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Editorial

Practiced in India and various other countries as a recognized system of medicine, Unani Medicine is one of the oldest and time-tested traditional medical systems. It has the largest and well-developed infrastructure for practice, education and research in India. The Central Council for Research in Unani Medicine (CCRUM), an apex organization of the country, is entrusted with the mandate of conducting research and development activities in Unani Medicine. Over the last four decades of its existence, the CCRUM has been busy in conducting scientific studies and generating evidences for validation of safety and efficacy of medicines which are in medical practice for centuries. The objective has been to explore the rationale behind the principles of treatment, therapeutics and philosophies adopted by the system and convince the modern scientific world in the contemporary rational language they are used to. Through its four key research programmes, namely literary research, survey and cultivation of medicinal plants, drug standardization and clinical research, the CCRUM has been making concerted efforts and contributing significantly to the cause of research and development in Unani Medicine. Vitiligo, sinusitis, filariasis, eczema, malaria, infective hepatitis and asthma are some of the conditions where Unani therapies have earned recognition due to the scientific studies conducted by the council. This has earned the CCRUM well-deserved recognition in the contemporary scientific fraternity and acceptability among diverse populations.

Started in 2006, the Hippocratic Journal of Unani Medicine (HJUM) has played a crucial role in the propagation and dissemination of research in the system amongst the scientific community. Along with studies on fundamental and applied aspects of Unani Medicine, the journal publishes recent advances in other related sciences and traditional medicines as well as different streams of medical sciences, which have bearing on validation and scientific interpretation of various concepts and strengths of Unani Medicine.

This issue of HJUM is comprised of seven papers. The first paper entitled '*Sharbat Fawlād* - A potent Unani formulation for *Faqr al-Dam* (anaemia)' is a review article contemplated to highlight the beneficial effects of *Sharbat Fawlād* in the treatment of anaemia. In the second paper, the authors have presented the outcome of their literature survey on *Qarḥa Ḥumūḍī* with its types, causes and treatment as per Unani Medicine. The third paper entitled 'Evaluation of pharmacopoeial standards with HPTLC profile of *Ḥabb Hindī Chashm*, a compound Unani formulation' is based on the standardization of the drug using quality control parameters such as organoleptic evaluations, physicochemical evaluations and HPTLC analysis. In the fourth paper, results of physicochemical standardization of *Tha'lab Miṣrī* (*Orchis latifolia* L.), an important drug of Unani Medicine, have been presented by the authors. The fifth paper presents the data of a cross-sectional descriptive study carried out in five villages of Lodha Block, Aligarh with an aim to assess the awareness about contraception and family planning in rural scheduled castes and find out the relation between the socio-economic and demographic variables and family planning practices in the study area. The sixth paper is based on an animal study conducted to investigate antihyperglycaemic effect of aqueous and 50% hydroalcoholic extracts of whole herb of *Convolvulus arvensis* L. (*Hiran Khurī*) in streptozotocin induced diabetic rats. In the last paper entitled 'Effect of gender, age and constitution (*Mizāj*) on radial artery pulse wave parameters in a healthy adult population', an effort has been made to generate a normal radial pulse wave profile for healthy subjects and verify the claim of Unani Medicine that pulse characteristics vary as per gender, age and *Mizāj*.

We hope that the papers would be helpful in furtherance of the cause of research and development in Unani Medicine. We sincerely acknowledge the contributions of authors and reviewers in bringing out this publication.

Prof. Asim Ali Khan
Editor-in-Chief

Contents

Sharbat Fawlād – A Potent Unani Formulation for *Faqr al-Dam* (Anaemia)

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Abstract

Anaemia is a major public health problem in India. According to the World Health Organization (WHO), there are two billion people with anaemia in the world and half of anaemia cases is due to iron deficiency. Unani Medicine has a treasure of single drugs and compound formulations for the treatment of anaemia. Among the compound formulations, *Sharbat Fawlād* is one of the famous Unani medicines and has various pharmacological actions like *Muwallid-i-Dam* (hemopoietic), *Muqawwī-i-Mi'da* (stomachic), and *Muqawwī-i-Kabid* (hepatotonic). It has been traditionally used for the treatment of anaemia (*Faqr al-Dam*) since ages. *Sharbat Fawlād* has been reported for its haematinic effect in recent years. This review has been contemplated to highlight the beneficial effects of *Sharbat Fawlād* for the treatment of anaemia and other disorders.

