/kg of Aq. Susp. of compound formulation, respectively. The results are presented in Table 1 and Fig. 3.

The secondary lesions i.e. swelling in other hind paw and fore paws, any nodules in the tail and ears were also looked for but not found in any group.

Tests for Analgesic Activity

1. Eddy's Hot Plate Test

Group I (Standard drug Diclofenac sodium 10mg/kg): The initial reaction time was found to be 4.24±0.31 sec. while it was increased to 5.22±0.31 sec. at 60 minutes, 7.39±0.31sec. (p< 0.001) at 75 minutes, 10.30±0.30 sec. (p< 0.001) at 90 minutes, 10.88±0.31 sec. (p< 0.001) at 105 minutes, 15.05±0.31 sec. (p< 0.001) at 120 minutes and 13.51±0.36 sec. (p< 0.001) at 135 minutes.

Group II (Aq. Susp. of tablet 200mg/kg): The initial reaction time was found to be 6.47±0.54 sec. while it was increased to 6.94±0.54 sec. at 60 minutes, 7.21±0.53 sec. at 75 minutes, 7.44±0.55sec. at 90 minutes, 7.92±0.59 sec. at 105 minutes, 10.08±0.50 sec. (p < 0.001) at 120 minutes and 12.08±0.63sec. (p< 0.001) at 135 minutes.

Group III (Aq. Susp. of tablet 300mg/kg): The initial reaction time was found to be 7.90±0.53 sec. while it was increased to 8.19±0.55 sec. at 60 minutes, 8.52±0.58 sec. at 75 minutes, 8.99±0.60 sec. at 90 minutes, 11.16±0.44 sec. (p< 0.001) at 105 minutes, 14.00±0.49sec. (p< 0.001) at 120 minutes and 16.08±0.49 sec. (p< 0.001) at 135 minutes.

Group IV (Aq. Susp. of tablet 400mg/kg): The initial reaction time was found to be 6.20±0.79 sec. while it was increased to 6.86±0.78 sec. at 60 minutes, 7.30±0.78 sec. at 75 minutes, 9.76±0.84 sec. (p< 0.05) at 90 minutes 11.85±0.87 sec. (p< 0.001) at 105 minutes, 14.01±0.93sec. (p<0.001) at 120 minutes and 13.18±0.77 sec. (p< 0.001) at 135 minutes.

The increase in reaction time in all the groups was higher at 120 / 135 minutes. All the groups showed significantly higher reaction time at 120 / 135 minutes. The maximum tolerance of pain was found with higher dose of test drug which is nearly equal to the effect of Diclofenac. The results are presented in Table 2 and Fig. 5.

Analgesiometer Test

Group I (Aq. Susp. of tablet 200mg/kg): The initial reaction time was found to be 4.23±0.19 sec. while it was increased to 4.63±0.18 sec. at 60 minutes, 5.32±0.18 sec. ($p < 0.01$) at 75 minutes, 5.18±0.18sec. ($p < 0.01$) at 90 minutes, 4.68±0.15 sec. at 105 minutes and 4.58±0.14 sec. at 120 minutes.

Group II (Aq. Susp. of tablet 300mg/kg): The initial reaction time was found to be 3.85±0.25 sec. while it was increased to 4.47±0.25 sec. at 60 minutes, 5.67±0.25 sec. ($p < 0.001$) at 75 minutes, 5.27±0.26 sec. ($p< 0.01$) at 90 minutes, 4.88±0.27 sec. ($p< 0.05$) at 105 minutes and 4.40±0.30sec. at 120 minutes.

Group III (Aq. Susp. of tablet400 mg/kg): The initial reaction time was found to be 4.07±0.23 sec. while it was increased to 5.38±0.27 sec. ($p< 0.01$) at 60 minutes, 6.05±0.29 sec. ($p < 0.001$) at 75 minutes, 5.58±0.26 sec. ($p< 0.01$) at 90 minutes 5.28±0.27 sec. ($p< 0.01$) at 105 minutes and 4.85±0.26sec. at 120 minutes.

The increase in reaction time in all the groups was higher at 75 minutes. The maximum tolerance of pain was observed with higher dose(400 mg/kg) of test formulation. The results are presented in Table 3 and Fig. 6.

Table 1: Effect of *Qurs-e-Mafasil Jadeed* in Freund's Adjuvant Induced Arthritis Test (Established Type) (Paw Volume and Ankle Thickness)

Group(s)	On day 17th after inducing Freund's adjuvant administration			
	Increase in Paw Volume in ml (Mean ± SE)	Percentage of inhibition	Increase in Ankle Thickness in mm (Mean ± SE)	Percentage of inhibition
Adjuvant	0.55±0.05	___	2.96±0.34	___
Diclofenac sodium (10mg/kg)	0.21±0.05 X^1	61.82	1.10±0.15 X^2	62.84
Aq. Susp. (200mg/Kg)	0.29±0.07 X^1	47.28	1.60±0.35 X^2	45.95
Aq. Susp. (300mg/Kg)	0.25±0.06 X^1	54.55	1.32±0.27 X^2	55.41
Aq. Susp. (400mg/Kg)	0.20±0.05 X^1	63.64	1.17±0.34 X^2	60.48
F-value	6.45		6.61	

n=6

X = Against Adjuvant 1 = $p < 0.01$

2 = < 0.001

Table 2: Effect of *Qurs-e-Mafasil* Jadeed in Eddy's Hot Plate Test

Group(s)	Reaction time in Seconds (Mean ± SE)						
	Initial	After Drug Administration					
		60 min	75 min	90 min	105 min	120 min	135min
Diclofenac sodium (10mg/kg)	4.24± 0.31	5.22± 0.31	7.39± 0.31 X^1	10.30± 0.30 X^1	10.88± 0.31 X^1	15.05± 0.31 X^1	13.51± 0.36 X^1
Aq. Susp. (200mg/Kg)	6.47± 0.54	6.94± 0.54	7.21± 0.53	7.44± 0.55	7.92± 0.59	10.08± 0.50 X^1	12.08± 0.63 X^1
Aq. Susp. (300mg/Kg)	7.90± 0.53	8.19± 0.55	8.52± 0.58	8.99± 0.60	11.16± 0.44 X^1	14.00± 0.49 X^1	16.08± 0.49 X^1
Aq. Susp. (400mg/Kg)	6.20± 0.79	6.86± 0.78	7.30± 0.78	9.76± 0.84 X^2	11.85± 0.87 X^1	14.01± 0.93 X^1	13.18± 0.77 X^1

n=6

X = Against Initial Reaction Time 1 = p <0.001 2 = p < 0.05

Table 3: Effect of *Qurs-e-Mafasil Jadeed* in Analgesiometer Test

Group(s)	Reaction Time in seconds (Mean±SE)							
	Initial	After Drug Administration						
		15 min	30 min	45 min	60 min	75 min	90 min	105 min	120 min
Aq. Susp. 200mg/Kg)	4.23± 0.19	4.28± 0.19	4.37± 0.19	4.40± 0.20	4.63± 0.18	5.32± 0.18 X^2	5.18± 0.18 X^2	4.68± 0.15	4.58± 0.14
Aq. Susp. (300mg/Kg)	3.85± 0.25	3.95± 0.24	4.18± 0.26	4.42± 0.27	4.47± 0.25	5.67± 0.25 X^1	5.27± 0.26 X^2	4.88± 0.27 X^3	4.40± 0.30
Aq. Susp. (400mg/Kg)	4.07± 0.23	4.15± 0.26	4.52± 0.29	4.68± 0.27	5.38± 0.27 X^2	6.05± 0.29 X^1	5.58± 0.26 X^2	5.28± 0.27 X^2	4.85± 0.26

n=6

X = Against Initial Reaction Time 1 = p < 0.001 2 = p < 0.01 3=p<0.05

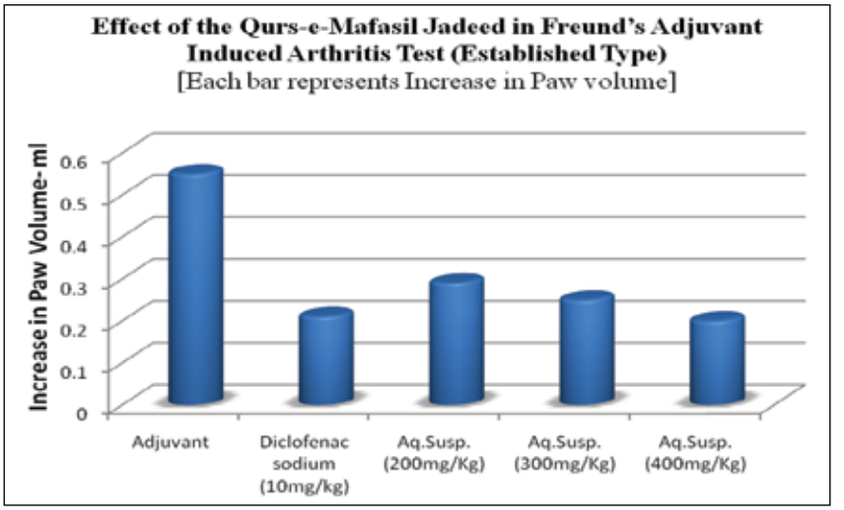

Fig.1

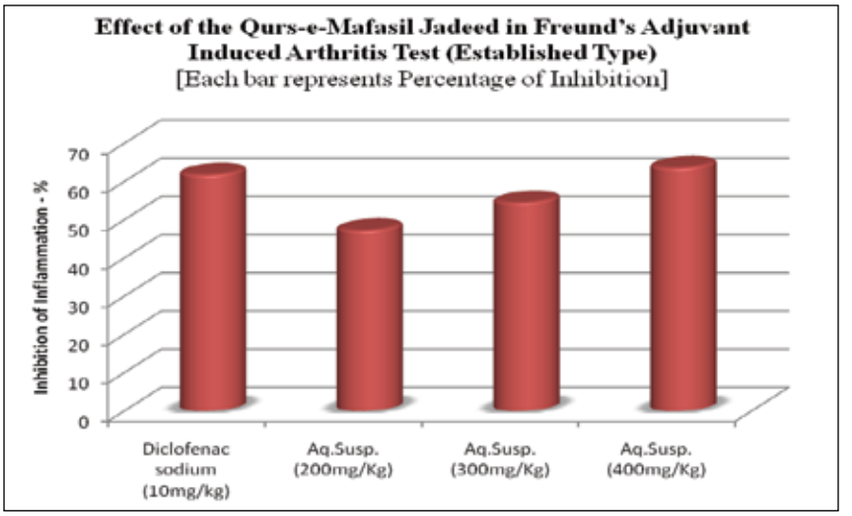

Fig.2

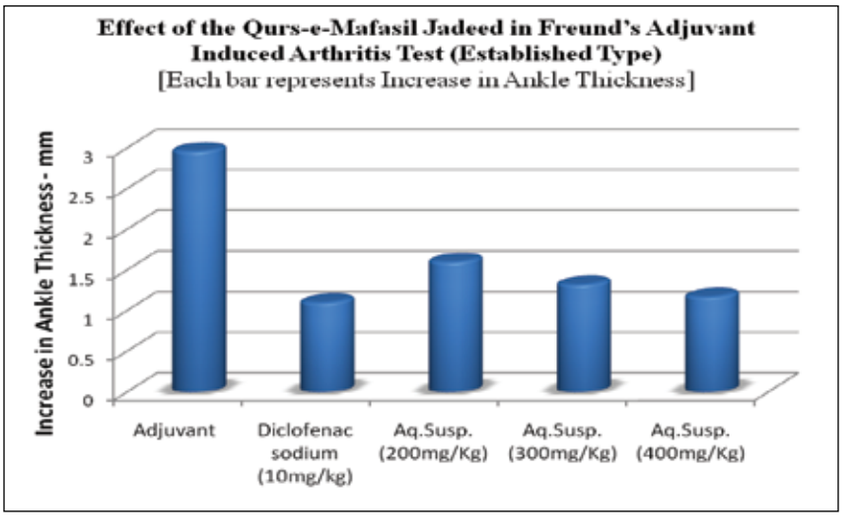

Fig.3

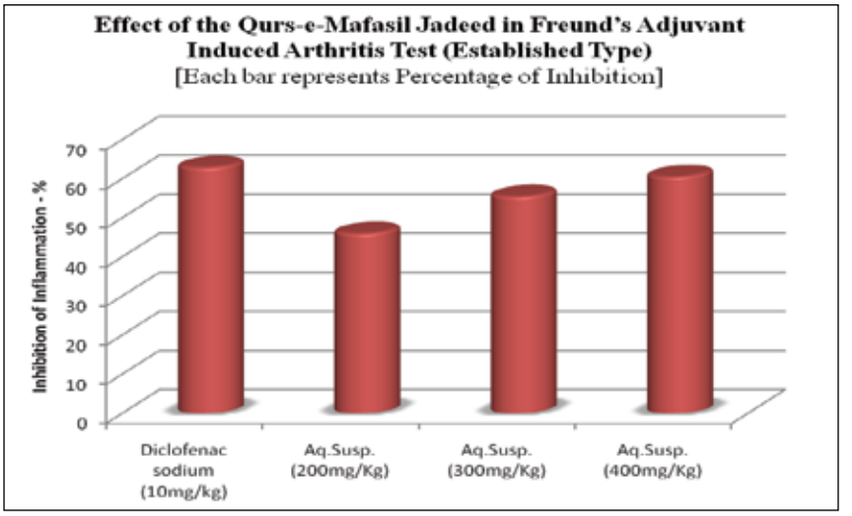

Fig.4

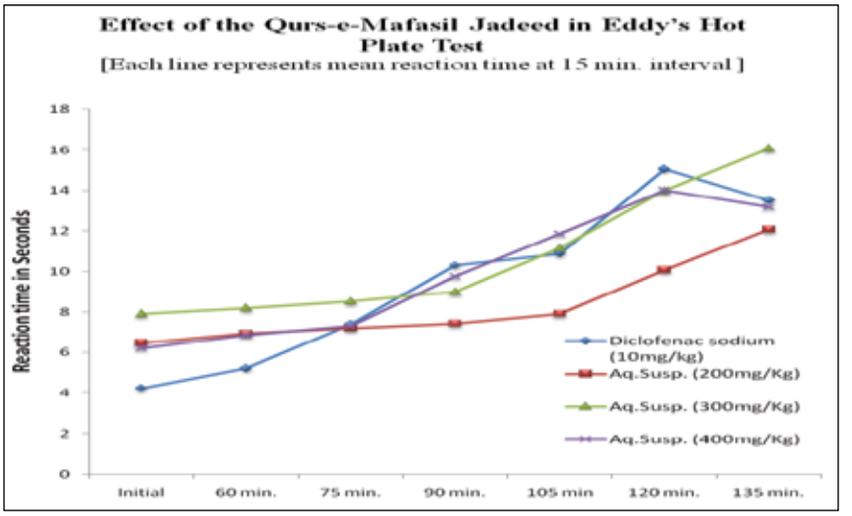

Fig.5

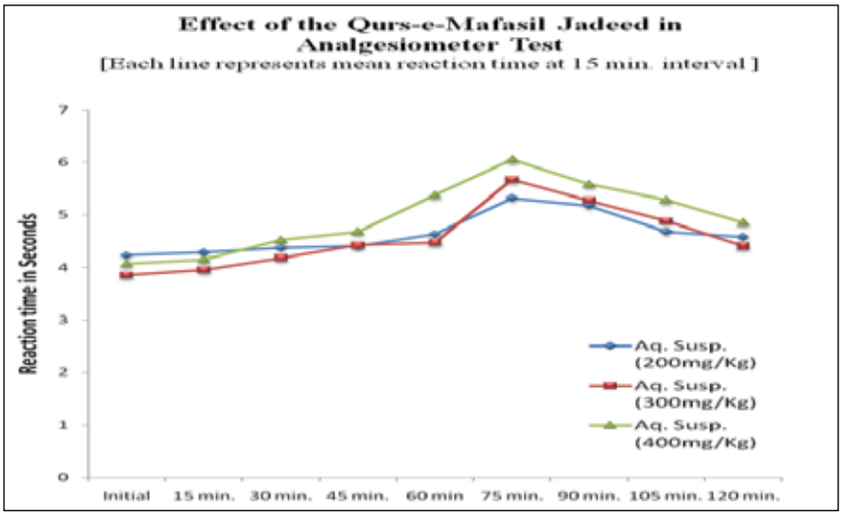

Fig.6

Discussion

In Freund's Adjuvant Arthritis Test Established Type the standard drug Diclofenac sodium, lower, medium and higher doses of Aq. susp. of the test formulation were found to decrease the hind paw volume and ankle joint thickness significantly ($p<0.01$) as compared the control group. Therefore, the study shows that all the three doses of aq. susp. of the test formulation possess significant anti-arthritic activity. However, there was no significant difference between the effects of the three doses of aq. susp. The percentage inhibition of arthritis in left hind paw of albino rats on 17^{th} day was found to be 61.82% with standard drug; 47.28%, 54.55% and 63.64% with the 200 mg/kg, 300 mg/kg and 400 mg/kg of the aq. susp. of tablet, respectively.

Furthermore, even if the paw-volume is more commonly used as the marker for assessing anti-arthritic activity but some studies employ ankle-joint thickness also as marker. Therefore, the ankle thickness was also observed for its anti-inflammatory activity. The percentage inhibition of ankle thickness in left hind paw of albino rats was found to be 62.84% with standard drug; 45.95%, 55.41% and 60.48% with 200 mg/kg, 300 mg/kg and 400 mg/kg of aq. susp. of tablet, respectively.

Therefore, in the present study both markers viz; paw volume and ankle thickness were studied. The study showed both parameters vary in the same manner in control and test drug groups. Thus, the present study shows that both paw-volume and ankle-joint thickness are valid markers for Freund's Adjuvant Arthritis Test. And all the three doses of the aqueous suspension of the tablet possess significant activity against arthritis. The results clearly indicate that the test drugs possess a striking and good protective activity against established arthritis which is in close proximity to the effect of Diclofenac sodium.

Since most of the anti-inflammatory drugs possess analgesic activity, the test drug was also studied for its possible analgesic effect by Eddy's Hot plate Test and Analgesiometer Test. These tests were selected because of several advantages including the sensitivity to strong analgesics and limited tissue damage (Shahabadkar et al., 2010).

In Eddy's Hot plate Test the reaction time was noted before and after 60 minutes of the treatment, at every 15 minutes intervals for 75 minutes. All the groups treated with the test drug or standard drug showed higher increase in the reaction time at 120 min /135 min. The level of significance was: $p<0.001$ with standard drug and higher dose, medium dose and lower dose of Aq. susp. of tablet.

The onset, peak and duration of analgesia with the higher dose and standard drug were 90 min., 120 min., 135 min. and 75 min., 120min and 135 min. respectively. The onset and peak of analgesia with medium dose and lower dose were 105 min., 135 min. and 120 min., 135 min. respectively.

In the Analgesiometer Test the post treatment reaction time of the groups (2nd and 3rd) treated with medium and higher dose of the test drug were found to be significantly higher at 75 min. ($p<0.001$) and group 1st treated with lower dose of the test formulation was found to be significantly higher at 75 min ($p<0.01$) against initial reaction time. The result shows that all the doses of the test formulation possess analgesic effect. The onset, peak and duration of analgesia with higher dose of the Aq. susp. of test formulation was 60 min., 75 min. and 105 min. respectively. The peak and duration of analgesia with the lower and medium dose of aq. susp. of tablet were found to be 75 min., 90 min. and 75 min, 105 min. respectively. Here maximum tolerance of pain was observed in higher dose of test formulation.

Considering the results of the test for anti-arthritic activity (Freund's Adjuvant Arthritis Test) and test for analgesic activity (Eddy's hot-plate test and Analgesiometer test), it may be inferred that tablet is effective in painful chronic arthritis. Thus, it can be concluded that the test drug possesses a significant anti-arthritic and analgesic effect. These findings are in conformity with anti-arthritic and analgesic effect of the tablet containing Suranjan and Haldi.

Conclusion

- The tablet / compound formulation possesses significant anti-arthritic and analgesic activity.
- The higher dose of aq. susp. of the formulation possesses remarkable anti-arthritic and analgesic activity approximately equal to the effect of standard referent agent (Diclofenac sodium).
- The aqueous suspension of the tablet possesses analgesia, probably of the Opioid type.
- The study scientifically validates the clinical use of the Unani Formulation in arthritic conditions.
- The study indicates that there is an ample scope for clinical studies of the Unani Formulation for its effect on Rheumatoid Arthritis with long term morbidity and mortality.
- The Formulation may be studied for possible synergistic interactions or / and chemical changes occurring due to ingredient interaction and the compounding process.
- The study offers an improvement in Unani Healthcare by showing more convenient Tablet form which is effective in arthritis.
- The parameters applied for standardization of lab samples of the Tablet (Compound Formulation) may be taken as standard parameters for future reference.

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सारांश

यूनानी मिश्रण कुर्स-ए-मफ़ासिल जदीद का गठियारोधी और पीड़ानाशक प्रभाव का मूल्याकंन : एक पूर्व-नैदानिक अध्ययन

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यह अध्ययन कुर्स–ए–मफ़ासिल जदीद, जिसमें कोल्चिकम ल्यूटियम, करक्यूमा लोगां और अकेशिया अरेबिका का गोंद शामिल है, के गठियारोधी और पीड़ानाशक गतिविधि का पता लगाने के लिए किया गया। इस अध्ययन में अकेशिया के गोंद में कुर्स/टैबलेट पाउडर के 2% जलीय सस्पेन्शन का उपयोग फ्रुंड सहायक गठिया परीक्षण, ऐड्डी हॉट प्लेट परीक्षण और ऐनाल्जीसीओमीटर परीक्षण द्वारा गठियारोधी और पीड़ानाशक गतिविधि को निर्धारित करने के लिए किया गया। इस यूनानी मिश्रण की प्रभावकारिता की तुलना, मानक औषधि, डिक्लोफेनेक सोडियम के साथ की गई। इस अध्ययन में खुराक़ में फ्रुंड के सहायक गठिया परीक्षण के अनुसार यह पाया गया कि नियंत्रण समूह की तुलना में परीक्षण मिश्रण का जलीय सस्पेन्शन न्यूनतम, मध्यम, उच्चतम पिछले पैर के विस्तार क्षेत्र और एंकल ज्वाइंट की मोटाई को सार्थकता से कम करता है ($P<0.01$)। इस अध्ययन से पता चलता है कि परीक्षण मिश्रण के जलीय सस्पेन्शन की सभी तीनों खुराक़ों में महत्वपूर्ण गठियारोधी गतिविधि होती है। ऐड्डी हॉट प्लेट परीक्षण और ऐनाल्जीसीओमीटर परीक्षण में, प्रक्रिया समय में एक असाधारण वृद्धि को दर्शाती है कि यौगिक मिश्रण की सभी खुराकों में एक अच्छी पीड़ानाशक गतिविधि होती है।

शब्द कुंजीः अकेशिया अरेबिका, पीड़ानाशक गतिविधि, गठियारोधी गतिविधि, कोल्चिकम ल्यूटियम, करक्यूमा लोगां, कुर्स–ए–मफ़ासिल जदीद

Quality Standards of *Safoof-e-Barangi*: A Unani Polyherbal Powder Formulation

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Abstract

Safoof-e-Barangi (SB) is a Unani polyherbal powder formulation used to treat *Deedan-e-Ama* (intestinal worm) since a long time. The objective of the study is to establish the standardization of SB by using scientific analytical procedures. In this study SB is evaluated for its various organoleptic and physico-chemical parameters. SB is buckthorn brown, odorless and bitter in taste. The physico-chemical parameters are expressed as mean values of the loss of weight on drying, total ash, acid insoluble ash and water soluble ash as 4.82± 0.18, 4.05 ± 0.24, 2.80 ± 0.14 and 1.30±0.06 respectively. The mean values of bulk density, tapped density, angle of repose, Hausner's ratio and compressibility index were 0.5481 ± 0.0042, 0.6922 ± 0.0026, 35.47± 1.02°, 1.278 ± 0.022º and 20.7887 ± 0.6785 respectively, pH of 1% and 10% solution were 4.9 ± 0.1 and 5.5 ± 0.1 respectively. Extractive values in petroleum ether, benzene and ethyl alcohol by successive extraction method were 2.07 ± 0.13, 1.02 ± 0.04 and 12.86 ± 0.35 respectively. Extractive values in petroleum ether, benzene and ethyl alcohol by non-successive extraction method were 2.07 ± 0.13, 2.40 ± 0.30, and 13.18 ± 0.35 respectively. Qualitative analysis showed the presence of all major organic constituents except proteins, saponins and steroids.

Keywords: *Deedan-e-Ama*, Intestinal worm, Quality standard, *Safoof-e-Barangi*

Introduction

Herbal drugs are gaining popularity in the world since last decade because of its efficacy and lower toxicity as compared to allopathic drugs. The use of herbs and their formulations to treat diseases has stood the test since ancient time. The chemical constituents present in herbal medicine are a part of the physiological functions of living flora and hence they are believed to have better acceptance within the human body (Afaq et al., 2012). With this growing need for use of safe drug more attention is drawn for quality of these formulations. Mixture of exhausted drugs is one of the major problems which has to be tackled (Kumar et al., 2011). Now, herbal medicines are manufactured on a large scale basis in mechanical units where manufacturers come across many problems such as non-availability of Standard Operational Procedure (SOP), proper methodology for standardization, non-availability of good quality raw materials etc (Afaq et al., 2012).

SB is a polyherbal powder formulation used in the Unani System of Medicine for treatment of Deedan-e-Ama (intestinal worm). This formulation also contains Halela Kabuli (*Terminalia chebula* (*Gaertn*) *Retz.)*, Aamla (*Emblica officinalis* Gaertn.), Baobarang (*Embelia ribes* Burm *f.*), Turbud Safaid (*Operculina turpethum* (L.) S. Manso), Faneez (Batasha / processed sugar) (Anonymous, 2006). As per the review of literature, so far this formulation has not been evaluated for its physico-chemical standardization and microbiological characterization. Thus, keeping this view in mind, the present study was carried out to fix the quality control standards of SB with scientific analytical techniques.

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Methodology

Procurement of Raw Drugs

Ingredients of *Safoof-e-Barangi* were procured from the herbal / raw drug dealer at Bangalore, Karnataka, India. The identification of these drugs was done by the experts at National Institute of Unani Medicine, Kottigepalya, Bangalore. Detail of ingredients is presented in Table 1.

Table 1: Ingredients of *Safoof-e-Barangi*

S. N.	Drug name	Botanical name	Part used	Proportion
1.	Halela kabuli	*Terminalia chebula*	Fruit	5.55%
2.	Aamla	*Emblica officinalis*	Fruit	5.55%
3.	Baobarang	*Embelia ribes Burm f*	Seed	5.55%
4.	Turbud safaid	*Operculina turpethum*	Rhizome	16.6%
5.	Faneez (Batasha) Sugar	----------	Crystals	66.6 %

Preparation of Formulation

All the drugs were first cleaned, dried in shade and powdered by passing through sieve no. 80. The formulation was prepared as per the method described in National Formulary of Unani Medicines. Figure 1 (Anonymous, 2006, NFUM Part IV).

Fig. 1: Safoof-e-Barangi

Physico-chemical Evaluation

The formulation was evaluated for organoleptic characters *i.e.* color, odor, taste (Anonymous, 2006); bulk and tapped density, Hausner's ratio, compressibility index (Anonymous, 2012) (Ali et. al. 2016) loss of weight on drying, total ash, acid insoluble ash, water soluble ash, alcohol soluble and water soluble matter (extractives), pH of 1% and 10% as per the method mentioned in UPI (Anonymous, 2010).

Successive Extractive Value and Non-Successive Extractive Value

Successive Extractive Value

The coarse powder of SB was extracted successively using Soxhlet apparatus with different solvents in increasing order of polarity viz; petroleum ether → benzene → chloroform → ethanol. 10 g powdered drug was taken and subjected to successive extraction with each solvent for 6 hours. After that the extracts were filtered first by using filter paper (Whatman No. 1) and dried on water bath. The extractive values were determined with reference to the weight of the drug taken (w/w). The procedure was repeated three times to calculate mean extractive values.

Non Successive Extractive Value

The coarse powder of SB was extracted separately in different solvents (water, ethyl alcohol and petroleum ether) using soxhlet apparatus. 10 g powdered drug was taken and subjected to separate extraction with each solvent. The extracts were filtered first by using filter paper (Whatman No. 1) and evaporated on water bath. Extractive values were determined with reference to drug taken (w/w) (Ali et al., 2016).

Qualitative Estimation

Qualitative estimation for organic constituent's viz. alkaloid, glycosides, tannins, flavanoids, carbohydrates, saponins, phenols, proteins, resin, starch and steroids was done (Anonymous, 2006).

HPTLC Fingerprinting Analysis

The weighed quantity (10g) of SB was extracted in a Soxhelt apparatus for 6 hours using 200 ml of solvent (ethanol) at a controlled temperature. HPTLC was performed on 20 cm × 10 cm aluminum backed plates coated with silica gel 60F254 (Merck, Mumbai, India). Standard solution of sample was applied to the plates as bands by use of a Camag (Muttenz, Switzerland) Linomat V sample applicator equipped with a 100 µl Hamilton (USA) syringe. Ascending development to a distance of 80 mm was performed at room temperature (28 ± 2°C) with toluene: ethyl acetate, formic acid 5 : 4 : 1 (v/v), as mobile phase, in a Camag glass twin-trough chamber previously saturated with mobile phase vapour for 20 min. After development, the plates were dried and then scanned at 254 nm and 430 nm with a Camag TLC Scanner with WINCAT software, using the deuterium lamp (Devies, 1990).

Results

Powder characterization of Safoof-e Barangi, physico-chemical evaluation of samples of Safoof-e- Barangi, successive extraction and non-successive extraction and phytochemical screening of *Safoof-e-Barangi* are given in Table 2, Table 3, Table 4 and Table 5.

Table 2: Powder Characterization of *Safoof-e-Barangi*

Parameters	Bulk density (gm/ml)	Tapped density (gm/ml)	Car's index	Hausner's Ratio	Angle of Repose
Mean± SEM	0.5481 ± 0.0042	0.6922 ± 0.0026	20.7887± 0.6785	1.278 ± 0.022	35.47± 1.02

Table 3: Physico-chemical Evaluation of *Safoof-e-Barangi*

Parameters	Total ash (%w/w)	Acid insoluble ash (%w/w)	Water soluble ash (%w/w)	Alcohol soluble matter (%w/w)	water soluble matter (%w/w)	Loss on drying (%w/w)	pH 1 % solution (%w/v)	pH 10 % solution (%w/v)
Mean ± SEM	4.05 ± 0.24	2.80 ± 0.14	1.30 ± 0.06	9.96 ± 0.22	65.86 ± 1.07	4.82 ± 0.18	4.9 ± 0.1	5.5 ± 0.1

Table 4: Successive Extraction and Non-Successive Extraction

Successive extractive value (%w/w)				Non-Successive extractive value (%w/w)		
Mean ± SEM	Petroleum ether	Benzene	Ethanol	Petroleum ether	Benzene	Ethanol
	2.07 ± 0.13	1.02 ± 0.04	12.86 ± 0.35	2.07 ± 0.13	2.40 ± 0.30	13.18 ± 0.35

Table 5: Phyto-chemical Screening of *Safoof-e- Barangi*

Parameters	Result
Alkaloids	+
Glycosides	+
Tannins	+
Flavanoids	+
Carbohydrates	+
Phenols	+
Proteins	-
Saponins	-
Resin	+
Starch	+
Steroids	-

HPTLC Fingerprinting Analysis

HPTLC analysis in Solvent (Toluene: Ethyl acetate: Formic acid 5:4:1) was done. Densitometric Scan of *Safoof-e Barangi* at 254 nm Wavelength and *Rf* value, No. of Peaks, peak area and height of *SB* at 254 nm are depicted in Figure 2 and Figure 3. HPTLC Densitometric Scan of *Safoof-e-Barangi* at 430 nm Wavelength and *Rf* value, number of Peaks, peak area and height of *SB* at 430 nm are depicted in Figure 4 and Figure 5 respectively. TLC images of ethanol extract at UV - 254 nm and 366 nm. are depicted in Figure 6. HPTLC fingerprint profile of ethanolic extract of SB at 254 nm and 430nm is depicted in Figure 7.

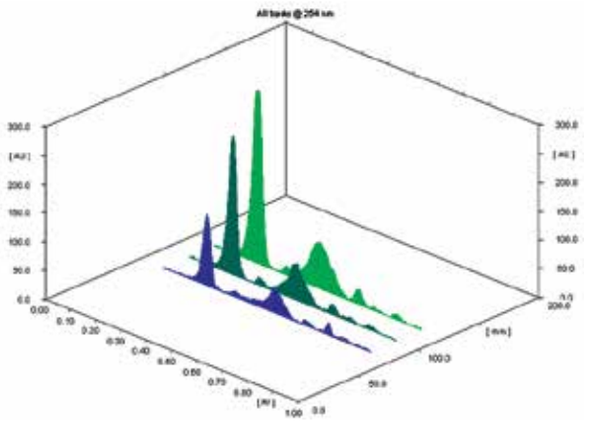
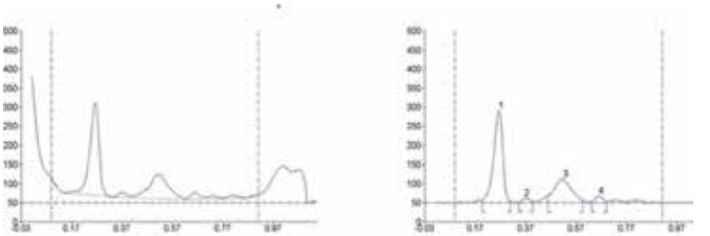


Fig. 2: HPTLC Densitometric Scan of Safoof-e Barangi at 254 nm Wavelength



Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.20	6.9	0.27	241.0	71.69	0.31	4.1	6936.1	62.03	unknown *
2	0.35	0.8	0.37	12.6	3.75	0.40	2.2	295.9	2.65	unknown *
3	0.46	18.4	0.52	63.7	18.94	0.60	6.0	3484.6	31.16	unknown *
4	0.63	3.4	0.66	18.9	5.63	0.69	3.6	464.6	4.16	unknown *

Fig. 3: Rf value, No. of Peaks, peak area and height of SB at 254nm

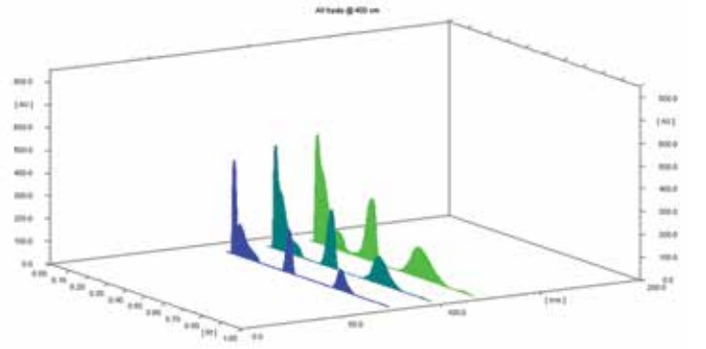
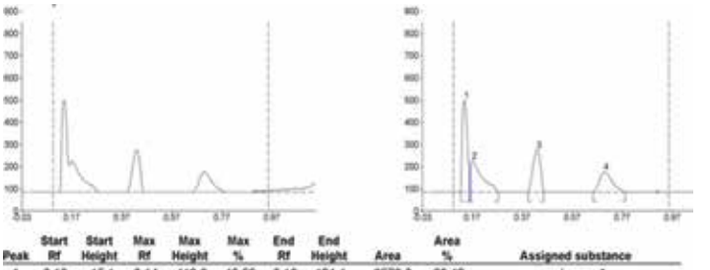
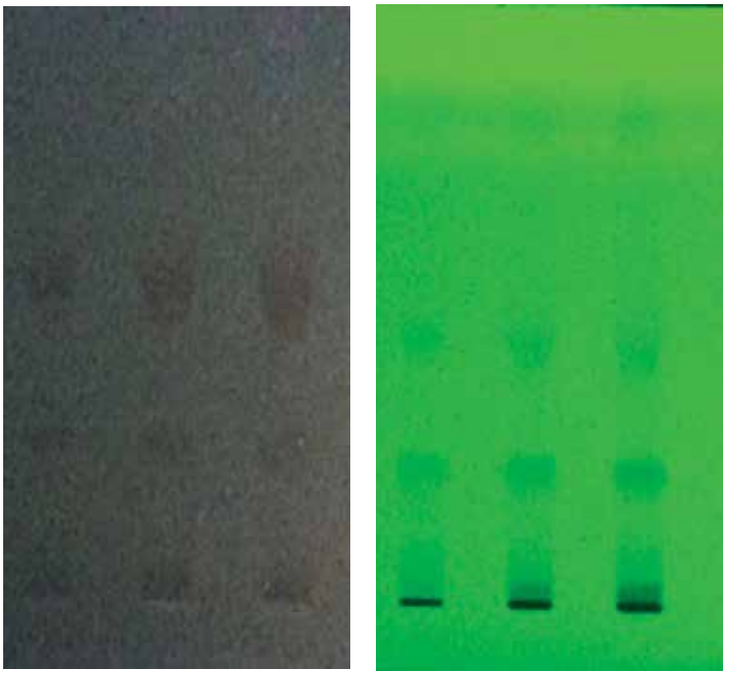


Fig. 4: HPTLC Densitometric Scan of Safoof-e-Barangi at 430 nm Wavelength



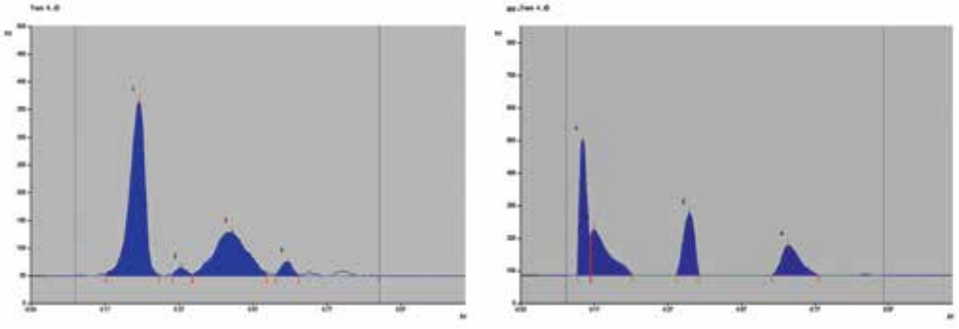
Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.13	15.1	0.14	413.6	49.53	0.16	121.1	6579.8	33.12	unknown *
2	0.16	122.4	0.17	140.1	16.78	0.28	1.0	5225.2	26.30	unknown *
3	0.39	1.2	0.43	190.0	22.75	0.46	1.4	4458.8	22.44	unknown *
4	0.65	0.0	0.70	91.4	10.94	0.78	0.0	3603.9	18.14	unknown *

Fig. 5: Rf value, No. of Peaks, peak area and height of SB at 430 nm



254 nm 366nm

Fig. 6: TLC photos of ethanol extract at UV - 254 nm and 366 nm



254 nm 366nm

Fig. 7: HPTLC fingerprint profile of ethanolic extract of Safoof-e-Barangi at 254 nm and 430nm L to R

Discussion

Finished product of *Safoof-e-Barangi* was buckthorn brown as per colour chart (No. 18-0935 TPX of Panton color chart), bitter in taste, odorless and without any clumping and aggregation. The mean values of bulk density, tapped density, angle of repose, Hausner's ratio and compressibility index were 0.5481 ± 0.0042, 0.6922 ± 0.0026, 35.47º ± 1.02, 1.278 ± 0.022 and 20.7887± 0.6785 respectively.

Hausner's ratio and compressibility index are the simple and popular method to determine the flow characteristics of powder. The flow characteristics of powder depend on the size, shape, size distribution of particles and moisture content. Increase in the moisture content of a powder results in decreasing the ability

to flow smoothly due to the increased thickness of adsorbed liquid layer that enhances the strength of liquid bridges formed between particles.

Finished *Safoof-e-Barangi* has Hausner's ratio of 1.25 to 1.5, it indicates good / moderate flow-ability (Manjula et al., 2012). The compressibility index of SB lies between 21 and 25 according to the scale of flowbility. Test drug SB has a fair passable flow character (Anonymous, 2009 USP). Angle of repose displayed passable flow property (Manjula et al., 2012) (Table 2)

The mean percentage of loss of weight on drying of SB was 4.82± 0.18 (Table 3). It is mentioned that the water content in plant drugs can vary between 8% and 14%. The presence of excessive amount of moisture in plant drugs causes hydrolysis of constituents, growth of bacteria and fungi and biochemical reactions. The pharmacopoeial monographs compulsorily limit the water content, especially in drugs that have hygroscopic nature or in which the excessive amount of water causes deterioration of products (Aulton, 2009, Junior et al., 2011). As finished SB contains very less amount of moisture it can be expected that it will be safe for a long time. Total ash value was 4.05 ± 0.24, acid insoluble ash was 2.80 ± 0.14 and water soluble ash was 1.30±0.06 displaying less inorganic content (Table 3). pH of *Safoof-e-Barangi* in 1% solution was 4.9 ± 0.1 while the pH of 10% solution was 5.5 ± 0.1 (Table 3). It is slightly acidic in nature. In a study by Abba et al., (2008) correlated the pH with microbial contamination and they suggested that a neutral or alkaline pH favours high microbial contamination levels of the herbal preparations.