Keywords: *Sharbat Fawlād*, *Faqr al-Dam,* Anaemia, Unani Medicine

Introduction

Anaemia is a global health problem which is worse in developing countries mainly because of malnutrition, infectious diseases and parasitic infections. It is the most prevalent nutritional deficiency disorder in the world (Parthibhan *et al.*, 2015). Anaemia is a condition in which the number of red blood cells (and consequently their oxygen-carrying capacity) is insufficient to meet the body's physiologic needs (WHO, 2011). In this disease, reduction of haemoglobin, number of RBCs per cumm of blood and quantity of Hb% are resulting in pallor of the skin (Warner, 1964). Globally, anaemia affects 1.62 billion people, which corresponds to 24.8% of the population (Kawaljit, 2014). In India, anaemia affects an estimated 50% of the population and one in every two Indian women (56%) suffers from some forms of anaemia. It causes about 20–40% of maternal deaths (Kawaljit, 2014). Fifty-three percent of women and 23 percent of men aged 15-49 have anaemia in India (IIPS & ICF, 2017). The problem becomes more severe as more women are affected with it as compared to men (Malhotra *et al.*, 2004). Anaemia has got a very high prevalence rate the world over and in spite of the massive efforts of the modern medical science, a good control has not been achieved (Rai & Kar, 2015). Iron deficiency anaemia (inadequate amount of red blood cells caused by lack of iron) is not only highly prevalent in the developing countries, but also remains a noticeable problem in the developed countries. Iron deficiency is not the only cause of anaemia, but where anaemia is prevalent, iron deficiency is usually the most common cause. It is estimated that half a billion women of reproductive age worldwide are affected by anaemia causing almost 20% maternal death directly (UNFPA, 2013).

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Anaemia is not a disease but a condition in which the haemoglobin content of blood is lower than normal as a result of deficiency of one or more essential nutrients particularly iron, which is essential for the formation of haemoglobin. Anaemia in any condition is characterized by an abnormal decrease in total red blood cell mass causing reduction in the concentration of haemoglobin of blood on red blood cell mass. The lower haemoglobin level and insufficient number of red blood cells due to lack of iron reduce the oxygen carrying capacity to various tissues, impair brain development, physical work capacity and regulation of body temperature (Pareek & Hafiz, 2015). UNICEF classified anaemia as mild if Hb level in blood is between 8.0 and 10.99 g/dl among children, 10.0 to 11.99 g/dl among adolescent girls and 8.0 - 10.99 g/dl among pregnant women. For severely anaemic, Hb level should be below 5.0 g/dl among children, 8.0 g/dl among adolescent girls and 5.0 g/dl among pregnant women. Accordingly, moderate anaemia is denoted when Hb level is between mild and severe anaemia (IIPS, 2006).

Faqr al-Dam is the equivalent term for anaemia in Unani Medicine (CCRUM, 2012). In Unani Medicine, various synonyms of anaemia are: *Faqr al-Dam*, *Sū' al-Qinya*, *Qilla al-Dam*, *Kamī-ī-Khūn* and *Fasād-i-Dam*. Various Unani physicians ((Ibn Sina (980-1037 AD), Ismail Jurjani (1041-1136AD), Ibn Hubal Baghdadi (1117-1213 AD) and Hakim Azam Khan (1813-1902 AD)) considered blood to be the vital fluid of human body which is formed in the liver. The formation of blood is not normal for nourishment *(Taghdhiya)* due to derangement of liver functions and weakness of hepatic faculties or sometimes due to associated diseases. This leads to signs and symptoms of anaemia such as pallor, oedema of face, eye lids and upper or lower limbs and sometimes generalized swelling all over the body with pitting oedema due to obnoxious gases (*Radī Bukhārāt*), sometimes gingivitis, disturbed sleep and sometimes excessive sleeping, loss of appetite, indigestion, flatulence, delayed healing of wound or ulcers (Khan, 2011; Ibn Sina, 2010; Jurjani, 2010; Baghdadi, 2004). According to Unani concept, anaemia is caused due to various etiological factors such as *Ḍu'f al-Kabid* (hepatic insufficiency), *Ḍu'f al-Mi'da* (gastric debility), *'Izam al-Ṭiḥāl* (splenomegaly), *Bawāsīr* (piles), *Iḥtibās al-Ṭamth* (amenorrhoea), excess use of moist and hardly digestible and spicy and oily diet (Khan, 2011; Jurjani, 2010; Ibn Sina, 2010; Baghdadi, 2004).