Extractive values in petroleum ether, benzene and ethylalcohol by successive extraction method were 2.07 ± 0.13, 1.02 ± 0.04 and 12.86 ± 0.35 respectively. Extractive values in petroleum ether, benzene and ethyl alcohol by non-successive extraction method were 2.07 ± 0.13, 2.40 ± 0.30 and 13.18 ± 0.35 respectively. (Table 4)

Extractive value of a drug in defnite solvent is an index of purity of a drug and plays a major role to determine adulteration also. Amount of the extract of a drug in a particular solvent is often an appropriate measure of the amount of a certain constituent that drug contains. The amount of drug soluble in a particular solvent is an index of its purity (Tauheed et al., 2017).

Organic constituents viz. alkaloid, glycosides, tannins, flavanoids, carbohydrates, saponins, phenols, proteins, resin, starch and steroids were qualitatively estimated. Only protein, saponins and steroids were found absent (Table 5).

HPTLC

HPTLC plates of SB were examined. *Rf* value, number of peaks, peak area and peak height were also analysed under 254nm and 430nm (Figure 3 & Figure 5).

Area percentage of peak no. 1 analysed under 254nm was highest and also Area percentage of peak no. 1 in 430nm was highest. Further studies can also be done with the help of standards and quantitative estimation and identification of the ingredients. HPTLC fingerprinting data of this study can help in authentication

and identification of SB in the performed solvent system and extract.

Safoof ingredient such as *Terminala chebula* contains many important constituents like anthraquinones, tannins, sennoside A, polyphenolic compounds, glycosides; *Embelic officinalis* contains Ascorbic acid, gallo tannins; *Embelia ribes* Burm f contains benzoquinones, alkaloids (christembine), tannins; (Anonymous, 2007) and *Operculina turpethum* contains resinous glycosides. (Anonymous, 2008).

Pharmacological activity reported in *Terminala chebula* are ovicidal and larvicidal (in-vitro) (Kamaraj et al., 2011) and wound healing (Choudhary, 2011). In *Emblica officinalis* are antiulcerogenic (Mehrotra et al., 2011), Larvicidal and mosquitocidal activity (Jeyasankar et al., 2012). In *Embelia ribes* Burm f are anthelmintic (Jalalpure et al., 2007) and wound healing activity (Kumara Swamy et al., 2012). In *Operculina turpethum* are anti-ulcer activity (Mahurkar et al., 2012) etc. Reported pharmacological activity and constituent of the ingredients of SB highlight the importance of the study formulation owing to its indications in Unani Medicine.

At present this powder dosage form of SB doesn't have any Pharmacopoeial standards. Various methods and parameters for the assessment of powder dosage form are mentioned in different guidelines and it is necessary to follow them so that these data could be used to set the standards for the formulation and could be taken as standard for quality control purpose to achieve maximum efficacy and safety of medicine.

Conclusion

In this present study, SB was evaluated physico-chemically to set its standards in accordance with contemporary guidelines. This work may be used as standard monograph for identification and further evaluation or future research work on standardization of this formulation.

Acknowledgement

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सारांश

सफूफ़-ए-बरंगी का गुणवत्ता मानक : एक यूनानी पॉलीहर्बल पाउडर मिश्रण

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सफूफ़–ए–बरंगी एक यूनानी पॉलीहर्बल पाउडर मिश्रण है जो लंबे समय से दीदान–ए–अमा (पेट के कीड़े) का उपचार करने के लिए प्रयोग किया जाता है। इस अध्ययन का उद्देश्य वैज्ञानिक विश्लेषणात्मक प्रक्रियाओं का उपयोग करके सफूफ़–ए–बरंगी के मानकीकरण को स्थापित करना है। इस अध्ययन में सफूफ़–ए–बरंगी का मूल्यांकन विभिन्न ऑर्गेनोलिप्टिक और भौतिक–रासायनिक मानकों के लिए किया जाता है। सफूफ़–ए–बरंगी रंग में भूरी, गंध रहित और स्वाद में कड़वी होती है। भौतिक–रासायनिक मानक जैसे कि सुखने पर कम होना, कुल राख, एसिड राख, एसिड में अघुलनशील राख, और जल में घुलनशील राख को क्रमशः 4.82± 0.18, 4.05 ± 0.24, 2.80 ± 0.14 और 4.06 ± 0.18 के औसत मूल्य के रूप में व्यक्त किया जाता है। स्थूल घनत्व, दबाब घनत्व, एंगल ऑफ रिपोस, हॉसनर्स अनुपात और दबाव सूचकांक का औसत मूल्य क्रमशः 0.5481 ± 0.0042, 0.6922 ± 0.0026, 35.47 ± 1.02, 1.278 ± 0.022 और 20.7887 ± 0.6785 पाया गया एवं 1% और 10% विलयन का पीएच क्रमशः 4.9 ± 0.1 और 5.5 ± 0.1 देखा गया। क्रमिक निष्कर्षण विधि द्वारा पेट्रोलियम इथर, बेंज़ीन और इथाईल एल्कोहल के निष्कर्षण मूल्य क्रमशः 2.07 ± 0.13, 1.02 ± 0.04 और 12.86 ± 0.35 मिले। अकर्मिक विधि द्वारा पेट्रोलियम इथर, बेंज़ीन और इथाईल एल्कोहल में निष्कर्षण मूल्य क्रमशः 2.07 ± 0.13, 2.40 ± 0.30 और 13.18 ± 0.35 देखे गये। गुणात्मक विश्लेषण अध्ययन में प्रोटीन, सेपोनिन्स और स्टीरोइड्स को छोड़कर सभी पादपीय रसायन घटक देखे गए।

शब्द कुंजीः दीदान–ए–अमा, पेट के कीड़े, गुणवत्ता मानक, सफूफ–ए–बरंगी

Calcination of *Abrak Safaid* in Muffle Furnace following Different Methods of Detoxification

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Abstract

Kushta Abrak Safaid is a unani formulation used in the treatment of Sual(chronic cough/Bronchitis) and Zeequn Nafas (Asthma), (Anonymous 2006). *Kushtajaat (calcines)* are organo-mineral fine particles prepared by treating mineral with several herbs and subjected to precise heat treatment. The present study aims at comparing physico-chemical evaluation of *Kushta Abrak Safaid* prepared by two different methods of detoxification. *Abrak* was detoxified by two methods as mentioned in Unani literature and their *kushtas (calcines)* were prepared. Finished products were compared for physico-chemical characteristics. Results suggest that physico-chemical constant of both *kushtas* were similar without any significant difference.

Keywords: Abrak (Mica), Bronchitis, Detoxification, *Kushta (calcine)*, Physico-chemical Properties,

Introduction

The process of calcination enhances the absorption of drug in the body and increases its efficacy manifold. In the past it was believed that minerals are incompatible with human system but research shows that their moderate presence in the body is essential for human health (Dandiya, et al, 1989). In Unani Medicine and other alternative systems of Medicine, these metals and minerals are mostly used in calcined form and called as *kushta. Kushta* is known by various vernacular names like *Rasayana*, Elixir, *Kimiya* and *Ikseer* (Mahdi Hassan, 1979; Bajaj, et al., 2000). It is an organo-metallic substance treated with a quantum of heat to induce thermal decomposition in drug which produces rapid remedial effect after entering into the body. In Unani system of Medicine, Abrak (Mica) has been used effectively since long for the treatment of various disorders. Internally, it is used in the form of *kushta*. But before making its *kushta*, it is always subjected to detoxification in order to enhance its therapeutic actions and remove the unwanted or toxic properties (Khaleefatullah, et al., 2009). Various detoxification procedures of *Abrak* are mentioned in classical texts which are still in practice. Unani scholars claim that different detoxification methods do not necessarily affect physico-chemical properties of the end products. However, this claim has not been scientifically tested. Therefore, the present study aims to prepare *Kushta Abrak Safaid* by detoxifying it in two different ways as well as to compare the physico-chemical properties of both the products to find out whether the two *kushtas* significantly differ from each other or not.

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Methodology

Abrak safaid and milk were purchased from the local market in Bangalore. *Gheekwar* (*Aloe barbadensis* Mill.) was procured from the herbal garden of National Institute of Unani Medicine, Bangalore. *Shora Qalmi* (Potassium nitrate) of analytical grade was purchased from Shrinivasa chemical shop, Rajaji Nagar, Bangalore.

Methods of Detoxification *(Tasfiya)* of *Abrak Safaid*

Before subjecting to *kushtasazi (calcination process)*, *Abrak Safaid* was purified as per classical literature. Generally, all raw drugs are sourced from the mines so there are always chances of impurities, toxicity and heterogeneous qualities. *Tasfiya* (detoxification) is a time tested method to eliminate all such impurities as well as to induce certain good qualities to enhance its pharmaco-therapeutic properties (Neeralagi, 2010).This process results in the conversion of impure mineral into pure or organo-mineral form, ready to be calcined (Tariq, 2013). If purification (*tasfiya*) is not performed, their use is said to be harmful to the individual (Chopra, et al., 1982).

First Method of Detoxification

The layers of *Abrak* were first separated by pounding with mortar and pestle (Fig. 1). The small pieces of *Abrak* were tied loosely in a bag of thick cotton cloth along with date (*Phoenix dactylifera*) seeds. The bag was then dipped in lukewarm water and rubbed vigorously (Fig. 2). Small particles of *Abrak* were then squeezed out of the bag. The process of dipping the bag in hot water and rubbing was repeated till all the particles of *Abrak* were squeezed out of the bag. The particles were allowed to settle down at the bottom of the vessel and the water was decanted. *Abrak* particles were then collected and allowed to dry. The dry particles are called *Abrak Mahloob* (Fig. 3) (Anonymous, 2007).

Fig. 1: Raw *abrak*

Fig. 2: *Dhanab* process

Fig. 3: *Abrak mahloob*

Second Method of Detoxification

Abrak was heated on fire (Fig. 4) until it became red (Fig. 5) and then dipped into 100 ml of milk (Fig. 6). The procedure was repeated seven times (Hafeez, Sanat'ut Taklees 2005).

Fig. 4: Raw *Abrak* during heating

Fig. 5: *Abrak* after red hot stage

Fig. 6: *Abrak safaid* after dipping in milk

Method of Preparation of *Kushta Abrak Safaid* (KAS)

KAS was prepared as per the method mentioned in *Kitabut Taklees* with a slight modification,ie; instead of using the cow dung cakes method it was prepared in furnace because being a closed chamber, furnace gives better temperature control (Tariq, 2013, Chaturvedi, et al., 2011), isolation of material being heated and saves time and labour (Chaturvedi, et al., 2011). Twelve gram of *Abrak Safaid purified* (*musaffa*) was dipped in *Luab-e- Gheekwar* (*mucilage of Aloe barbadensis*) (Fig. 7) and placed inside Muffle Furnace and heated (Fig. 8). For the operation of heat, thermo gram of 12 kg of cow dung cakes cited by Kumar et al. 2012 was followed as same quantity of cow dung cakes was used for the preparation of KAS. After self cooling, 18g *Shora Qalmi* dissolved in 20 ml of water was added (Fig. 9) and again heated (Fig. 10) by following the same heat pattern. After self cooling, *kushta* was removed and dipped in one liter of water (Fig. 11) and kept undisturbed for 2-3 hours so as to remove *Shora Qalmi*. Afterwards, water was removed and *kushta* was dried on heater. After complete drying, KAS (Fig. 12) was stored in an air tight bottle.

Fig. 7: *Abrak* flakes dipped

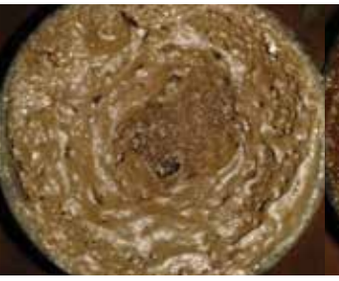

Fig. 8: After 1st puta (Heating)

Fig. 9: After addition of *shora*

Fig. 10: After 2nd puta

Fig.11: *Kushta* dipped in water

Fig. 12: Final *Kushta Abrak Safaid*

Observations

The prepared *kushtas* were evaluated for classical parameters like organoleptic properties, classical parameters of *kamil kushta* (perfect calcine) like floating test (Tariq, et al., 2013), grain floating test (Mohaptra, et al., 2010), fineness test (Tariq, 2013) as well as modern scientific parameters like bulk density, tapped density (Ahmed, et al., 2013), Hausner's ratio (Qui, et al., 2006), Carr's compressibility index (Ghosh, et al., 2008) in density tester by LABINDIA model no. 1025. pH in 1% and 10% solution (Anonymous, 2006) by digital pH meter by Eutech instruments model no. 1544421, loss of weight on drying (Anonymous, 2006) in hot air oven by LABLINE, Anmatrix instrument technologies. Total ash (Anonymous, 2007), acid insoluble ash, water soluble ash (Anonymous, 2007) and extractive values (Anonymous, 2011) were also evaluated.

Results and Discussion

Ideally, *Kushta* should be tasteless, odorless and lusterless. Both KAS were tasteless, odorless, smooth to touch and lusterless (Table 3). KAS-1 was yellowish white and KAS-2 was complete white. Floating, grain floating, finger and wall stick test were positive for both *kushtas* (Fig.13-18). These findings imply that both the *kushtas* were perfect (*kamil*) as per classical Unani literature.

Fig.13: Floating test KAS-1

Fig.14: Rice floating on KAS-1

Fig. 15: Finger test KAS-1

Fig. 16: Floating test KAS-2

Fig. 17: Rice floating on KAS-2

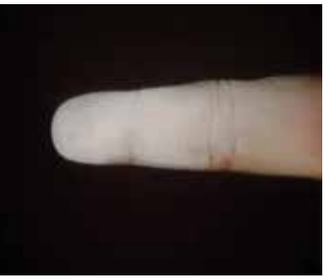

Fig. 18: Finger test KAS-2

The mean value of bulk and tapped density of KAS-1 and KAS-2 were 0.50± 0.00 gm/ml, 0.83± 0.00 gm/ml and 0.49±0.00, 0.83± 0.03 gm/ml respectively (Table 4). Bulk density is the mass per unit volume of a loose powder bed. It is an essential parameter for process development of solid dosage manufacturing. It indicates the amount of powder that can fit in a space. The tapped density represents the random dense packing of the material and is generally higher for regularly shaped particles (i.e. spheres) as compared to irregularly shaped particles such as needles (Qui, et al., 2006). The mean value of Hausner's ratio and compressibility Index of KAS-1 and KAS-2 were 1.69± 0.00,40.23± 0.24% and 1.78± 0.00, 40.39±0.25 % respectively (Table 4).Compressibility index is a measure of relative importance of inter-particle interactions. In a free flowing particle, these interactions are generally less significant; so bulk density and tapped density values are closer. For poorly flowing materials, there are frequently greater inter particle interaction which results in lower bulk density and a greater difference between bulk and tapped densities. These differences in particle interactions are reflected as compressibility index (Qui, et al., 2006). Compressibility index of kushtas were more than 37 and indicated that both *kushtas* have very, very poor flow properties (Aulton, 2009). However, the compressibility index of KAS-1 was less than that of KAS-2 indicating that KAS-2 was more compressible than KAS-1.

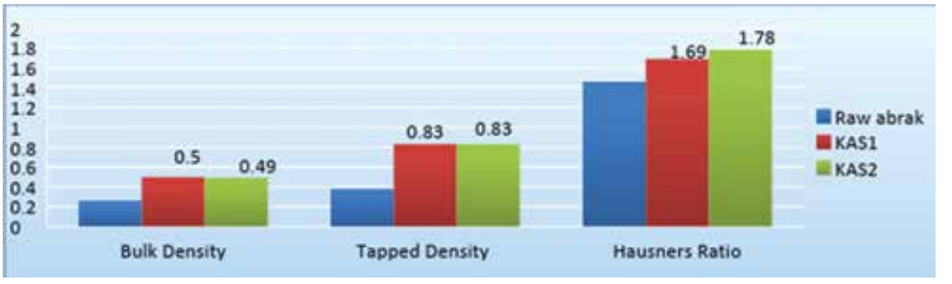

Fig.19: Comparative Bulk density, tapped density and Hausner's ratio of raw *abrak*, KAS-1 and KAS-2

pH values of both *kushtas* were alkaline. The pH value of KAS-1 and KAS-2 was 9.96± 0.01 and 9.60± 0.01 respectively in 1% and 10.87± 0.00 and 10.30± 0.01

respectively in 10% aqueous solution (Table 4). These results are in accordance with the fact that the pH value of water solutions of metallic oxides is basic (Qasmi, 2003). The percentage of loss of weight on drying at 105°C was found to be 0.095± 0.00 and 0.094± 0.00 in KAS-1 and KAS-2 respectively (Table 4). Shelf life of *kushta* as mentioned in classical literature is infinite and they become more and more potent with the advent of time. This negligible amount of moisture might be the factor responsible for high shelf life as it would not provide any medium for the growth of the microbes and restricts the chemical reactions. The mean percentage values of the total ash, acid insoluble ash, water soluble ash and water insoluble ash in KAS-1 were 93.04± 0.05%, 5.98± 0.01 %, 6.59± 0.07% and 86.45± 0.07 % respectively and 97.26± 0.03 %, 6.84± 0.01 %, 7.48± 0.00 % and 89.77± 0.04% respectively in KAS-2 (Table 4). High ash value in both *kushtas* showed the presence of very high inorganic content.

Fig. 20: Comparative total ash (TA), water insoluble ash (WIA), acid insoluble ash (AIA) and water soluble ash (WSA) of raw *Abrak*, KAS-1 and KA-S2

The mean percentage of the extractive value of KAS1 in petroleum ether, acetone, ethanol and water were 0.00± 0.00, 0.46± 0.03, 1.43± 0.03 and 5.23± 0.03 respectively and KAS 2 were 0.00± 0.00, 0.6± 0.00, 1.73± 0.03 and 5.73± 0.03 respectively (Table 4). Extractive values help in the determination of adulteration. *Kushta* extractive value is performed to extract out organic matter (Rasheed, et al., 2011). Low extractive values were indicative of very low organic matter and maximum quantity of inorganic substance in both *kushtas*.

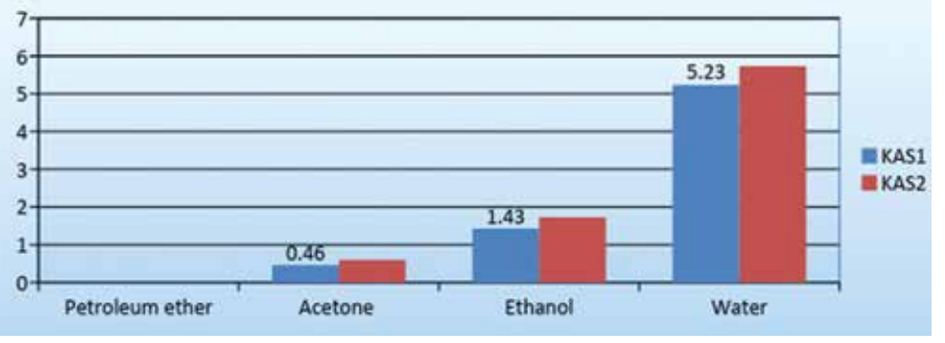

Fig. 21: Comparative extractive values of KAS-1 and KAS-2 in petroleum ether, acetone, ethanol and water

***LOD- Loss of weight on drying, AIA-Acid insoluble ash, WIA- Water insoluble ash, WSA-Water soluble ash**

Conclusion

The data generated from the present study suggest that the physico-chemical characteristics of KAS-1 and KAS-2 were similar without any significant difference before and after calcination. However, these kushtas(calcines) may be analyzed using more advanced and sophisticated analytical instruments like XRD, Particle size distribution, SEM, TEM, Energy Dispersive X Ray and AFM methods. Furthermore, work needs to be done using various animal models to evaluate the extent and scope of absorption and their elemental effect at tissue level.

Table 1: Observations while Detoxification of *Abrak*

S. No	Method	Weight Before detoxification (g)	Weight After detoxification (g)
1.	Method 1	50	48.62
2.	Method 2	50	49.70

Table 2: Physical Constants of Raw *Abrak*

S. No	Properties	Raw abrak
1.	Nature	Flaky (separable in thin layers)
2.	Colour	Greyish yellow
3.	Fracture	Uneven
4.	Luster	Splendent
5.	Cleavage	Absent
6.	Tenacity	Flexible
7.	Transparency	Translucent
8.	Hardness	2.5
9.	Specific gravity	2.6

Table 3: Preliminary Tests of Raw *Abrak*, KAS-1 and KAS-2

Properties	Raw *Abrak*	KAS-1	KAS-2
Colour	Greyish yellow	Yellowish white	White
Odour	Odourless	Odourless	Odourless
Taste	Tasteless	Tasteless	Tasteless
Touch	Smooth	Very Smooth	Very Smooth
Floating test	Absent	Present	Present
Fineness test	Fine	Very fine	Very fine
Wall stick test	Absent	Present	Present
Finger test	Negative	Positive	Positive
Lusture	Present	Absent	Absent

Table 4: Physico-chemical Parameters of Raw abrak, KAS1 and KAS2

	Raw Abrak	KAS Method 1				KAS Method 2			
Parameters	**Mean ± SEM**	**1**	**2**	**3**	**Mean ±SEM**	**1**	**2**	**3**	**Mean ±SEM**
Bulk Density	0.26± 0.00	0.50	0.50	0.50	0.50± 0.00	0.50	0.49	0.50	0.49± 0.00
Tapped Density	0.38± 0.00	0.84	0.83	0.84	0.83± 0.00	0.83	0.83	0.84	0.83± 0.03
Hausner's Ratio	1.46± 0.00	1.69	1.69	1.69	1.69± 0.00	1.78	1.787	1.78	1.78± 0.00
Carr's Index	31.57± 0.22	40.47	39.75	40.47	40.23± 0.24	39.75	40.96	40.47	40.39± 0.25
pH (1%)	7.92± 0.01	9.94	9.97	9.98	9.96± 0.01	9.59	9.63	9.60	9.60± 0.01
pH (10%)	7.78± 0.01	10.86	10.89	10.87	10.87± 0.00	10.28	10.33	10.29	10.30± 0.01
LOD* (%)	0.2± 0.00	0.095	0.095	0.095	0.095± 0.00	0.094	0.094	0.094	0.094± 0.00
Total ash (%)	97.45± 0.02	92.97	93.16	93.01	93.04± 0.05	97.20	97.31	97.27	97.26± 0.03
AIA* (%)	95.10± 0.01	5.97	6.01	5.98	5.98± 0.01	6.85	6.81	6.87	6.84± 0.01
WIA* (%)	96.85± 0.06	86.32	86.47	86.56	86.45± 0.07	89.70	89.84	89.79	89.77± 0.04
WSA* (%)	0.6± 0.07	6.65	6.69	6.45	6.59± 0.07	7.5	7.47	7.48	7.48± 0.00
Extractive values									
Petroleum ether	-	0.00	0.00	0.00	0.00± 0.00	0.00	0.00	0.00	0.00± 0.00
Acetone	-	0.5	0.5	0.4	0.46± 0.03	0.6	0.6	0.6	0.6± 0.00
Ethanol	-	1.4	1.5	1.4	1.43± 0.03	1.7	1.7	1.8	1.73± 0.03
Water	-	5.2	5.2	5.3	5.23± 0.03	5.7	5.8	5.7	5.73± 0.03

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सारांश

डिटॉक्सिफीकेशन की विभिन्न विधियों द्वारा अब्रक सफ़ेद का मफल फर्नेस में निस्तापन

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कुश्ता अब्रक सफेद एक यूनानी मिश्रण है जो सुआल (स्थायी खांसी/श्वसनीशोथ) और ज़ीक़ुन नफ़्स (अस्थमा), के उपचार में उपयोग की जाती है। कुश्ताजात (कैल्सीन) ऑग्रेनो–खनिज महीन कण होते हैं जो खनिज के कई जड़ी–बुटियों से उपचार द्वारा तैयार किये जाते हैं और उचित ताप–उपचार के अधीन होते हैं। वर्तमान अध्ययन का उद्देश्य कुश्ता अब्रक सफेद के भौतिक–रासायनिक मूल्यांकन की तुलना करना है जो डिटॉक्सिफीकेशन की दो विभिन्न विधियों से तैयार की गईं है। अब्रक का यूनानी साहित्य में वर्णित दो विधियों से डिटॉक्सिफीकेशन किया गया और उनके कुश्तास (कैल्सीन) को तैयार किया गया। संपूर्ण उत्पादों की भौतिक–रासायनिक विशेषताओं के लिए तुलना की गई। परिणाम बताते हैं कि दोनों कुश्तास की भौतिक–रसायनिक स्थिरता समान थी।

शब्द कुंजीः अब्रक, श्वसनीशोथ, डिटॉक्सिफीकेशन, कुश्ता (कैल्सीन), भौतिक रसायन, गुण

Pharmacopoeial Standard Development and Quality Assessment Studies of Asu. Drug Roughan-E-Qaranfal or Laung Taila (Clove Oil)

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Abstract

Roughan-e-Qaranfal or Laung Taila (Clove Oil) is useful for treatment of Dyspepsia, Indigestion or Acidity (Su-e-Hazam), Ozostomia, Oral Sepsis or relieving tastelessness and Bad breath, Toothache, Muscular pain (Waj-ul-Asnam), Analgesic (Musakkin-e-Alam), Hepatitis or Weakness of Liver (Zof-e-Kabid), Weakness of Stomach (Zof-e-Meda), Respiratory disorder, Asthma, Breathing difficulty etc. Three batch study samples of these compound formulations were prepared in the Pharmacy, DSRU, CRIUM, Hyderabad by employing authenticated standard methods. The quality assessment physico-chemical research data were investigated and the presence of Arachis oil, Cotton seed oil, Sesame oil and Mineral oil were found negative in clove oil samples. The TLC/HPTLC studies of petroleum ether extracts of the drug samples showed various spots along with their R*f* values at UV-254nm, UV-366nm and in visible light by applying derivatizing agents, i.e. Iodine vapors and 5% methanolic sulphuric acid reagent. The quality control and assurance studies results revealed the absence of hazardous and toxic contamination. The R*f* values of separated spots also show the indication of enhanced presence of bioactive phytochemical constituents.

Keywords: Acidity, Hepatitis, Indigestion, Roughan-e-Qaranfal or Laung Taila.

Introduction

Herbal medicines are complex chemical mixtures obtained from plant and used in healthcare in both developed and developing countries. In the present era, universal trend has been shifted from synthetic to herbal medicine i.e., return to Nature (Sharma et al., 2008). Ayurveda, Siddha and Unani are the plant based system of medicines. As per Unani system of medicine, the drug Roughan-e-Qaranfal or Laung Taila (Clove oil) is frequently recommended for Ozostomia or Oral sepsis (Bakhr-ul-Fam), Toothache or Muscular pain (Waj-ul-Asnam), Weakness of the Stomach (Zof-e-Meda), Hepatitis or Weakness of Liver (Zof-e-Kabid), Dyspepsia (Sue-Hazm), Flatulence in the stomach and Colic (Nafkh-e-Shikam Qulanj) problems. As per Ayurvedic System of Medicine, it is used for respiratory disorder (Svasa), vomiting (Chardi), bloating or gaseous distension of abdomen (Adhmana), wheezing, breathing difficulty (Hikka), cough, cold (Kasa), chronic respiratory disorder (Ksaya or Kshaya), excessive thirst (Trsna or Trushna), indigestion or acidity (Amlapitta), bleeding disorder (Pittasran ashana), asthma (Shwasa) and improving digestion strength (Deepana & Paachan) and taste (Ruchya)(Kabiruddin, 1967; Anonymous, 1989; Anonymous, 2006, Anonymous, 2007(a)

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The drug Roughan-e-Qaranful or Laung Taila (Clove oil) is the fixed essential oil obtained from dried flower buds of *Syzygium aromaticum* (Linn.). Merr. & L. M. Perry. Syn. *Eugenia aromatica* Kuntze, *Eugenia caryophyllata* Thunb. of Myrtaceae family. It is a light brown colored viscous liquid with spicy aromatic odour and astringent sensation of taste. The oil was reported to contain bio-active phytochemical constituents of nearly 36 components with a high concentration of eugenol (88.58%), eugenol acetate (5.62%), β-caryophyllene (1.39%), less concentration of 2-heptaanone (0.93%), ethylhexanoate (0.66%), humuleno (0.27%), α-humulenol (0.19%), calacorene (0.11%) and calamenene (0.10%) (Pulikottil and Nath, 2015; Chaieb et al., 2007). Eugenol (4-allyl-1-hydroxy-2-methoxybenzene), a phenolic non-nutrient compound, is one of the major components with a molecular weight of 164.20 and β-caryophyllene, the other major constituent of clove oil which has a molecule weight of 204.35 (Lee et al., 2002). The Siddha Pharmacopeia of India reported the presence of active constituents such as Caryophyllene oxide, caryphylla-3(12),6-dien-4-ol, caryophylla-3(12),7(13)-dien-6 α-al, eugenol (77.1% of volatile oil), acetophenone, 2-hydroxy,4,6,di-methoxy-5-methylaceto phenone, β-caryophyllene, eugenol acetate, derivative of β-caryophyllene, α-humulene and its expoxide, benzyl salicylate, α-cardinol, γ-decalacetate, fenchone, hexanol, 2-hexanone, methyl palmitate, α-murolene, palustrol, propyl benzoate, α-thujene, β-selinene and eugenine.

Various *in-vivo* and *in-vitro* pharmacological activities were carried out and reported on the plant *Syzygium aromaticum* and its oil content such as antibacterial, antifungal, antioxidant, antistress activity, anti-inflammatory, anticancerous, antiviral, analgesics activity, dental care activity, Mosquito repellent, insecticidal activities and Neuroprotective activity (Wenkhede, 2015; Kessab and Baijomy,2014 ; Kumar et al, 2011). However, one of the impediments in the acceptance of herbal medicines is the lack of standard quality control profiling. Due to the complex nature and inherent variability of the chemical constituents, it is difficult to establish quality control parameters. Hence, this study was designed to standardize the drug Roghan-e-Qaranfal and to arrive at the scientific data for the development of pharmacopeoia in order to gain global acceptance.

Material and Methods

Procurement of the Plant Material

Fresh reddish brown flower buds of Qaranfal or Laung (Clove) - *Syzygium aromaticum* Linn (QF1, QF2 and QF3) were collected from Pharmacy, CRIUM, Hyderabad (procured from authenticated national raw drug vendors of India). The collected raw drug samples were botanically and pharmacognostically identified by the Survey of Medicinal Plant Unit and Drug Standardization Research Units,

CRIUM, Hyderabad. The fresh dried flower bud samples were used for the study after complete assurance of preliminary identity, purity and quality assessment and pharmacognostical test. Analysis of quality control parameters like microbial load, heavy metals and aflatoxins detections were carried out using standard methods

Physico-chemical Screening

Physico-chemical screening of raw drug samples and Roughan-e-Qaranfal (Clove oil) was carried out under the following parameters like foreign matter, moisture contained at 105°C, petroleum ether soluble extractive value and volatile oil content as per the standard methods (Anonymous 1998, Anonymous 2005).

HPTLC Fingerprint of Petroleum Ether Extract

2.5g of each sample was extracted with 30 ml of petroleum ether separately by refluxing on water bath for 30 minutes. The extracts were filtered through Whatman No. 1 filter paper and concentrated to 5 ml in a standard flask separately. HPTLC was performed on 10 cm x 10 cm TLC plates pre-coated with silica gel 60 F_{254} (E. Merck). The samples were applied on plates by using applicator. Linear ascending development to a distance of 8 cm with toulence: Ethyl Acelate (9:1) (v/v) as a mobile phase was performed in a twin-trough glass chamber. The plates were dried in air and visualized under 254 nm and 366 nm for ultra violet detection. Further, the same plates were exposed to I_2 vapours and derivatized with 5% methanolic sulphuric acid spray reagent and densitogram was recorded, Figure 1.

Results and Discussion

The drug Roughan-e-Qaranfal or Laung Taila (Clove oil) has been frequently and widely used since ancient times due to its important miraculous therapeutic and medicinal values. The physico-chemical parameters, High Performance Thin Layer Chromatography (HPTLC) analysis and Quality control parameters of the oil were studied. The mean value of the aromatic oil yield is 45.54%. The physico-chemical parameters data and the quality control parameters data are given in Table 1, 2,3,4,5 and 6. It is inferred from the data that the drug is free from any foreign adulterated materials, microbial load, aflatoxin, pesticide and toxic heavy metals.

The HPTLC Studies of petroleum ether extracts of Roughan-e-Qaranfal drug samples is shown in Figure -1. The chromatogram profile shows three spots at Rf values 0.24, 0.32 and 0.71, (Dark green) under Uv 254 nm and six spots at Rf values 0.14 (Light blue), 0.26(Light blue), 0.32(Blue), 0.46(Indigo), 0.71(Reddish pink) and 0.76 (Light blue) under UV 366nm. After exposure to Iodine vapours,

it shows four spots at Rf values 0.19, 0.32, 0.46 and 0.71, (Dark brown) and five spots at Rf values 0.19(Pink), 0.32(Brown), 0.38(Purple), 0.49(Brown) and 0.71(Dark pink), under visible region after derivatisation with 5% methanolic sulphuric acid and heating the plate at 105ºC for five minutes.

Conclusion

The research study data and comparative quality screening assessment data will provide the preliminary referral supportive information for the development of pharmacopoeial standard.

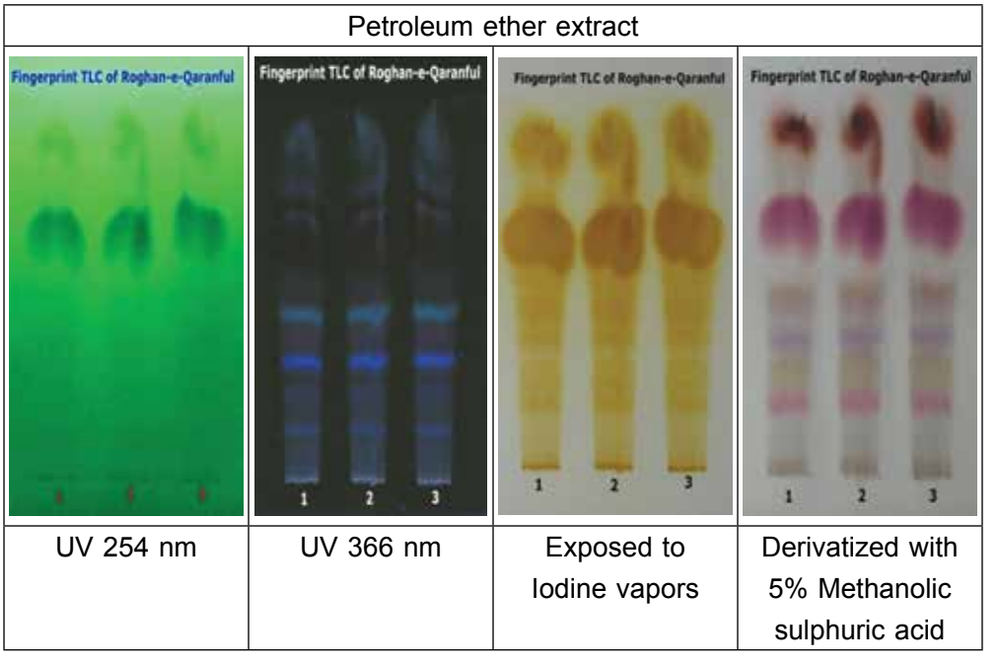

Fig 1: Solvent system: Toluene: Ethyl acetate (9:1 ratio)

Table-1: Oil Yield

Parameters Analyzed	Method applied	Use of solvent	Sample QF1	Sample QF2	Sample QF3	Mean Values
Aromatic oil Yield (%)	Soxhlet hot extraction at 35°C to 45°C temp. for 12 hours and distilled at 45°C to 55°C temp. for 5 hours.	Petroleum Ether (40°C to 60°C)	43.94%	44.36%	48.34%	45.54%

Table 2: Physico-chemical parameters of Roghan-e-Qaranfal

Parameters Analyzed	Sample 1 RQF1	Sample 2 RQF2	Sample 3 RQF3	Mean value
Petroleum ether (40-60°C) Extractive, %, w/v.	100.0	100.0	100.0	100.0
Acid value	2.235	2.745	2.765	2.581

Parameters Analyzed	Sample 1 RQF1	Sample 2 RQF2	Sample 3 RQF3	Mean value
Iodine value	5.023	5.244	5.352	5.206
Peroxide value	14.889	15.127	17.906	15.974
Unsaponifiable matter	1.756	1.821	1.856	1.811
Refractive Index	1.5375	1.5390	1.5396	1.5387
Weight per ml.(gm.)	0.7022	0.7056	0.7035	0.7037
Arachis oil	– ve	–ve	–ve	–ve
Cotton seed oil	–ve	–ve	–ve	–ve
Sesame oil	–ve	–ve	–ve	–ve
Mineral oil	–ve	–ve	–ve	–ve

Table-3: Estimation of Microbial Load

S. No.	Parameters Analyzed	Results			WHO & API / UPI Part-II Limits
		Sample RQF1	Sample RQF2	Sample QF3	
1.	Total Bacterial Count	Nil	Nil	Nil	10^5 cfu/gm.
2.	Total Fungal Count	Nil	Nil	Nil	10^3 cfu/gm.
3.	*Salmonella Spp.*	Absent	Absent	Absent	Nil
4.	*Staphylococcus aureus*	Absent	Absent	Absent	Nil
5.	*Escherichia coli*	Absent	Absent	Absent	Nil

Table 4: Estimation of Aflatoxins

S. No.	Parameters Analyzed	Results			WHO & API / UPI Part-II Limits
		Sample - RQF1	Sample - RQF2	Sample - RQF3	
1.	B1	Not detected	Not detected	Not detected	0.5 ppm.
2.	B2	Not detected	Not detected	Not detected	0.1 ppm.
3.	G1	Not detected	Not detected	Not detected	0.5 ppm.
4.	G2	Not detected	Not detected	Not detected	0.1 ppm.

Table 5: Estimation of Pesticide Residues

S. No.	Parameters Analyzed	Results			WHO & API / UPI Part-II Limits (mg/kg)	Relative Retention time (as per GLC applied method)
		Sample RQF1	Sample RQF2	Sample RQF3		
1.	Aldrin	N/D	N/D	N/D	0.05	0.68
2.	Dieldrin	N/D	N/D	N/D	0.05	0.87
3.	DDE (all isomers)	N/D	N/D	N/D	1.0	0.81-0.87

S. No.	Parameters Analyzed	Results			WHO & API / UPI Part-II Limits (mg/kg)	Relative Retention time (as per GLC applied method)
		Sample RQF1	Sample RQF2	Sample RQF3		
4.	Azinphos-methyl	N/D	N/D	N/D	1.0	1.17
5.	Chlorfenvinphos	N/D	N/D	N/D	0.5	1.00
6.	Endrin	N/D	N/D	N/D	0.05	0.91
7.	Chlorpyrifos	N/D	N/D	N/D	0.2	0.70
8.	Chlorpyrifos-methyl	N/D	N/D	N/D	0.1	0.60
9.	Cypermethrin	N/D	N/D	N/D	1.0	1.40
10.	DDT (all isomers)	N/D	N/D	N/D	1.0	0.95-1.02
11.	Deltamethrin	N/D	N/D	N/D	0.5	1.54
12.	Diazinon	N/D	N/D	N/D	0.5	0.52
13.	Dichlorvos	N/D	N/D	N/D	1.0	0.20
14.	Ethion	N/D	N/D	N/D	2.0	0.96
15.	Fenitrothion	N/D	N/D	N/D	0.5	0.96
16.	α- Endo sulfan	N/D	N/D	N/D	3.0	0.82
17.	Fenvalerate (all isomers)	N/D	N/D	N/D	1.5	1.47-1.49
17.	Heptachlor	N/D	N/D	N/D	0.05	0.61
18.	Hexachlorobenzene	N/D	N/D	N/D	0.1	0.45
19.	Lindane (gamma-HCH)	N/D	N/D	N/D	0.6	0.49
20.	Malathion	N/D	N/D	N/D	1.0	0.67
21.	Parathion methyl	N/D	N/D	N/D	0.2	0.66
22.	Permethrin	N/D	N/D	N/D	1.0	1.29-1.31
23.	Phosalone	N/D	N/D	N/D	0.1	1.18
24.	Pirimiphos methyl	N/D	N/D	N/D	4.0	0.66

Note: Where N/D = Not detected

Table 6: Estimation of Heavy Metals

S. No.	Parameters Analyzed	Results			WHO & API / UPI Part-II Limits
		Sample - RQF1	Sample - RQF2	Sample - RQF3	
1.	Arsenic	Not detected	Not detected	Not detected	3.0 ppm.
2.	Cadmium	Not detected	Not detected	Not detected	0.3 ppm.
3.	Lead	Not detected	Not detected	Not detected	10.0 ppm.
4.	Mercury	Not detected	Not detected	Not detected	1.0 ppm.