In the era of tremendous progress of medicine, the problem is that most of the drugs are synthetic compounds and associated with numerous side effects. Moreover, modern medicines are getting more and more costly and people from developing countries often face tough choice to make. According to a survey, the WHO appraises that 80% of the world population reckon on medicines of plant origin for their primary healthcare (Kamboj, 2000). According to Unani Medicine, the modes of treatment comprise *'Ilāj bi'l-Tadbīr* (regimenal therapy),

'Ilāj bi'l-Ghidhā' (dietotherapy), *'Ilāj bi'l-Dawā'* (pharmacotherapy) and *'Ilāj bi'l-Yad* (surgery). Considering pharmacotherapy, both single and compound drugs are being used successfully since hundreds of years in the management of anaemia. There are several single drugs such as *Za'frān* (*Crocus sativus*), *Dārchīnī* (*Cinnamomum zeylanicum*), *Sa'd Kūfī* (*Cyperus rotundus*), *Asārūn* (*Asarum europaeum*), *Bālchhaṛ* (*Nardostachys jatamansi*), *Halila* (*Terminalia chebula*), *Balila* (*Terminalia bellerica*), *Āmla* (*Emblica officinalis*), *Qaranful* (*Eugenia caryophyllata*), *Bisfā'ij* (*Polypodium vulgare*) (Ibn Sina, 2010; Jurjani, 2010; Ibn Baitar, 2003). There are a number of Unani formulations containing *Fawlād* (iron) such as *Qurṣ Kushta Fawlād, Ma'jūn Fanjnūsh, Kushta Samm al-Fār, Ma'jūn Khabath al-Ḥadīd, Jawārish Āmla* and *Sharbat Anārayn*. Among the compound drugs, *Sharbat Fawlād* has been traditionally used for the treatment of anaemia (*Faqr al-Dam*).

Sharbat

The word *Sharbat* is derived from Persian '*Sharbat*', and 'Sherbet' is from Turkish '*Serbet*', both of which in turn come from Arabic '*Sharba*', a drink, from '*Shariba*' to drink. *Sharbat* is an important invention of a renowned Unani physician Pythagoras. It is sweet viscous liquid or medicinal preparations made either by preparing the decoction from the plant, animal and mineral origin drugs or by taking juice of fruits from different plants and mixed with sugar and boiled to the required consistency *(Qiwm)* i.e. one *Tār* (Anonymous, 1986; Khan, 2010; Anonymous, 2011; IIPS, 2006).

Method of Preparation of Sharbat

For preparing *Sharbat*, dry herbal drugs are soaked overnight in water, amounting to 8 or 10 times the weight of the drugs. Next morning, they are boiled till one third water is left, allowed to cool, rubbed with hands, and filtered through a piece of fine cloth. Then, two or three times of sugar are added, and the mixture is boiled on a low fire to obtain the desired consistency of *Sharbat*. The *Qiwām* (base) of various Unani formulations is generally made by adding *Āb* (water), *'Araq* (distillate) or *Āb-i-Thamar* (fruit juice) in any of the bases of purified honey with sugar, candy or jaggery, etc. and boiled over a low fire till it acquires the required consistency. The base is generally purified by adding *Āb-i-Limū* (lemon juice), *Satt-i-Limū* (lemon extract) or *Shibb-ī-Yamānī* (alum), etc. before making the *Qiwām* (Anonymous, 2007) which act as preservative also.

Sharbat Fawlād

Sharbat Fawlād is an important Unani formulation mentioned in classical Unani literature which is used for the treatment of anaemia. It has various pharmacological actions like *Muwallid-i-Dam* (haemopoietic), *Muqawwī-i-Mi'da*

(stomachic) *Muqawwī-i-Kabid* (hepatotonic), *Mushtahī* (appetiser) and *Muqawwī-i-Aʿṣāb* (nervinetonic), etc. (Anonymous, 2007).

Ingredients of *Sharbat Fawlād*

The formula for preparation of *Sharbat Fawlād* as mentioned in National Formulary of Unani Medicine, Part VI contains twenty-five ingredients with sugar/honey as a base (Anonymous, 2007).