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सारांश

एएसयू औषधि रोग़न-ए-क़रंफल या लौंग तेल का भेषज मानक विकास और गुणवत्ता अध्ययन

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रोग़न–ए–क़रंफल या लौंग का तेल अपच, बदहजमी या अम्लता (सू–ए–हज़म), ओजोस्टोमिआ, मौखिक पूति या स्वादरहितता से छुटकारा और सांस की बदबू, दांत दर्द, मांसपेशियों में दर्द (वज–उल–असनाम), दर्दनाशक (मुसक्किन–ए–अलम), यकृत शोथ या यकृत की कमज़ोरी (ज़ोफ–ए–कबिद), पेट की कमज़ोरी (ज़ोफ–ए–मैदा), श्वसन संबंधी विकार, अस्थमा, सांस लेने में कठिनाई इत्यादि के उपचार के लिए उपयोगी है। इस यौगिक मिश्रण के नमूने तीन बैच में प्रमाणिक मानक विधियों के तहत औषधि मानकीकरण इकाई – केन्द्रीय यूनानी चिकित्सा अनुसंधान संस्थान, हैदराबाद की फार्मेसी में तैयार किये गये। औषधि का गुणवत्ता मूल्यांकन भौतिक रासायनिक अनुसंधान डाटा के आधार पर किया गया और दूसरे तेल के नमूने जैसे अराकिस तेल, कपास के बीज का तेल, तिल का तेल और खनिज तेल की जांच के आधार पर देखा गया। औषधि में ये सभी तेल अनुपस्थित पाए गए। औषधि के पेट्रोलियम ईथर उद्धरण का अध्ययन के पश्चात् यू.वी. 254 एन.एल., यू.वी. 366 एन.एल. और दृश्य प्रकाश में विभिन्न बिन्दु एवं चिन्ह उनके आर. एफ. मूल्य पाए गए। गुणवत्ता अध्ययन एवं प्रतीति अध्ययन के परिणाम से खतरनाक व ज़हरीले पदार्थों की अनुपस्थिति का पता चला। विभिन्न आर.एफ. बिन्दुओं में से माना गया कि औषधि में अनेक प्रकार के जैवसक्रिय और पादपकीय रसायन उपस्थिति हैं।

शब्द कुंजी: अम्लता, यकृत शोथ, बदहजमी, रोगन–ए–करंफल, लौंग का तेल

Anti Psoriatic Effect of Leech Therapy in Psoriasis - A Case Report

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Abstract

Taqashshur Jild (Psoriasis) is a common, genetically determined and inflammatory skin disorder of unknown cause which affects 1-3 percent of world's population. Despite the advancement in modern pharmacotherapy, the figure in terms of remission and recurrence of disease, withdrawal symptoms and adverse side effects grossly suggest the limitation in its management. Unani physicians have been successfully treating Psoriasis (*Taqashshure Jild*) through *Irsale Alaq* (leech therapy) since ancient times but lacks scientific documentation. Hence, it was decided to carry out a case report to evaluate the safety and efficacy of leech therapy (Hirudinaria granulose) in a case of Psoriasis on scientific parameters. Diagnosis was made on the basis of clinical presentation. Primary outcome measure was based on VAS and PASI. Secondary outcome measure was evaluated by VAS sub score and VAS total score during the study with photographic evidence. Leech therapy was found to have significant effect in the treatment of Psoriasis. PASI was found to be significant. Further, no side effect was observed during and after the study.

Keywords: Case report; *Irsale Alaq* (leech therapy); Psoriasis; *Taqashshur Jild*

Psoriasis is a chronic inflammatory skin disorder clinically characterized by erythematous, sharply demarcated papules and rounded plaques, covered by silvery micaceous scale. Raised patches of dead skin develop on the arms, back, chest, elbows, legs, nails, folds between the buttocks and scalp because Psoriasis causes skin cells to mature in less than a week and the body cannot shed the old skin as rapidly as new cells rise to the surface. It is often precipitated by trauma, emotional stress, winter season, infections, medication etc. (Valia et al. 2010)

Current recommendations for managing Psoriasis focus on relieving symptoms i.e pain and itching rather than cure. Treatment options for Psoriasis are non-pharmacologic therapy i.e Emolients and Balenotherapy and pharmacologic therapy i.e topical pharmacotherapy as Salicylic acid Topical Corticosteroids and Vitamin D3 Analogues (Valia et al., 2010; Wells et al., 2009). Second-line topical pharmacotherapy as Coal Tar and Anthralin (Longo et al., 2012), first-line systemic pharmacotherapy as Inflixmab and Etanercept and the second-line systemic pharmacotherapy as Acitretin, Cyclosporine and Methotrexate were used (Valia et al., 2010; Wells et al., 2009). Phototherapy as UVB (290 to 320 nm) is often used in treating Psoriasis (Longo et al., 2012). Side effect of these treatments are erythema, photoaging, dry skin and pigmentation (Khanna., 2011). Photochemotherapy i.e. PUVA which means administration of psoralens and subsequent long wave UVA radiation. Commonly used psoralen is 8-methoxy psoralen (8-MOP) in a dose of 0.6 mg/kg on alternate days or 4, 5, 8 trimethoxypsoralen (Wells et al., 2009). Side effects of this treatment are Nausea, vomiting, headache, drug fever, cataract and hepatitis (Marks, 2003). These traditional therapies are often ineffective and may cause unwanted and

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severe side effects. These disadvantages warrant for an evaluation of the risks and benefits of the therapies in comparison with a less toxic one for Psoriasis.

The term *Taqashshure Jild* may be used for Psoriasis. Unani medicine has a history of treating Psoriasis by using various drugs through regimens like *Dalk (Massage), Hijamat bil Shart (Wet cupping) and Bila Shart (Dry cupping), Takmeed (Hot fomentation), Irsale Alaq (Leech), Zimaad (Medicated Paste), Tila (Less viscous medicated Paste), Nutool (Irrigation)* etc, though these regimens are not still validated scientifically (khan et.al., 2012; Ibne Sina., 1408 Hijri).

Irsale Alaq (Leech therapy) is one of the most applicable and used therapies in Unani system of Medicine. Medicinal leeches are best known for their blood feeding habits and for their use in the art of phlebotomy i.e bleeding. Although their medicinal use is declined in Europe and America, this therapy has always occupied an important place in Unani system of Medicine to manage various ailments including Psoriasis. It is constantly being practised in India, Iran and Pakistan by the Unani Physicians. Hirudine, one of the biologically active substances in leech saliva, was identified as the most potent known natural inhibitor of coagulation. European medicinal leech, *Hirudo medicinalis* has recently been rediscovered and is used by the plastic surgeons to aid salvage of compromised venous engorged tissue, including free and pedicled flaps, amputated digit, ears and nasal tips. Besides hirudine, various anti-inflammatory substances and hyaluronidase have been found in leech saliva. Keeping the traditionally safe and effective therapeutic use of the Hirudinaria granulose species in India and to rationalize the idea scientifically, the study was conducted (khan et.al.,2012; Ibne Sina., 1438 Hijri).

Methodology

Being a case report study, a male patient aged 41 years, resident of Ghanteswer (Odisha), a case of Psoriasis was taken after getting written consent from him for initiation of the study. The diagnosis was confirmed on the basis of history and physical examination. The patient was subjected to comprehensive general, physical and systemic examination. A thorough clinical examination of skin was done for its colour, pallor, cyanosis, icterus, erythema, induration, scaling, vesicle, pustule, papule, exudation, site, shape, border, surface, distribution of lesion, Auspitz sign, Signe de la tache de bougie, Membrane of Berkeley and Woronoff's ring to classify the type. The type of case enrolled is Plague Psoriasis. Following investigations were carried out to exclude the patient from the study as well as part of safety evaluation of the patient undergoing the study:

- Routine haemogram to exclude the secondary infection
- Random Blood Sugar to exclude diabetes mellitus
- RFT (Blood urea, S. creatinine) to exclude renal disease.
- LFT (SGOT, SGPT, S. bilirubin) to exclude liver diseases
- S. Uric acid to exclude gout
- HIV to exclude AIDS

- VDRL to exclude syphilis
- CT, BT to exclude haemophilia and other bleeding disorders.

All the findings were recorded in the Case Report Form (CRF), designed especially for the study. The patient was not taking any medication at the time of enrolment. Both calf regions were affected. The severity of the disease activity was recorded on the basis of visual analogue score (VAS). There was no history of diabetes, Hypertension or any other chronic debility. Subjective parameters assessed were Erythema, Induration, Scaling and Itching. Objective parameters include photos of lesions and VAS Scale. Patient was kept under strict observation and advised to come fortnightly in OPD for assessment till completion of the study. Follow-ups were carried out at an interval of 15 days, i.e; on 15th, 30th and 45th day. At every visit, patient was enquired about the progression or regression in their symptoms to assess the clinical findings. Concomitant treatment was not allowed during the study. The Mizaj was assessed on the basis of *Ajinnase Ashra* proforma designed for assessment of Mizaj. The patient was of *Saudavi Mizaj*. The occupation of the patient was labour and belonged to lower economic class.

Method of Leech Procedure

Leeches were obtained from commercially registered sources. Leeches were collected a day earlier. Identification of the leech species was done (Hirudinaria granulose). Leeches were kept in a well labelled container containing dechlorinated water. The physician used gloves to handle leech. The part was prepared where leech was to be attached i.e on the shin of the patients. Once leech was attached it typically remained attached until fully distended. Length of time of feeding was usually from 30- 45 minutes after that they were detached spontaneously. Three to four inches long and four in number leeches were applied on each leg. A leech on an average sucked 5-20 ml depending on its size, desire of feed and site of application. An additional amount of blood (20-30ml) was lost due to slow and continous oozing which lasted for some hours, if bleeding didn't stop by itself. These bites were dusted with powdered lime, cold vinegar or some styptic like *Shib e yamani*. The area was then dressed with an antiseptic solution and tight bandaging was done (St. Vincent Hospital 2007).

The assessment of efficacy in the patient was based on both subjective and objective parameters. Subjective parameters include symptoms like erythema, scaling, induration and itching. Objective parameters were evaluated by Psoriasis Area and Severity Index (PASI) (www.pasi.corti.li) VAS scale and pre and post assessment of photographs. The grading was done on the basis of scores recorded for the patient on each visit such as 4=severe and then gradually, improvement was scored as 3, 2 up to 1. After completion of the treatment, the pre and post treatment values or scores of different parameters (subjective and objective) were assessed and subjected to comparison to evaluate the efficacy of leech. Withdrawal criteria include: Failure to follow the protocol, any adverse reaction or adverse event. It was observed that there was no any adverse event recorded during the course of study.

The case report form and consent form were properly documented and submitted to the Department of *Ilaj bit tadbeer* (Regimenal Therapy) of Regional Research Institute of Unani Medicine. Bhadrak after completion of the study.

Results

Table 1: Effect of Leech on Clinical Parameters in Psoriasis

No. of patient	Clinical parameters	Assessment day			
n=1		0 day	15th day	30th day	45th day
	Itching	4	3	2	1
	Erythema	4	3	2	1

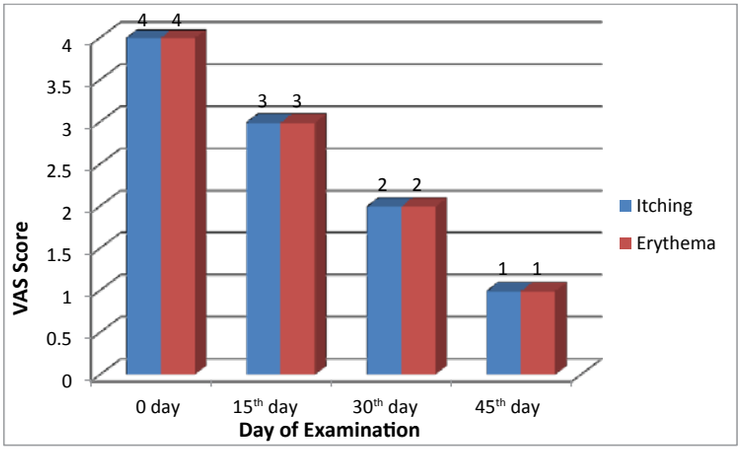


Fig 1: Effect of Leech on Clinical parameters in a case of Psoriasis

Table 2 : Psoriasis Area and Severity Index of the Case

Clinical Parameter (n=1)	Baseline	After 45th day
PASI	14.4	3.6

PASI Score 14.4- 3.6 = 10.8

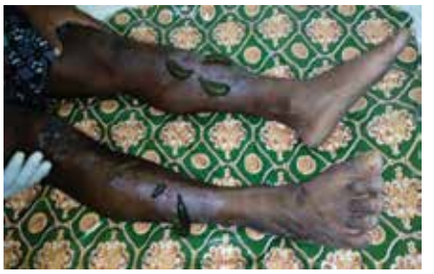
10.8÷ 14.4% = 75% Improvment

Table 3: Effect of Leech on Safety Parameters in Psoriasis

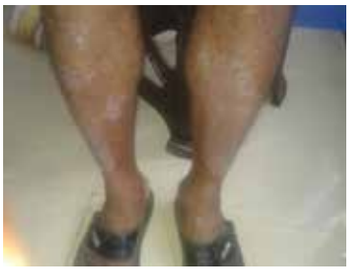
Safety Parameters (n=1)	Baseline	After 45th day
Hb%	13	12
TLC	8242	8275
Poly	58	56
Lympho	36	37
Eosi	3	3
Mono	1	2
Baso	0	0
ESR	15	17.35
RBS	91	90

Safety Parameters (n=1)	Baseline	After 45th day
Blood Urea	24	25
S. Creatinine	0.83	0.84
S. Uric Acid	3	3
SGOT	25.85	24.55
SGPT	24	23
S. Bilirubin	0.6	0.6

Photograph Assessment



Pre-Treatment



Post-Treatment

Discussion

Psoriasis is a chronic inflammatory skin disorder affecting up to 1–3 percent of the world's population; clinically characterized by erythematous, sharply demarcated papules and rounded plaques, covered by silvery micaceous scale. The skin lesions are variably pruritic. It affects both sexes equally and occurs mostly from second to fourth decade of life. It often occurs in families and has a multifactorial inheritance. In India, prevalence of the disease is reported to be 0.7% (Neimann et al., 2006; Dogra, 2010). Being a chronic disease in nature, it causes both physical and mental agony to the patient. Furthermore, chances of recurrence also add to the stigma and agony of the sufferers.

The present case report study was undertaken to evaluate the safety and efficacy of *Irsale Alaq* (Leech) in the management of Psoriasis on modern scientific parameters. The study was conducted at Regional Research Institute of Unani Medicine, Bhadrak, for a period of 45 days from 31st August 2016 to 15th October 2016 on OPD basis. The patient was kept under strict diet restriction. The observations obtained from the trial have been depicted in tables and graphs. The finding of the study is supported by the description of *Razi, Ibn Sina, Ibn Hubul Baghdadi, Ibn Zohr and Hakeem Azam Khan* who have discussed the pathophysiological aspects of the disease in detail and concluded that *Sauda* is the most important cause for the genesis of psoriasis (Razi, 2005; Sina., 1408 Hijri; Zohr 1986; Hubul., 2007; Khan, 1289, Khan, 2006)

The patient under the study had no family history of Psoriasis. This finding is in accordance with the description mentioned by (Valia et al. 2010). The patient was a Labourer. This observation suggests that there may be relation with the

occupation of the patient but no data are available to support this finding. The chronicity of disease was two years and resisted to any kind of treatment. This finding is in accordance with the description given by Burge et al., 2011.

In the present study the patient was suffering from mild anxiety. This is in accordance with the description of Neimann et al., (2006). The sites of lesions of the patient in the study were confined to legs.

Irsale Alaq (Leech) was applied to patient for the management of Psoriasis. The patient was assessed for cure outcome on 0, 15th, 30th and 45th day. The outcome was the extent of alleviation in subjective parameters and reduction in VAS and PASI scores. PASI score shows 75% improvement.

Itching was rated with VAS scores from 0-4. Erythema was rated with scores from 0-4 as described by Valia et al; (2010). The median rating scores on 0, 15th, 30th and 45th day were 4, 3, 2 and 1 respectively. It was found that rating scores for erythema significantly (on day 30 & 45) reduced in comparison to day 0 & 15. Erythema is an important symptom of Psoriasis which subsided to a great extent in the study. The improvement in the erythema in the patient may be due to the *Muhallil* (Resolvent) and *Mudammil Qurooh* (Wound Healing) activities of *Hirudine (A protein found in the saliva of Leech)*. These findings are in accordance with the description given by Khan, 2006 and Khan, 2012.

Reduction in induration is also indicative of improvement in psoriatic lesions (Burns, 2004). This improvement may be due to *Muhallil* (Resolvent), *Mudammil Qurooh* (Wound Healing) and *Murakhkhi* (Emollient) effects of the ingredients present in saliva of Leech (Khan, 2012).

All the parameters related to toxicity of drugs like SGOT, SGPT, Blood Urea, Serum creatinine, ESR, TLC, DLC and Hb% were collected on 0 and 45th day. All the parameters remained within the normal range in the patient after the treatment.

Assessment was also done on the basis of pre and post photographs of lesions which revealed remarkable improvement in the lesions.

The major known enzymes of leech saliva having different functions are as under: (Khan, 2012)

Hirudin: The most well known enzymes, a powerful anti coagualant in existence than heparin

Bdellin: A protease inhibitor thus acts as anti-inflammatory

Apyrase: A powerful platelet anti-aggregate factor thus making blood flow more fluid

Eglin: It is also an inhibitor of inflammation but at the same time it is anti-oxidant

Destabilase: This enzyme has very powerful platelet anti-aggregate activity which acts by dissolving the blood clots, thus opening up very exciting therapeutic avenues.

Hyaluronodase: This acts both as factor of diffusion as an antibiotic.

Lipase and esterases: These substances have lipolytic effect.i.e; dissolves fat and thus can be used for hyperlipidemia.

Anti elastase: This substance acts by limiting the action of elastases which degrade cutaneous elastin particularly at the level of skin.

Vasodilatory: This substance has not yet been identified but it is very similar to histamine.

Conclusion

In the light of the above discussion, it can be concluded that the *Irsale Alaq* (Leech therapy) has significant anti psoriatic effect without demonstrating any sign of toxicity or side effect. The *Irsale Alaq* (Leech therapy) is effective because of it's blood purifying, analgesic, anti inflammatory, detergent and wound healing properties. However, detailed and large sample size studies are required to determine relapse of the disease over a relatively long period of time.

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Conflict of Interest

The authors declare that there is no conflict of interest involved in this study.

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सारांश

सोरायसिस में लीच थेरेपी के सोरीएटिक विरोधी प्रभाव - एक केस रिपोर्ट

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तक़श्शुर जिल्द (सोरायसिस) एक साधारण, आनुवांशिक और अज्ञात कारणों के लिये उत्तेजक तथा त्वचा विकार है जो विश्व की 1–3% आबादी को प्रभावित करता है। आधुनिक फार्माकोथेरेपी में प्रगति के बावजूद, रोग की कमी, पुनरावृत्ति, लक्षणों को ख़त्म करने, प्रतिकूल दुष्प्रभाव के मामलों के आंकड़े इसके अत्यंत सीमित उपचार को दर्शाता है। यूनानी चिकित्सक प्राचीन काल से इरसाल अलक़ (लीच थेरेपी) के माध्यम से सोरायसिस (तक़श्शुर जिल्द) का सफलतापूर्वक उपचार कर रहे हैं परन्तु इसमें वैज्ञानिक दस्तावेजों की कमी है। अतः वैज्ञानिक मापदंडों पर लीच थेरेपी (हिरुडिनेरिया ग्रैनुलोज) की सुरक्षा और प्रभावकारिता का मूल्यांकन करने के लिए एक मरीज का अध्ययन किया गया। नैदानिक प्रस्तुतिकरण के आधार पर निदान किया गया। प्राथमिक परिणाम मान वी.ए.एस. और पी.ए.एस.आई. पर आधारित थे। फोटोग्राफिक सबूत के साथ अध्ययन के दौरान वी.ए.एस. उप अंक और वी.ए.एस. कुल स्कोर द्वारा माध्यमिक परिणाम मान का मूल्यांकन किया गया। लीच थेरेपी से सोरायसिस के उपचार में महत्वपूर्ण प्रभाव पाए गये। पी.ए.एस.आई. में महत्वपूर्ण कमी पाई गई। इसके अतिरिक्त, अध्ययन के दौरान और उसके बाद कोई दुष्प्रभाव नहीं पाया गया।

शब्द कुंजीः केस रिपोर्ट; इरसाल अनक (लीच थेरेपी), सोरायसिस; तकश्शुर जिल्द

Phyto-Pharmacological Aspects of *Bisehri Booti (Aerva Lanata)* and its Uses in Unani System of Medicine : A Review

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Abstract

This review article is an attempt to explore the origin and history of use of *Bisehri Booti (BB) (Aerva Lanata (Linn.)* in Unani system of medicine and to establish the fact that the drug is in fact a part of the rich documentation of the Unani system of medicine. It also recapitulates the action and uses of BB mentioned in Unani classical literature along with the morphology, phytochemistry and pharmacological aspects to provide a direction for further research. The review reveals that the plant, as part of folk medicine, has been used by some Unani Physicians of western Uttar Pradesh, India for cough, strangury (slow to be and painful discharge of urine), headache and Urolithiasis. Further, the authors in this article based on the review suggest that BB has many phytochemical constituents for example; alkaloids, flavanoids, tannic acid etc. in addition to activities like diuretic, anti-inflammatory, hypoglycemic, anti-diabetic, antiparasitic, antimicrobial, hepato-protective, anti-urolithiasis, anti-asthmatic, antifertility and hypolipidemic.

Keywords: *Aerva lanata Linn.* Bisehri booti, Pharmacology, Phyto-Chemistry, Unani Medicine.

Introduction

Bisehri booti (Aerva lanata (Linn.) Juss.; Family Amaranthaceae, is a common weed which grows wild everywhere in the plains of India. BB grows in Asia, Africa, Australia, Sri Lanka, South Asia, Saudi Arabia, Egypt, Java and Philippines (Lakshmi and Lethi 2014). BB is widely used by rural communities of India and Srilanka. It has been used for the treatment of Headache, Diarrhoea, Sore throat and Cough in Srilanka (Anonymous 1990, Trimen 1974). In Bihar region of India, it is used by common people for White urine, Diarrhoea and Snakebite (Jain 1976; Asolkar, et. al. 1992, Nadkarni 1976). The tribes of Rajasthan use the juice and decoction of the roots for treating liver congestion, jaundice, biliousness, dyspepsia, pneumonia, typhoid and other prolonged fevers (Singh & Pandey 1998). The drug was taken up by the traditional systems of medicine like Unani system of Medicine (USM), Ayurveda etc. The basis of such belief is the herbal origin of the USM which is not true. The USM is an exhaustively documented system with strong references of systemic pharmacology of the drugs.

The use of BB as a Diuretic and Anthelmintic agent is mentioned in the classical literature of USM. BB has been used for Haematuria, albuminuria and other nephrological disorders by some Tabeebs and the outcome was good. However, it seems to have been included later as it does not find mention in the important works on *Mufradat, Murakkabat* and *Moalajat* of USM. Although *Aerva lanata* L. is mentioned by Nadkarni (1976) and Kirtikar & Basu (1987) but they have not mentioned the term BB as one of its vernacular names. BB is derived

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from Arabic word Arwa (Collett, 1921). A renowned Unani physician of western Uttar Pradesh, Hakim Abdul Qadir (1930) had mentioned the use of BB in his book *Mujarrabat-e-Qadri* in the treatment of albuminuria, heamaturia, renal and vesicular calculi and prostatitis.

Ibn Baitar (1874) and Najmul Ghani (1921) have mentioned a drug *Aksar* which is somewhat similar in medicinal properties to *Aerva lanata*. Najmul Ghani (1921) has also mentioned that the synonym of *Aksar* is mentioned as *Arwa*. The morphological description mentioned in the books is not identical to *Aerva lanata* but the medical properties are somewhat similar to the plant. A well-known botanist of Aligarh Muslim University, Prof. S.H. Afaq (1991) was the first persi on to establish that *Bisehri booti* is *Aerva lanata* (Linn.) Juss.; Family Amaranthaceae, the other species are *A. Javanica* Burm. and *A. tomentosa* L. which are also commonly used as medicine.

Botanical Description

BB is an erect, prostrate under-shrub which grows as a common weed in the fields and wastelands in hotter plain parts of India. It is 1-4 ft. high, having tap root which is cylindrical and branches arising from the stem or root stock, straight or slightly twisted with many slender, fibrous lateral roots. Externally it is pale yellowish brown in colour and whitish internally with camphoraceous odorous (Thiselton, 1963; Trimen, 1974; Nagaratna et. al. 2014).

Taxonomy

Kingdom: Plantae (Plants)
Sub-kingdom: Tracheobionta (Vascular plants)
Division: Magnoliophyta (Angiospermes, flowering plants)
Class: Magnoliopsida (Dicotylédones)
Subclass: Caryophyllidae
Order: Caryophyllales

Family: Amaranthaceae
Genus: Aerva
Species: *Aerva lanata* (L.) A. L. Juss. ex Schultes

Common name

Ayurvedic: Paashaana bheda, Gorakshaganjaa, Aadaanpaaki, Shatkabhedi
Bengali: Chaya
Delhi: Gedue ki Chal
Hindi: Chaya, Gorkhabundi, Kapurijadi Bhui Kalan
Marathi: Kapurmadhura, Kapurimadhuri, Kapurphuti
Punjabi: Bui-kallan
Rajasthani: Bhui
Sanskrit: Astmabayda
Sindhi: Bui, Jari
Unani: Tarf- dosh,

In some areas of Madhya Pradesh, it is commonly known as Gorakha Benja and Pindikura (Bedi 1978; Dymock, et. al. 1890; Bamber 1916; Collett 1921; Patnayak 1956; Maheshwary 1963; Kirtikar & Basu 1975; Nadkarni 1976; Anonymous 1985).

Morphology

Herb, erect with a long tap-root, branches are many, pubescent or wolly-tomentose, striate generally originated from near the base. Leaves are alternate, 2-2 × 1-1.6 cm on the main stem, 6-10 x 5-6 mm on the branches, elliptic or obovate or subotbicular, obtuse or acute, entire, pubescent above, more or less white with cottony hairs beneath; petioles 3-6 mm long, often obscure (Thiselton, 1963; Trimen, 1974; Kirtikar, et. al. 1975,Nagaratna et. al. 2014).

Flowers are very small, sessile, often bisexual, dense sub-sessile axillary heads or spikes 6-13 mm long, greenish white in colour, sometime closely crowded and forming globose clusters; bracteoles 1.25 mm long, membranous, broadly ovate, concave, apiculate. Perianth 1.5-1.25 mm long; sepals oblong, obtuse, sometimes apiculate, silky-hairy on the back. Utricle broadly ovoid, acute; stigmas two, seed 0.85 mm in diameter, smooth and polished, black (Thiselton, 1963; Trimen, 1974; Kirtikar, et. al. 1975, Nagaratna et. al. 2014).

Part used: The whole plant, flowers, leaves, stem and roots. Both the juice of the fresh plant and extract of the dried plant are common in use (Qadri, 1930; Chunekar & Pandey 2010).

Flowering and Fruiting Season: November to January (Pandey, 2001).

Phytochemistry

BB consists of the following biological active constituents:

Alkaloids

It contains canthin-6-one alkaloids such as 10-methoxy-canthin-6-one, 10-hydroxy-canthin-6-one, 10-O-β-D-glucopyranosyloxycanthin-6-one, 10-hydroxycanthin-6-one (ervine), 10-methoxycanthine-6-one (methylervine), 10-β-D-glucopyranosyloxycanthin-6-one (ervoside), aervine (10-hydroxycanthin-6-one), methylaervine (10-methoxycanthin-6-one) and aervoside (10-β-D-glucopyranosyloxycanthin-6-one), also contains alkaloids like β-carboline-1 -propionic acid, 6-methoxy-β carboline-1-propionic acid, 6-methoxy-β-carbolin-l-ylpropionic acid (ervolanine), and aervolanine (3-(6-methyoxy-β-carbolin-1-yl) propionic acid) (Zapesochnaya, et.al. 1991a; Zapesochnaya, et.al. 1991b; Zapesochnaya, et. al. 1992).

Flavanoids

BB (*Aerva lanata* Linn.) is a rich source of flavanoids such as kaempferol, quercetin, isorhamnetin, isorhamnetin 3-O-β-[4-p-coumaroyl-α-rhamnosyl(1→6) galactoside and flavanone glucoside persinol, persinosides A & B 5, 4'-hydroxy-3, 6, 7-trimethoxyflavone, 5-hydroxy-3, 6, 7, 4-tetramethoxyflavone, 5-hydroxy 2', 3,5', 6, 7-pentamethoxyl flavone, 3,3',5,7-trihydroxy-4'-methoxyflavone, apigenin 7-O-β-D- glucoside and 7-O-β-D-glucopyranoside (Saleh, et. al. 1990; Pervykh, et. al. 1992; Ahmed, et. al. 2006).

Miscellaneous Phyto-constituents

Aerva lanata L. also contains methyl grevillate, lupeol, lupeol acetate benzoic acid, β-sitosteryl acetate and tannic acid (Omoyeni & Adeyeye, 2009).

Nutritive Content

Leaves of BB (*Aerva lanata* L.) contain carbohydrate, crude protein and ash. Some mineral composition revealed that the leaves were high in PO_4, and moderately high in other minerals such as Poatssium, Calcium, Magnesium, Zinc, Ferrous) and Manganese (Omoyeni & Adeyeye, 2009)

Pharmacological Studies

Analgesic Activity

The ethanolic extract of dried aerial part of *Aerva. Lanata* L. showed significant antinociceptive activity which may be through peripheral pain receptors and not by central opioid receptors on acetic acid-induced writhing and hot plate test in mice as compared to aspirin and morphine (Venkatesh, et al. 2009).

Anti-asthmatic Activity

The ethanolic extract of the aerial parts of *Aerva lanata* L. showed anti-asthmatic activity against clonidine -induced catalepsy and it also inhibits mast cell degranulation in mice (Kumar, et al. 2009).

Anti-Diabetic Activity

The alcoholic extract of *Aerva lanata* L. significantly reduces the increased blood sugar level in alloxan-induced diabetes in rats and mice models (Deshmukh, et. al. 2008; Vetrichelvan & Jegadeesan 2002).Single oral administration of methanolic extract of the roots significantly reduces the serum glucose level in streptozotocin-nicotinamide induced type-II NIDDM in rats (Agrawal, et. al. 2013).Methanol and aqueous extracts showed a significant anti-diabetic activity in Streptozotocin induced diabetic rat as compared to Glibeneclamide (Rajesh, et. al. 2014).Seventy percent hydro ethanolic extract significantly improved the fasting blood glucose, insulin level, HbA1c and glycogen content in the liver and muscle as compared to diabetic controls (Riya, et. al. 2014). Ethanolic, aqueous and ethyl acetate leaf extracts showed a significant anti-hyperglycemic activity in normal and streptozotocin induced diabetes in rats (Riya, et. al. 2015).

Anti-Diarrhoeal

Ethanolic and aqueous extracts of *Aerva lanata* L. and *A. javanica* L. showed a significant anti-diarrhoeal activity in charcoal meal test, reduction of the intestinal transit is suggested as mechanism of action (Joanofarc & Vamsadhara 2003). Alcoholic extract of whole plant showed anti-diarrhoeal effect in castor oil, charcoal meal test and PGE2 induced rats by reducing gastro intestinal motality and inhibiting the synthesis of prostaglandin (Sunder, et al. 2011).

Anti-Fertility Activity

The ethanolic extract of the aerial parts of *Aerva lanata* L. showed antifertility activity by anti-implantation, abortificient and decrease motility activity of rat spermatozoa in vitro models (Savadi & Alagawadi 2009).

Anti-Fungal Activity

Ethyl acetate and methanol extract showed antifungal activity against the fungi like *Aspergillus fumigatus, Aspergillus niger, Candida albicans, Hensinela californica* and *Rhizopus oligosporum* as compared to standard clotrimazole (Chowdhury, et al. 2002).

Antihelminthic Activity

Ethanolic extract of seed and leaf extracts of *Aerva lanata* L. showed antihelminthic activity against tapeworms and earthworms than the Albendazole which is used for treating parasite infections (Anantha, et. al. 2010).

Anti-HIV Activity

Hexane, chloroform, ethyl acetate, Acetone and Methanol extracts exhibited HIV-RT inhibition by using Retro sys HIV-1 RT activity against the control drug Azidothymide (Gujjeti & Mamidala 2014).

Anti-Inflammatory Activity

Benzene and alcoholic extract of *Aerva lanata* L. showed significant inhibited carrageenan-induced rat paw edema (Vetrichelvan, et. al. 2000).Plant-derived natural products such as alkaloids, flavonoids, terpenoids and polysaccharides significantly reduce the elevated levels of proinflammatory cytokines and nitric oxide production by lipopolysaccharide (LPS)-stimulated macrophages (Siveen & Kuttan 2012).

Anti-Metastatic Activity

Ethanolic extract showed a significant reduction in tumour nodule formation in B16F-10 melanoma induced lung metastasis mice in three different modalities (prophylactic, Simultaneous and developed metastatis) and also increase the survival rate of metastatic tumour bearing animals (Siveen & Kuttan 2013).

Antimicrobial Activity

Ethyl acetate and methanol extracts of whole plant showed antimicrobial activities against *Bacillus subtilis, Bacillus cereus, Staphylococcus aureus, Escherichia coli, Shigella dysenteriae, Shigella shiga, Shigella sonnei, Shigella flexneriae, Shigella boydii* and *Klebsiella*, (Chowdhury, et. al. 2002; Valsaraj, et. al. 1997; Perumal, et. al. 1999). *Aerva lanata* extracts influenced the growth of Corynebacterium xerosis 1911 (Baronets, et. al. 2001)

Anti-Neurotoxic Activity

Hydro-ethanolic extract of dried part showed dose dependent protective effect in the neurotoxicity induced by cisplatin in experimental rats (Rao, et. al. 2014).

Anti-Oxidant Activity

Aqueous, Ethanol and hydro-ethanolic extracts of whole plant showed antioxidant activity in experimental rats when compared to different standards e.g. Butylated Hydroxytoulene and Ascorbic acid (Ragavendra,et. al. 2012). The petroleum ether and methanol extracts showed significant inhibition of lipid peroxidation in CCl_4 induced toxicity in rats (Ramachandra, et. el. 2013). Aqueous extract of *Aerva lanata* L. stem exhibited high radical scavenging activity, metal chelating activity, reducing power activity and DNA damage inhibition efficiency (Kumar, et. al. 2013).

Anti-Plasmodial Activity

Ethyl acetate and methanolic extracts of whole aerial parts showed promising antiplasmodial activity against the chloroquine resistant INDO strain of P. falciparum and good selectivity indices when tested against the HeLa cell line (Kaushik, et. al. 2015)

Anti Ulcer Activity

Aqueous extract showed significant anti ulcer activity as compared to omeperazole in gastric mucosal lesions in rats caused by ethanol, pyloric ligation, indomethacin and cysteamine (Indukuri, et. al. 2013).

Anti-urolithiatic Activity

Oral administration of *A. lanata* L. and *Vediuppu Chunnam* increased the urinary excretion of calcium, oxalate, uric acid, phosphorous, protein and decreased magnesium excretion in hyperoxaluric rats (Selvam, et. al. 2001). Aqueous suspension reduced the oxalate-synthesizing enzymes and significantly showed anti-urolithiatic activity by diminishing the markers of crystal deposition in the kidney and cytoprotective mechanism (Soundararajan, et. al. 2006; Soundararajan, et. al. 2007a; Soundararajan, et. al. 2007b). Another study on aqueous extract of dried flowers showed better anti-urolithiatic activity than the cystone tablet against ethylene glucol induced renal calculi in experimental rats (Chandirika, et. al. 2013).

Cardio-Protective Activity

Extract of *Aerva lanata* L. showed cardioprotective activity against Doxorubicin induced cardiotoxicity in animal models (Abushouk, et. al. 2017)

Cytotoxic Activity

Petroleum ether, ethyl acetate, methanol extracts and partial purified fraction of petroleum ether in in-vitro and in-vivo studies showed significant cytotoxic properties in Daltons lymphoma ascites (DLA) tumor cell lines and stimulated lymphocyte proliferation (Chowdhury, et. al. 2002; Nevin & Vijayammal 2003; Nevin & Vijayammal 2005b). Ethanolic extract was found to stimulate cell-mediated immunological responses in normal and tumor-bearing BALB/c mice (Siveen & Kuttan 2011; Siveen & Kuttan 2012b). Chloroform and Ethyl Acetate Fraction of flowering aerial part showed significant inhibitory effect for leukaemia, lung, colon and cervix cancer as compared to standard drug mitomycin (Bhanot, et. al. 2013).

Diuretic Activity

The alcoholic extract of *Aerva lanata* L. showed good diuretic effect with respect to acelazolamide in animal models (Vetrichelvan, et. al. 2000). Ethanolic extract of whole plant significantly increase in urine volume, urinary sodium, potassium and chloride levels as compared to frusemide (Kumar, et. al. 2005). Fresh and dried aqueous extract have showed diuretic effect in hydrated rat assay technique (Herath, et. al. 2005). Hydro-alcoholic extract of leaf and root have

showed significant diuretic activity on albino rats as compared to control group (Majumdar, et. al. 1999).

Hepatoprotective Activity

Petroleum ether extractable fraction of the whole plant *Aerva lanata* L. showed hepatoportective activity against liver damage induced by carbon tetra chloride (CCl_4) in Sprague Dawley rats by reduceing hepatic lipid peroxidation and increased the serum total protein and albumin/globulin (A/G) ratio and also significantly reversed the histopathological changes (Nevin & Vijayammal 2005a). Hydro/alcoholic extract significantly reverse the levels of AST, ALP and bilirubin and ALT in paracetamol induced liver damage in rats (Manokaran, et. al. 2008). Hydro-alcoholic extract of leaf and root showed slight hepatoprotective activity (Majmundar, et. al. 1999)

Hypolipidemic Activity

Aqueous suspension of *Aerva lanata* L. showed hypolipidemic activity by reverting total cholesterol and triglyceride levels, phospholipids, high-density lipoproteins, low-density lipoproteins and very low-density lipoproteins levels in calcium oxalate urolithic rats (Soundararajan, et. al. 2007).

Immunomodulatory Activity

Petroleum ether extract of *Aerva lanata* L. showed immunomodulatory activity (Nevin & Vijayammal 2005b). Intraperitoneal administration in five different doses found to enhance the total WBC count, bone marrow cellularity and number of α-esterase-positive cells (Siveen & Kuttan 2011; Siveen & Kuttan 2012a). Ethanolic extract of *Aerva lanata* L. was found to stimulate cell-mediated immunological responses in normal and tumor-bearing BALB/c mice (Siveen & Kuttan 2012b).

Nephroprotective Activity

The ethanol extract of the entire plant of *Aerva lanata* L. showed nephroprotective activity by decreasing the blood urea and serum creatinine in cisplatin and gentamicin induced acute renal injury in albino rats of either sex and also normalized the histopathological changes (Shirwaikar, et. al. 2004).

Conclusion

Bisehri booti is a useful medicinal plant described by Unani physicians which is also ethnomedicinally used as a therapeutic agent for a variety of diseases in traditional systems of medicine and folklores. Numerous research works on BB have proved its uses in experimental animals. Phyto-constituents from this plant are responsible for its pharmacological activities. Therefore, cultivation,

collection and further clinico- pharmacological exploration of BB are essential. The plant possesses many phytochemical constituents for example; alkaloids, flavanoids, tannic acid etc. in addition to activities like diuretic, anti-inflammatory, hypoglycemic, anti-diabetic, antiparasitic, antimicrobial, hepato-protective, anti-urolithiasis, anti-asthmatic, antifertility and hypolipidemic.