S. No.	Ingredients	Scientific Name	Quantity in Each 10ml
1.	*Burāda Fawlād*	Iron rust	120.0 mg
2.	*Tursha Shūra*	Potassium nitrate	0.3 ml
3.	*Tursha Namak Shūra*		0.1 ml
4.	*Tursha Kibrīt*	Sulphur	0.1 ml
5.	*Sirka-i-Jāmun*	*Eugenia jambolana*	3.0 ml
6.	*Satt-i-Limū*	*Citrus limon*	60.0 mg
7.	*Tukhm-i-Karafs*	*Apium graveolens*	6.0 mg
8.	*Bādiyān*	*Foeniculum vulgare*	3.0 mg
9.	*Ajwāyin Desī*	*Trachyspermum ammi*	3.0 mg
10.	*Ṣaʿtar Farsī*	*Zataria multiflora*	3.0 mg
11.	*Anīsūn Rūmī*	*Pimpinella anisum*	3.0 mg
12.	*Hiltīt Khāliṣ*	*Ferula foetida*	3.0 mg
13.	*Kishnīz Khushk*	*Coriandrum sativum*	3.0 mg
14.	*Filfil Darāz*	*Piper longum*	3.0 mg
15.	*Filifil Siyāh*	*Piper nigrum*	3.0 mg
16.	*Kundur Gond*	*Boswellia serrata*	3.0 mg
17.	*Saʿd Kūfī*	*Cyperus rotundus*	3.0 mg
18.	*Dārchīnī*	*Cinnanmomum zeylanicum*	3.0 mg
19.	*Khurfa Siyāh*	*Portulaca oleracea*	3.0 mg
20.	*Jawzbuwwā*	*Myristica fragrans*	3.0 mg
21.	*Balchhaṛ*	*Nardostachys jatamansi*	3.0 mg
22.	*Tukhm-i-Hālūn*	*Lepidium sativum*	3.0 mg
23.	*Tukhm-i-Piyāz*	*Allium cepa*	3.0 mg
24.	*Zanjabīl Khushk*	*Zingiber officinalis*	3.0 mg
25.	*Zīra Safayd*	*Cuminum cyminum*	1.5 mg
26.	*Qand Safayd*	Sugar	Q.S.

Dosage of *Sharbat Fawlād*:

Dosage of *Sharbat Fawlād* as mentioned in National Formulary of Unani Medicine, Part VI is as follows (Anonymous, 2007):

Adult: 20ml twice a day

Children: 10ml twice a day

Pharmacological Actions

Sharbat Fawlād has various pharmacological actions mentioned in Unani classical literature which are as follows:

Muwallid-i-Dam (hemopoietic) (Anonymous, 2007; Khan, YNM; Kabeeruddin, 2006)

Muqawwī-i-Mi'da (stomachic) and *Muqawwī-i-Kabid* (hepatotonic) (Anonymous, 2007)

Mushtahī (appetiser) (Khan, YNM)

Muqawwī-i-A'ṣāb (nervinetonic) (Khan, YNM)

Therapeutic Uses

Faqral-Dam (anaemia) (Anonymous, 2007; Khan, YNM) (Kabiruddin, 2006)

Pharmacological Studies

Verma *et al.* (2013) reported that *Sharbat Fawlād* possesses significant haematinic effect. It can also be inferred that the drug is safe as it did not induce any toxic effect, particularly on liver and kidney functions.

Conclusion

This review presents that *Sharbat Fawlād* is traditionally useful in various ailments primarily in anaemia. *Sharbat Fawlād* has been proven scientifically to possess significant haematinic activity. It has various pharmacological actions like hemopoietic, stomachic, appetiser and nervine tonic. However, more scientific studies and clinical trials are needed on this compound formulation to ensure its scientific validation for clinical use in patients. It is also important to find out the active ingredient(s) in this preparation and their mode of action.

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सारांश

शर्बत–ए–फौलाद: फक़्र अल–दम (एनीमिया) के लिए एक गुणकारी यूनानी मिश्रण

ज़ेबा आफ़रीन, *शगुफ़्ता परवीन, अब्दुल रहीम, तमन्ना नाज़ली, आसिम अली ख़ान

भारत में एनीमिया एक प्रमुख जन स्वास्थ्य समस्या है। विश्व स्वास्थ्य संगठन के अनुसार दुनिया में दो अरब लोग एनीमिया से पीड़ित हैं और एनीमिया के आधे मामले आयरन की कमी के कारण हैं। यूनानी चिकित्सा में एनीमिया के उपचार के लिए एकल औषधियों और यौगिक मिश्रणों का खज़ाना है। यौगिक मिश्रणों में *शर्बत–ए–फौलाद* प्रसिद्ध यूनानी औषधियों में से एक है जिसमें *मुवल्लिद–ए–दम* (हेमोपोएटिक), *मुक़व्वी–ए–मेदा* (स्टोमेकिक) और *मुक़व्वी–ए–कबिद* (हेपेटोटॉनिक) सहित विभिन्न औषधीय क्रियाएं हैं। एनीमिया के उपचार के लिए इसका उपयोग प्राचीन काल से होता आ रहा है। हाल के वर्षों में *शर्बत–ए–फौलाद* के हेमेटिनिक प्रभाव के बारे में पता चला है। इस समीक्षा में एनीमिया एवं अन्य विकारों के उपचार हेतु *शर्बत–ए–फौलाद* के लाभकारी प्रभावों को उजागर करने का प्रयास किया गया है।