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सारांश

यूनानी चिकित्सा पद्धति में फीटो-फार्माकोलॉजिकल पहलुओं और बिसेहरी बूटी (ऐरवा लानाटा) का उपयोग : एक समीक्षा

[1]निग़हत अंजुम, [2]नीलम कुद्दुसी और [3]मिस्बाहुद्दीन अज़हर

यह समीक्षा लेख यूनानी चिकित्सा पद्धति में बिसेहरी बूटी (बी.बी.) (ऐरवा लानाटा लिन.) के उपयोग की उत्पत्ति और इतिहास तथा इस तथ्य को स्थापित करने के लिए कि यह औषधि वास्तव में यूनानी चिकित्सा पद्धति के समृद्ध दस्तावेज का भाग है, को जानने का एक प्रयास है। यह आगे अनुसंधान के लिए एक दिशा प्रदान करने हेतु मोर्फोलॉजी, फाइटोकैमिस्ट्री और फार्माकोलॉजिकल पहलुओं के साथ यूनानी शास्त्रीय साहित्य में बिसेहरी बूटी के उपयोगों और कार्य को भी संक्षेप में दोहराता है। समीक्षा से पता चलता है कि लोक औषधि के रूप में पौधे का उपयोग भारत के पश्चिमी उत्तर प्रदेश के कुछ यूनानी चिकित्सकों द्वारा खांसी, मूत्रकृच्छ (बूंद बूंद कर कष्ट से पेशाब निकलना), सिरदर्द और यूरोलिथियासिस के लिए किया जाता है। इसके अलावा, समीक्षा के आधार पर इस लेख के लेखकों का सुझाव है कि डाइयूरेटिक, एंटी–इन्फ्लामेटरी, हाइपोग्लाइसेमिक, एंटी–डाइबेटिक, एंटीपैरासिटिक, एंटीमाइक्रोबायल, हेपाटो–प्रोटेक्टिव, एंटी–यूरोलिथियासिस, एंटी–अस्थमेटिक, एंटीफर्टिलिटी और हाइपोलिपिडेकिम जैसी गतिविधियों के अतिरिक्त बिसेहरी बूटी में कई फोटोकैमिकल घटक उदाहराणार्थ; अल्कालोइड्स, फ्लेवानोइड्स, टेनिक एसिड इत्यादि हैं।

शब्द कुंजीः ऐरवा लानाटा लिन., बिसेहरी बूटी, फाइटोकैमिस्ट्री, औषध विज्ञान, यूनानी चिकित्सा

Safoof Jawahar Mohra (Classical Unani Formulation): A Review

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Abstract

There are several Unani formulations composed of herbs and minerals (particularly gems) which are used as *Muqawwi-e-aam* (general body tonic) for the purpose of improving functions of vital organs, increasing *Hararat-e-ghareezi* (metabolic heat) *Rooh* (vital energy or life force) and boosting the immune systems. The Safoof-e-Jawahar Mohra (SJM) is a classical Unani formulation reported for strengthening the cardiovascular system, brain and liver function. SJM is also scientifically evaluated in HIV positive individuals and found useful in the improvement of quality of life. In some cases the CD4 counts were also increased significantly.

Pharmacological actions of individual ingredients of SJM suggest that its beneficial effect may be exerted via diverse mechanisms on various organ systems / faculties. Some of their main actions and uses described in the Unani literature are (i) Zehar Mohra - described as vital organ tonic, exhilarant, protectors of quwa (faculties) and arwah (vital force) and detoxicant of body humours and the muscles toners; (ii) Marwareed (Pearl) - described as exhilarant, enhancers of body faculties and vital force, tonic for vital organs and anti-depressant; (iii) Warq-e-Tila (Gold leaves) - reported in Unani literature as general body tonic, tonic for heart and brain, purifier of body humours, anti-depressant, helps improving *hararat-e-ghareezi* and a good protective agent for general health and (iv) Narjeel Daryaee (*Lodoicea seychellarum*) - described in Unani literature as general tonic, enhancer of *hararat-e-ghareezi*, protector of body faculties and helps removing waste and toxic humours.

The Present review is not only focused on the classical uses of SJM but also presents a detailed account of various pharmacological activities reported on the individual ingredients of SJM.

Keywords: Safoof-e-Jawahar Mohra, Unani formulation, Vital organs.

Introduction

Drugs of mineral origin, especially gems, are extensively used in Tibb-e-Unani (Unani Medicine), both as single drug as well as compound formulations. The Safoof-e-Jawahar Mohra is one of such Unani drugs. The SJM is considered to be tonic to multiple vital organs and stimulant to innate heat which indicates possible anti-stress activity (Ghani, 1921; Nafees, 1954). SJM is also scientifically evaluated in HIV positive individuals and found useful in the improvement of quality of life (Qureshi, 2008). The Safoof-e-Jawar Mohra was also studied as an anti stress activity against diverse stressors in albino rats and the study shows that the SJM contributes significantly to its anti-stress activity (Ahmad,1997). In

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some cases the CD4 count was also increased significantly (Qureshi, 2016). SJM was also clinically assessed with reference to sign and symptoms of HIV/ AIDS patients and found remarkable improvements (Qureshi, 2015).

The ingredients of SJM are given in Table 1

Table 1: Ingredients of SJM

S.No.	Ingredients	Scientific/English name	Weight (g)
1.	Zehar Mohra	Serpent Stone	30
2.	Marwareed	Pearl	10
3.	Bussud	Red coral	10
4.	Kehroba	Vateria indica	10
5.	Lajward	Lapis lazuli	10
6.	Yaqoot	Ruby	10.
7.	Yaqoot Kabood	Sapphire	10
8.	Yaqoot Asfar	Topaz	10
9.	Yashab Sabz	Green Jade	10 .
10.	Zamuurrad	Emerald	10
11.	Aqeeq Surkh	Red Agate	10
12.	Warq-e-Nuqra	Silver leaves	10
13.	Mastagi	Pistacia lentiscus	10
14.	Warq-e-Tila	Gold leaves	10.
15.	Jadwar	Delphinium denudatum	10
16.	Narjeel Dariyaee	Lodoicea seychellarum	5
17.	Arq-e-Gulab	Rose water	Q.S.

Classical Uses of SJM

SJM described in the classical Unani books as tonic to multiple vital organs and stimulant to innate heat and it is useful in general weakness (Ghani, 1921; Nafees, 1954; Khan, 1902).

Dose: 60 to 120 mg.

Major Pharmacological/ Biological Actions of Individual Ingredients of SJM

1. Zehar Mohra (Serpent Stone)

It is a hydrous magnesium silicate mineral. Usually it is in green color but other color variations such as yellow or brown are produced by veins of talc, magnesite, iron oxide and other minerals present in the stone (Anonymous, 2002a).

Actions and Uses

Vital organs' tonic, exhilarant, (Hijazi, 1997; Ghani, 1926); antidote to poisons

(Kabiruddin, 1937); protects quwa (faculties) and arwah (vital force) (Hakim, 2002; Ghani, 1926); purifier and detoxifier for body humours (Ghani, 1926; Hakim, 2002); aphrodisiac (Kabiruddin, 1937); strengthens the muscles (Ghani, 1926). If it is used for forty days, it protects general health (Ghani, 1926; Hakim, 2002). Useful in diarrhoea, vomiting and cholera (Ghani, 1926; Hakim, 2002); phobia, anxiety, palpitation, poisoning, inflammations, melancholia (Hakim, 2002; Kabiruddin, 1937).

2. Marwareed (Pearl)

Pearls, although counted as precious stones, are like corals, products of the ocean. Pearls are formed and nurtured in the body / shell of a mollusk, the pearl oyster.

Actions and Uses

Exhilarant, enhances body faculties and vital force (Hakim, 2002); tonic for vital organs, enhances vital force, tonic to internal organs (Kabiruddin, 1937) stimulant, tonic aphrodisiac nutritive (Nadkarni, 1976); general tonic, improves eye sight, cardiac tonic, anti-depressant (Singh, 2000); exhilarant for brain and heart, antidote to poison, antidepressant (Hijazi, 1997). Palpitations, phobia, jaundice, tuberculosis, weak vision (Hijazi, 1997); weakness of stomach, liver, kidney, heart and brain (Lubhaya, 1975); heart disease, wounds (Hakim, 2002); weakness of heart, palpitation, mania, illusion, weakness of stomach, liver and kidney (Kabiruddin, 1937); fear and phobia, impurities of blood, illusion due to sauda (Khan, 1895); weakness of heart, palpitation, weakness of spleen and kidney (Singh, 2000).

3. Bussud (Red Coral)

Coral is a limestone formation formed in the sea by millions of tiny animals. Coral formation looks like branching trees, large domes, small irregular crust or even like tiny organ pipes (Anonymous, 1993b). In appearance it is a small shrub in a pendant or reverse position

Actions and Uses

Antacid, astringent, nervine tonic, laxative and diuretic, antiphlegmonous and antibilious (Nadkarni, 1976). Astringent, desicant, exhilarant, heart tonic (Khan, 1895; Kabiruddin, 1937; Ibn Beytar, 1985).

Mania, epilepsy, palpitation, weakness of stomach and urinary bladder, anorexia, heamorrhage, malena, intestinal ulcers (Kabiruddin, 1937; Khan, 1895). Its chief use is in cough, phthisis, asthma, low fever, urinary diseases, Spermatorrhoea and gonorrhoea, carbuncle, scrofulous affections and as a nervine tonic in headache, giddiness and vertigo. It was administered to cases of chronic bronchitis and

pulmonary tuberculosis and found useful in both classes of diseases. It is given as an antacid to check vomiting and to cure dyspepsia and bilious headache (Nadkarni, 1976).

4. Kehruba (*Vateria Indica*, Linn.)

It is a resin and obtained by cutting notches in the tree when it exudes and gradually hardens. Specimens differ much in colour, fragrance and density; some being of a light greenish colour, dense, homogeneous and vitreous on fracture whilst others are amber colored and vesicular. These differences apparently arise from the mode of collection and the age of the trees producing them (Dymock et al., 1890, Warrier et al., 1994).

Actions and Uses

The bark is hot with a sharp, bitter, acrid, taste, alexipharmic; the resin is three kinds – reddish dark slightly white ; bitter, becoming more bitter as it gets older: alexipharmic, tonic, carminative, expectorant, detergent (Warier et al, 1994); resin of the seeds is emollient and stimulant (Nadkarni,1976). Resolvent, stomachic (Ibn Hubl, 1362H); exhilarant; cardiac tonic, astringent, styptic (Kabiruddin, 1937); liver tonic (Ashraf, ynm). Resin of the seeds is useful in chronic rheumatism and other painful affections (Nadkarni, 1976); bark is useful in cough, anaemia, urinary discharge, skin eruptions, ulcers and wounds; and also useful in dysentery, leprosy and itch. The resin is good for sore throat, chronic bronchitis, piles, rheumatism, amenorrhoea, diarrhoea, hemicrania, tuberculosis, glands, boils and ringworm (Warrier et al, 1994). Useful in palpitation, haemoptysis, diarrhoea (Hakim, 2002); heametemesis, epistaxis, nasal ulcers, malena, piles, wounds (Kabiruddin, 1937); weakness of stomach and kidneys, dysentery (Hakim, 2002); abdominal cramps, weakness of kidney and urinary bladder (Asharaf, ynm); burnig micturition, bilious diarrhoea and jaundice (Ghani, 1926).

5. Lajward (*Lapis lazuli*)

Lapis lazuli is a gemstone with a deep azure blue colour. It consists chiefly of Lazurite, a mineral composed of sodium, aluminium, silicon, oxygen and sulphur (Anonymous, 1993c).

Actions and Uses

It improves cardiac functions, evacuates thick humours, blood purifier, diauretic, desiccant (Rafiquddin, 1985). It cleanses body humours, expels saudavi matter through faeces. It also purifies the blood from viscous humours, particularly Sauda. It is exhilarant and tonic for health (Kabiruddin, 1937; Ghani, 1926). It is analgesic and resolvent of chronic inflammations (Khan, 1895). It also controls Ufoonat (infections) (Ibn Hubl, 1943). It is used in palpitation, melancholia, eye

ulcers and leucoderma (Rafiquddin, 1985). It is also useful in illusion, phobia, grief, anxiety, Saudavi ailments (Ghani, 1926). Its is useful in mania (Kabiruddin, 1937).

6. Yaqoot Surkh (Ruby)

Ruby is the red gem variety of the mineral corundum and composed of aluminum oxide, Al2O3 (Anoymous, 1993d).

Actions and Uses

Heart and brain tonic, exhilarant, enhances hararat-e-ghareezi (body energy) (Kabiruddin, 1937); blood purifier, protects hararat-e-ghareezi (Khan, 1895). Weak function of vital organs, depression, palpitation, nausea, tuberculosis, epilepsy and effects of poisons (Hijazi, 1997; Singh, 2000).

7. Yaqoot Kabood (Sapphire)

Sapphire, a hard and clear gem, is a variety of the mineral corundum. The best-known sapphire is blue and the color results from small amount of iron and titanium in the stone (Anonymous, 1993e).

Actions and Uses

Exhilarant (Ghani, 1926); general body tonic and brain tonic (Singh, 2000); antidote of poisons (Kabiruddin, 1937). Useful in palpitation, illusion, weak vision, poisoning, cough and impurities of blood (Ghani, 1926).

8. Yaqoot Asfar (Topaz)

The name “topaz” is ancient, perhaps coming from a Sanskrit word meaning “fire” or “heat”

Gem topaz is not necessarily yellow, as is commonly thought, but can be blue, pale green or colorless. Topaz is a mineral composed of aluminum, silicon, oxygen and fluorine (Anonymous, 2002f; Rao, 2004).

Actions and Uses

Anodyne, aphrodisiac, protective action for body (Singh, 2000). Exhilarant, brain and heart tonic, enhances and protects harara-e-ghareezi (innate-heat or energy), protects from epidemics, vital organ tonic (Kabiruudin,1937). Useful in weak digestion, impurities of blood and effects of poisons (Singh, 2000); mania, epilepsy, palpitations, tuberculosis (Kabiruddin, 1937); illusions poisoning (Kabiruddin, 1937).

9. Yashab Sabz (Green Jade)

Jade is a hard, tough and highly colored stone. Their chief colours are white and green (Anonymous (1993i).

Actions and Uses

Tonic for heart, brain and stomach (Kabiruddin, 1937; Ghani, 1926). Useful in internal ulcers and dysentery (Khan, 1895,, Ghani, 1926); illusion, palpitations (Kabiruddin, 1937; Ghani, 1926).

10. Zamurrad (Emerald)

Emerald is a rich green gemstone and the gem name is aquamarine. (Anonymous, 1993d)

Actions and Uses

Exhilarant, vital organ tonic, stomachic, liver tonic, enhances hararat-e-ghareezi (body energy) and rooh (vital force) (Kabiruddin, 1937; Khan, 1895; Hijazi, 1997, Hakim, 2002). It is used in pneumonia, mania, palpitation, jaundice and effect of poison (Ghani, 1926); grief depression, anxiety (Hakim, 2002); diseases of brain and heart (Hijazi, 1997); weak function of stomach, liver and kidney (Kabiruddin, 1937); illusion, melancholia, heat of liver and kidneys (Hijazi, 1997).

11. Aqeeq Surkh (Red Agate)

Agate is a special type of chalcedony, a quartz mineral. It has a characteristic handed or layered structure. Most types of agates are dull colored. Their bands vary from white through gray to black. In some cases, the bands may be pale red, yellow or blue. The colors result from the presence of such impurities as iron oxide and manganese oxide (Anonymous, 1993; Anonymous, 1993e).

Actions and Uses

Cardiac tonic (Hakim, 2002; Khan, 1895); aphrodisiac (Hijazi, 1997). Useful in palpitation and week vision (Ashraf, ynm; Khan, 1895; Singh, 2000); useful in obstructions of liver and spleen with other deobstruent drugs (Hakim, 2000); useful in vital organs tonic and heart diseases (Hijazi, 1997).

12. Warq-E-Nuqra (Silver Leaves)

A soft white, brilliant and ductile metal; it does not oxidize when exposed to air, but is soon tarnished by vapors of sulphur (Nadkarni, 1976).

Actions and Uses

Silver leaf is tonic, stimulant, aphrodisiac, astringent, cool, demulcent, purgative, emetic, constipative and alleviative of wind and bile (Nadkarni, 1976).

General body tonic, exhilarant, tonic to heart, brain, liver and stomach (Kabiruddin, 1937); protects quwat-e-haiwani (vital faculty) (Ghani, 1926); aphrodisiac (Hakim, 2002). The silver leaf is useful in excessive heat in the body, hectic fever, phthisis, chest affections, impotence and seminal weakness; also in painful and

irritable condition of the stomach and intestines, heat-burn chronic diarrhoea, uterine diseases such as leucorrhoea, menorrhagia and irritability of the uterus (Nadkarni, 1976). It is useful in the diseases of heart and brain. Its kushta improves function of the vital organs, relieves palpitation, illusion, melancholia, mania, premature ejaculation etc. (Kabiruddin, 1937). It is also useful in cough, phobia and weakness of nerves (Ghani, 1926).

13. Mastagi (*Pistacia Lentiscus*, Linn.)

Mastic is a resin or more correctly an oleoresin containing little oil; obtain from a cultivated variety of *Pistascia lentiscus* in the Greek Island of Chios. A small bushy tree or shrub up to 3m (10ft) height, which produces a natural oleoresin from the trunk. Incisions are made in the bark in order to collect the liquid oleoresin which then hardens into brittle pea- sized lumps (Lawless, 1999 , Evans, 2001).

Actions and Uses

Stimulant, diuretic; Mastiche galls are acid and astringent (Anonymous, 1997); anti-microbial, antiseptic, antispasmodic, astringent, expectorant, stimulant (Lawless, 1999). Attenuant, resolvent, vital organ tonic (Ashraf, ynm; Ghani, 1926); stomachic, promotes digestion, sexual stimulant (Ghani, 1926); liver tonic carminative desiccant (Kabiruddin, 1937); internal body tonic, resolvent, appetizer (Ibn Hubl, 1943); diuretic (Kabiruddin, 1937). It is used in catarrhs of the respiratory and urinary passages. Gum mastiche is applied as a paste to the chest in catarrh and pulmonary affections. Galls are used in emulsion in cough mixtures. They are also used in the form of decoction as gargle for sore mouth and bleeding gums (Anonymous, 1997). Mastiche is used as a masticatory in tooth affections. It's useful in general and genital debility as an aphrodisiac. Galls are used in emulsion in cough mixtures (Nadkarni, 1976). It is useful in diarrhoea in children and is chewed to sweeten the breath. It is useful in whooping cough, bronchitis catarrh, leucorrhoea, urethritis, cold and neuralgia (Lawless, 1999). It is useful in intestinal ulcers, haemoptysis, inflammation, hepatitis, gastritis and diarrhoea (Khan, 1313H); useful in cold and excessive phlegm (Ghani, 1926); useful in weak function of stomach, amnesia and cough (Kabiruddin, 1937).

Pharmacological Activities

Antimicrobial Activity: The *in vitro* antimicrobial activity of the three essential oils and of the resin (total, acid and neutral fraction) against six bacteria and three fungi is reported (Magiatis et al., 1999).

Antimicrobial Activity: The in vitro antimicrobial activity of Pistacia lentiscus L. extracts was determined. Pistacia lentiscus L. extracts were tested on bacteria (Sarcina lutea, Staphylococcus aureus and Escherichia coli) and fungi (Candida albicans, Candida parapsilosis, Torulopsis glabrata and Cryptococcus

neoformans). Of the different plant extractions, decoctions showed the best antibacterial activity but the activity against fungal cells appears to be much more interesting (Iauk et al., 1996).

Antibacterial Activity: The essential oil of the leaves of Pistacia lentiscus exhibited strong antibacterial activity against Klebsiella pneumonia but no activity against Pseudomonas aeruginosa. This antibacterial activity may be due to chemicals like germanicol (12.8%), thunbergol (8.8%), himachalene (7.4%), trans-squalene (6.7%), terpinyl propionate (6.7%), 3,3-dimenthol (6.2%) and cadina-1.4-diene (5.1%) (Mharti FZ, et al.,2011).

Anti-ulcer Activity: A double-blind clinical trial was carried out on thirty-eight patients for two weeks with symptomatic and endoscopically proven duodenal ulcer to compare the therapeutic responses to mastic (1 g daily, twenty patients) and placebo (lactose, 1 g daily, eighteen patients). Symptomatic relief was obtained in sixteen (80%) patients on mastic and in nine (50%) patients on placebo while endoscopically proven healing occurred in fourteen (70%) patients on mastic and four (22%) patients on placebo. The differences between treatments were highly significant (P less than 0.01). Mastic was well tolerated and did not produce any side effect. It is concluded that mastic has an ulcer healing effect but further studies are needed to establish its role in treating peptic ulcer (Al-Habbal et al., 1984).

Anti-ulcer Activity: The effect of mastic, a concrete resinous exudate obtained from the stem of the tree Pistacia lentiscus, has been studied on experimentally-induced gastric and duodenal ulcers in rats. Mastic at an oral dose of 500 mg/kg produced a significant reduction in the intensity of gastric mucosal damage induced by pyloric ligation, aspirin, phenylbutazone, reserpine and restraint + cold stress. It produced a significant decrease of free acidity in 6-h pylorus-ligated rats and a marked cytoprotective effect against 50% ethanol in rats, which could be reversed by prior treatment with indomethacin. The protective effect was not seen when it was given intraperitoneally in phenylbutazone and restraint + cold stress models. The reduction in the intensity of ulceration in cysteamine-induced duodenal ulcers was not found to be statistically significant in mastic-pretreated rats. The results suggest that mild antisecretory and a localized adaptive cytoprotectant action may be responsible for its anti-ulcer activity. These observations support the results of an earlier study on the clinical effectiveness of mastic in the therapy of duodenal ulcer (Al-Said et al., 1986).

Antifungal Activity: The aqueous extracts (15 micrograms ml-1 medium) of 22 plants used in folkloric medicine in Palestine were investigated for their antifungal activity and minimum inhibitory concentrations (MICs) against nine isolates of Microsporum canis, Trichophyton mentagrophytes and Trichophyton violaceum. The extract of the different plant species reduced colony growth of

the three dermatophytes by 36 to 100% compared with the control treatment. Antimycotic activity of the extract against the three dermatophytes varied significantly ($P < 0.05$) between test plants. The Pistacia lentiscus was one of the most active extracts (90-100% inhibition) against M. canis, T. mentagrophytes and T. violaceum. The MICs of these most active plants ranged from 0.6 to 40 micrograms ml-1. The three dermatophytes differed significantly with regard to their susceptibility to plant extracts (Ali-Shtayeh and Abu Ghdeib, 1999).

Anti-tumor Activity: A study to investigate Chios mastic gum (CMG) extract as a potential anti-tumour agent for oral squamous cell carcinoma in vitro was designed to examine the effects of CMG extracts on growth of oral squamous cell carcinoma cell line, YD-10 B and to determine whether the extracts could induce apoptosis through the activation of caspase-3, using the common chemotherapeutic agent paclitaxel (Taxol, Bristol-Myers Squibb) as a control. MTT assay suggested that both CMG and taxol inhibited the proliferation of YD-10B cells in a time and dose dependent manner. Moreover, 10μg/mL of CMG and 50μg/mL of taxol caused fragmentation of the genomic DNA at 24 hour. Finally, 10μg/mL of CMG and 50μg/mL of taxol caused cleavage of procaspase-3 in western blot analysis. These results suggest Chios mastic gum's potential as an anti- tumour agent (ShengJin Li, et al., 2011).

Wound Healing Activity: An experimental trial was conducted by Zouhir djerrou et al. in which the efficiency of the virgi fatty oil of Pistacia lentiscus was assessed for burn wounds healing. They concluded that this oil promotes significantly wound contraction and reduces epithelization period in experimental animals (Zouhir Djerrou, et al., 2010).

Hepato Protective Activity: The hepatoprotective effect of the boiled and non-boiled aqueous extracts of Pistacia lentiscus was evaluated in vivo using carbon tetrachloride (CCl 4) intoxicated rats. Plant extracts were administrated orally at a dose of 4 ml/kg body weight, containing various amount of solid matter. Aqueous extract of P. lentiscus showed marked anti-hepatotoxic activity against CCl 4 by reducing the activity of the three enzymes (alkaline phosphatise, alanine aminotransferase and aspartate aminotransferase) and the level of bilirubin. The effect of the non-boiled aqueous extract was more pronounced than that of the boiled extract (Sana Janakat and Hela Al-Merie, 2002).

Hypotensive Activity: The hypotensive effect of Pistacia lentiscus L. was evaluated in normotensive urethane anaesthetized Wistar rats. It was shown that lyophilized aqueous extract caused a dose-dependent decrease of the systemic arterial blood pressure (Villar A, Sanz, et al., 1987)

Antioxidant Activity: In a laboratory study the seasonal variation of the essential oil composition, the antioxidant activity and the total phenolic content of Pistacia

lentiscus L.were investigated. The essential oil composition of P. lentiscus L. was characterised by a high monoterpene hydrocarbon fraction (45.0-68.3%),which was found in greater amount during the flowering stage (May). At the same stage, the extracts showed highest free radical-scavengingactivity and antioxidant capacity as well as highest phenolic content (Gardeli, et al., 2008).

Antiatherogenic Activity : In a laboratory study on Antiatherogenic effect of *Pistacia Lentiscus* via GSH restoration and down regulation of CD36 mRNA expression was proved (Dedoussis et al. 2004).

14. Warq-E-Tila (Gold Leaves)

Pure gold has a metallic lustre, reddish yellow colour; it is the most ductile of all metals softer than silver. It acquires lustre under pressure. It is not attached by any acid except selenic acid and a mixture of which like nitro-hydrochloric acid, contains nascent chlorine (Nadkarni, 1976).

Gold and its preparations are nervine and aphrodisiac tonic, resolvant, emmenagogue and alterative. They increase strength and beauty, improve intellect and memory, clear the voice and increase sexual powers; also stimulate the activity of the stomach, skin and kidneys causing diaphoresis and diuresis (Nadkarni, 1976).

Actions and Uses

General body tonic, exhilarant, improve functions of heart and brain (tonic), normalizes and purifies body humours (akhlat) (Kabiruddin, 1937; Hijazi, 1997). It is a good anti-depressant. It improves Hararat-e- ghareezi (innate heat or energy) of the body. It relives palpitations, anxiety, feeling of grief and also enhances intelligence (Ghani, 1926). It is a liver tonic and also improves libido (Kabirddin, 1937).

It is useful in palpitation, illusion, melancholia, chronic headache, cough, weight loss and tuberculosis (Hijazi, 1997); weakness of heart, mania, weak libido (Kabiruddin, 1937). It is also used in phobias, vertigo, emaciation, anorexia, weak digestion (Ghani, 1926). Weak stomach and liver, spleenomegaly, dysentery; and it is also a good protective agent for general health (Hakim, 2002).

Preparation of properly reduced gold are used in fevers, insanity, diseases of the nervous system and urinary organs, hysteria, epilepsy, leprosy, asthma, nervous dyspepsia, amenorrhoea, impotence, sterility, habitual abortion, chronic Bright's disease, chronic metritis, syphilis and scrofula (Nadkarni, 1976).

15. Jadwar (Delphinium Denudatum, Wall.)

Jadwar, an important drug used in Unani medicine, is the root of *Delphinium denudatum*, Wall. It is a commonly occurring plant belonging to the natural order

Renunculaceae. The generic name, delphinium, is from the Greek, meaning 'dolphin', so-called because the nectary resembles the figure of a dolphin (Tyler et al., 1976).

Actions and Uses

Appetizer (Momin, 1855; Ghani, 1913; Zafar, 1990), stomachic (Husain, 1897); theriac (alexeteric or antidote) (Ibn Baytar, 1985; Husain, 1875 & 1897; Ibn Sina, 1887, Ghani, 1913); *dafe-ufoonat* (antiseptic) (Husain, 1875 & 1897; Attar, 1887; Momin, 1855); musakkin (mild sedative) (Husain, 1897). General tonic (Khorey and Katrak, 1985; Anon., 1952; Dymock et al., 1890); tonic for brain and nerves, appetizer (Chopra et al., 1958; Caius, 1986); stimulant (Anon., 1952; Chopra et al., 1956); stomachic (Khorey and Katrak, 1985; Nadkarni, 1976), analgesic (Caius, 1986); cooling (Chopra et al., 1958; Caius, 1986; Zafar, 1990). Epidemic Diseases (Momin, 1855, Khan, 1875, Husain, 1875 &1897); catarrh and coryza (Ghani, 1913); septicemia (Husain, 1875 & 1897); lymphadenitis (Attar, 1887, Husain, 1897); cardiac weakness and Palpitation (Attar, 1887; Ghani, 1913). Brain diseases (Chopra et al., 1958; Caius, 1986); blood diseases (Chopra et al., 1958; Caius, 1986); debility (Caius, 1986).

Pharmacological Activities

Anticonvulsant Activity: The alkaloid delphinine is an antidote against muscarine and digitaline (Nadkarni, 1976; Khorey and Katrak, 1985). Anticonvulsant activity of alcoholic extract of Jadwar in rats was investigated by Khan (1980 and 1981).

Immunomodulating Properties: Investigations on aqueous extract of D. *denudatum* revealed its beneficial effects in hepatoprotection against CCL_4 induced liver damage in rats; and cardioproteciton against Russel viper's envenomation and radiation-induced myocardial changes in rats. Organic solvent extracts of the plant have shown immunomodulating properties (Zafar et al., 2003).

Antibacterial Activity and Antifungal Activity: The ethanolic extracts of the roots of D. denudatum have shown antibacterial activity against *Corynebacterium diphtheriae, Proteus vulgaris, Salmonella typhi and Klebsiella pneumoniae.* The antifungal activity of the compounds of D. denudatum, 8-acetylheterophyllisine, Vilmorrianone and Panicutine was determined by the agar tube diffusion method. Organic solvent extracts of the plant D. denudatum have shown antimicrobial properties. The ethanolic extracts of the roots of D. denudatum collected from Kashmir (Pakistan) have shown antifungal activity against stachybotrys atra, Trichophytone longifusus, Curvularia lunata, Drechslera rostrata, Epidermophyton flocosum, Microsporum canis, Nigrospora oryzae and Ganoderma applanatum. Compounds 8 – acetylheterophyllisine and Vilmorrianone showed antifungal activity against Allescheria boydii, E. flocosum and Aspergillus niger. Compound Panicutine exhibited antifungal activity against Allescheria boydii, Stachybotrys atra; Pleurotus

ostreatus, nigrospora oryzae, Dutarium rotatum and Aspergillus niger (Zafar et al., 2003; Zafar, 1990). Alcoholic extact of the root of D. denudatum attenuates the withdrawal symptoms of moderately morphine dependent rates. Recently the aqueous extract of the root of D. denudatum is reported for the protection against morphine – induced tolerance and dependence (Zafar et al., 2003).

Antioxidant Efficacy: Studies have been done on its phytochemical and pharmacological properties. Bioactive constituents were isolated from petroleum ether-soluble fraction of root of Delphinium denudatum and their structures were elucidated as β-Sitosterol based on mass and nuclear magnetic resonance (NMR) spectroscopy. Antioxidant activity of β-Sitosterol was evaluated through DPPH radical scavenging method and it revealed that β-Sitosterol was shown to trap free radicals in a concentration dependent manner as high as 65.02% using 160 µg/mL. (Subramani Mohanapriya and Ganesan Vijaiyan siva, 2013)

16. Narjeel Daryaee (*Lodoicea Seychellarum,* Labill.)

Narjeel daryaee is a palm growing in the Seychelles but its fruits are obtainable on the Bombay side. Fruit or nuts are of big size. They were growing on the west cost of India and Ceylon.

Actions and Uses

General Tonic (Anonymous, 1992; Nadkarni, 1976; Dymock et al., 1890; Warrier et al., 1994). It enhances hararate ghareezi (innate heat or energy), antidote to poison (Kabiruddin, 1937). It protects body faculties, removes waste and toxic humours (Ghani, 1926). It removes the effects of poisons from the deep tissues and also protects body faculties (Khan, 1895).

It is useful in cholera, hyperdipsia, edema, acute diarrhoea, colic and also as an antidote in opium and aconite poisoning. It is good cardio tonic (Kirtikar and Basu, 1987; Warrier et al., 1994). It is useful in brain diseases, poisoning, paralysis, facial palsy and arthralgia (Ghani, 1926). Because of enhancing the hararate- ghaareezi (body energy) it is included in the formulation of *Jawahar Mohra* (Kabiruddin, 1937).

17. Arq–E-Gulab (Rose Water) *Rosa Damascena*

R. damascena is a shrubby plant with numerous unequal with strong prickles, dilated at the base, leaflets 5 to 7, ovate, stiffish, flower-bud oblong, sepals deflexed after the flower have opend; tube elongated, often dilated at the top; fruit ovate, pulpy; calyx and peduncles glandulosely hispid viscous; colour of flower light red, the petals of which are described as yellow outside and red within, of these the red garden rose appears to be the R. damascena which is cultivated both in Persia and India for official purposes and is the kind from which rose water and oil of rose are usually obtained (Dymock et al., 1890).

Actions and Uses

Mildly astringent, aperient, carminative and refrigerant, cardiac tonic. (Nadkarni, 1976; Anonymous, 1997). The flower is bitter, acrid, with a good odor; cooling, laxative, aphrodisiac, antipyretic; cures leprosy, “vata”, biliousness, burning sensations; removes bad odour from the mouth and improves appetite. The flower is bitter, sweetish; tonic, laxative, expectorant, cardiotonic, good for the eyes, headache, toothache, stomatitis; lungs, kidneys and liver. It is also used in chronic fever, inflammation, intestinal affections and excessive perspiration (Warrier et al., 1994).

Strengthening, astringent, expectorant; slightly laxative, promotes wounds healing and scar formation, hemostatic, antiseptic, and anti-inflammatory, anti viral and anti bacterial, sedative, strengthens nerves, aphrodisiac (Balz et al., 1999); brain and heart tonic (Hakim, 2002); *mufarreh* for brain and heart tonic (Ghani, 1926).

Petal – astringent; gulkand made from petal – tonic; bud – cordial (Husain, 1993). In India, rose buds are preferred for medicinal use, as they are more astringent than the expanded flowers; they are considered to be cold and dry, cephalic, cardiacal, tonic and asperient, removing bile and cold humours. A conserve made from equal parts of rose petals and white sugar beaten together, known as gulkand, is considered tonic and fattening, and is much used by women and old people (Warrier et al., 1994). Tonic for heart, Stomach, liver and uterus (Balz et al., 1999); useful in palpitation, abdominal cramps, pain in liver and spleen, headache (Ghani, 1926; Chughtai and Chughtai, 1963).

Pharmacological activities

Anti-HIV Activity and Anti-Viral Activities: Water and methanol extracts of *Rosa damascena* exhibited moderate anti-HIV activity. The anti-viral activities of 9 compounds isolated from the methanol extract were compared. The tetrahydroxyflavanone (kaempferol, 1), was effective in reducing the maturation of infectious progeny virus apparently due to selective inhibition of the viral protease. On the other hand, the pentahydroxyflavone (quercetin, 2) and two 3-substituted derivatives of kaempferol appeared to inhibit HIV-infection by preventing binding of gp120 to CD4. 2-Phenylethanol-O-(6-O-galloyl)-beta-D-glucopyranoside 8 interacted irreversibly with gp120 and neutralized virus infectivity. The differences in the modes of action of 1 and 8 can account for the apparent synergy of their anti-viral activities (Mahmood et al., 1996).

Antioxidant Effects: The *R. damascena* similar to many aromatic and medicinal plants exhibits antioxidant properties. Sources of natural antioxidant are primarily phenolics compound that are found in all parts of plants such as the fruits, vegetables, seeds, leaves, roots and barks (Pratt et al 1990). The presence of phenolic compound in ethanolic extract of *R. damascena* has been shown

(Kumar et al 2009). They determined antioxidant activity of this extract compared to standard antioxidant L-ascorbic acid by 1, 1-diphenyl-2-picryl hydrazyl (DPPH) free-radical method. This study showed that *R. damascena* has high antioxidant activities (Kumar et al 2009). The antioxidant activity of hydro-alcoholic extract of petals and essential oil of this plant were also evaluated by DPPH for measurement of free radical scavenging activity and by ferric ammonium thiocyanate method for evaluation of lipid peroxidation properties. Additionally, three flavonol glycosides of ethanolic extract including quercetin-3-O-glucoside, kaempferol-3-O-rhamnoside and kaempferol-3-O-arabinoside have antioxidant activity. However, the potential of this effect may be due to existence of quercetin 3-O-glucoside and other flavonoids in the extract (Yassa et al., 2009). Both fresh flower (FF) and spent flower (SF) extracts of *R. damascena* flowers also showed antioxidant activity. However, the antioxidant activity of FF extract was higher than that of SF extract (özkan et al., 2004). The antioxidant effect of R. damascene and its inhibitory effect on lipid oxidation were evaluated in an in vivo study. The results showed a potent antioxidant and lipid per oxidation inhibitory effects comparable to copherol and suggest that the plant can be considered as a medical source for the treatment and prevention of many free radical diseases (Shahriari et al., 2007).

Antimicrobial Effects: It has been shown that *R. damascena* has wide spectrum of antimicrobial activities. Essential oil, absolute and hydrosol are important products that showed essential oil and absolute have strong antibacterial activity against *Escherichia coli, Pseudomonas aeruginosa, B. subtilis, Staph. aureus, Chromobacterium violaceum* and *Erwinia carotovora* strains. The *C. violaceum* was the most sensitive microorganism against rose essential oil and absolute. *E. coli* was also sensitive against rose essential. However, hydrosol had no antimicrobial activity against any of the microorganisms ((Ulusoy et al., 2009). Rose absolute also showed antibacterial activity against both gram-negative and gram-positive bacteria (Ulusoy et al., 2009).

Anti-diabetic Effect: *R. damascena* exert an anti-diabetic effect. Oral administration of the methanol extract of this plant significantly decreased blood glucose after maltose loading in normal and diabetic rats in a dose- dependent manner. In addition, its methanol extract inhibited postprandial hyperglycemia similar to acarbose. It was found that *R. damascena* is a potent inhibitor of α-glucosidase enzyme (Gholam Hoseinian et al., 2008). Therefore, anti-diabetic effect of this plant may be mediated by inhibition of α-glucosidase that suppressed carbohydrate absorption from the small intestine and can reduce the postprandial glucose level (Gholam Hoseinian et al., 2009).

Conclusion

It is evident that Safoof-e-Jawahar Mohra has been used as a valuable therapeutic formulation for a variety of diseases, as we have illustrated in this review article. The individual ingredients of SJM are reported to possess various pharmacological activities including, anti-oxidant, immunomodulatory, anti-ulcer, anti-microbial and anti-HIV activity. Ingredients of SJM also reported to have CNS activities including anti-epileptic, anti-depressant and anti-stress activity. Considering the wide spectrum of activities reported, SJM needs a systematic evaluation of its pharmacological activities on different organs.

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सारांश

सफूफ़ जवाहर मोहरा (शास्त्रीय यूनानी मिश्रण) : एक समीक्षा

*[1]मसरूर अली क़ुरेशी, [2]गुलाम मोहम्मद हुसैन, [2]मुनव्वर हुसैन काज़मी और [1]मोहम्मद हुसैन

यूनानी मिश्रण बहुत–सी जड़ी–बूटियों और खनिजों (विशेषतः रत्न) से बने होते हैं जोकि मुक़व्वी–ए–आम (सामान्य स्वास्थ्यवर्धक) के तौर पर उपयोग किये जाते हैं जिनका उद्देश्य महत्वपूर्ण अंगों के कार्यों में सुधार, हरारत–ए–ग़रीज़ी (चयापचय ऊर्जा), रूह (महत्वपूर्ण ऊर्जा या जीवन शक्ति) और प्रतिरक्षा प्रणाली को बढ़ाना है। सफूफ़ जवाहर मोहरा (एस.जे.एम.) एक शास्त्रीय यूनानी मिश्रण है जो हृदय प्रणाली, मस्तिष्क और यकृत के कार्यों को मज़बूत करने के लिए होता है। एस.जे.एम. का एच.आई.वी. –सकारात्मक व्यक्तियों पर मूल्यांकन किया गया और इसको जीवन की गुणवत्ता के सुधार में उपयोगी पाया गया। कुछ मामलों में सीडी4 की संख्या भी काफी बढ़ गई थी। उनकी कुछ क्रियाऐं एवं उपयोग जोकि यूनानी साहित्य में वर्णित हैं वह महत्वपूर्ण अंग टॉनिक (वाइटल ऑर्गन टॉनिक), प्राणपोषक (एक्ज़ीलारेन्ट), क़ुवा (क्षमता) और अरवाह (जीवन शक्ति) का सरंक्षण और शरीर के ह्यूमरस का निर्विषीकृत और मांसपेशियों के टोनर के रूप में उपयोगी हैं। मरवारीद प्राणपोषक, शारीरिक एवं जीवन शक्तियों की बढ़ोत्तरी, महत्वपूर्ण अंगों और अवसादरोधी के रूप में वर्णित है। वर्क़–ए–तीला (सोने की पत्तियां) यूनानी साहित्य में सामान्य स्वास्थ्यवर्धक हृदय और मस्तिष्क के लिए टॉनिक, शरीर के ह्यूमरस के लिए शुद्धता, अवसादरोधी, हरारत–ए–ग़रीज़ी को बेहतर बनाना और सामान्य स्वास्थ्य के लिए एक अच्छे सुरक्षात्मक घटक के रूप में वर्णित है; और नरजील दरयाई (लोडोइसीआ सीचेल्लरम) यूनानी साहित्य में सामान्य स्वास्थ्यवर्धक हरारत–ए–ग़रीज़ी को बेहतर बनाने, शारीरिक शक्तियों के संरक्षण और अपशिष्ट और विषाक्त पदार्थों को निकालने के लिए वर्णित है।

यह समीक्षा एस.जे.एम. के केवल शास्त्रीय उपयोगों पर केंद्रित नहीं है बल्कि यह इसके अलग–अलग घटकों से संबंधित विभिन्न औषधीय गतिविधियों का विस्तृत विवरण भी प्रस्तुत करती है।

शब्द कुंजीः सफूफ़–ए–जवाहर मोहरा, यूनानी मिश्रण, महत्वपूर्ण अंग

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