शब्दकुजी: शर्बत–ए–फौलाद, फ़क्र अल–दम, एनीमिया, यूनानी चिकित्सा

Qarḥa Ḥumūḍī (Peptic Ulcer): An Overview

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Abstract

Peptic ulcer has become a major medical and social issue nowadays. It resembles *Qarḥa Ḥumūḍī* according to the Unani classical literature. It is a lesion of the mucosal lining of the upper gastrointestinal tract (GIT). It occurs due to imbalance between the gastro-duodenal mucosal lining and defense mechanisms of the GIT which protects from injury. According to Unani classical literature, *Qarḥa Ḥumūḍī* (peptic ulcer) is defined as discontinuation of the lining of *Mi'da* (stomach) including duodenum. The most common disorders of upper gastrointestinal tract are characterized by retrosternal burning, dysphagia, dyspepsia, pain (may be associated with meals before or after), nausea and vomiting. Unani physicians had mentioned causes of ulceration such as acrid phlegmatic matter, bile mixed with phlegm or the matter accumulated in the stomach which is secreted from other organ. In this review paper, *Qarḥa Ḥumūḍī* is elaborated with its types, causes and treatment as per Unani Medicine.

Keywords: *Qarḥa Ḥumūḍī,* Peptic Ulcer, *H. pylori*, Unani Medicine

Introduction

Qarḥa Ḥumūḍī (peptic ulcer) is a very common and chronic disorder found in the society. The term peptic ulcer resembles *Qarḥa Ḥumūḍī* in Unani Medicine. It refers to an ulcer found in the lower oesophagus, stomach or duodenum. It is characterized by nausea, vomiting, dysphagia, retrosternal burning, dyspepsia and pain (may be associated with meals before or after). It occurs due to imbalance between the gastro-duodenal mucosal lining and defense mechanisms of the GIT which protects from injury (Crew & Neugut, 2006).

In the current scenario, lifestyle factors are responsible for peptic ulceration and even the composition of unbalanced daily diet, consumption of tobacco, alcohol, tea, coffee, betel nut and spicy foods (Kato *et al.*, 1992). The aggravating factors are gastric juice (consisting of hydrochloric acid, pepsin, and bile salts refluxed from the duodenum), *Helicobacter pylori*, and NSAIDs (Goodman & Correa, 2000; Huang *et al.*, 2002).

The prevalence of peptic ulcer disease has shifted from predominance in males to similar occurrences in males and females. The lifetime prevalence is approximately 11%-14% in men and 8-11% in women (Naqvi, 2001). Gastric and duodenal ulcers coexist in 10% of patients and more than one peptic ulcer is found in 10–15% of patients (Kumar *et al.*, 2008).

In Unani classical literature, gastric ulcer (*Qarḥa-i-Mi'da*) and intestinal ulcer (*Qarḥa-i-Am'ā'*) are dealt with separately, while modern medicine deals with both gastric and intestinal ulcers under the heading of peptic ulcer (Tabari, 2010).

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Diagnostic criteria for *Qarḥa Ḥumūḍī* (peptic ulcer) on the basis of *'Alāmāt* (signs and symptoms) particularly related with the pain association had been mentioned in Unani Medicine.

Qarḥa Ḥumūḍī (peptic ulcer) may be associated either with gastric infection caused by *H. pylori* or with the intake of non-steroidal anti-inflammatory drugs (NSAIDs). The management of peptic ulceration includes the elimination of its causative agents. Moreover, it appears that a number of peculiar epidemiologic features of peptic ulcer disease which puzzled the early investigators can be explained by considering the epidemiology of *H. pylori* infection and NSAID use (Kato *et al.*, 1992).

Concept of Peptic Ulcer in Unani Medicine

According to *Allama Qarshi* (1210-1288 AD), a famous Unani physician, *Qarḥa Ḥumūḍī* (peptic ulcer) is defined as discontinuation of the lining of *Mi'da* (stomach) including duodenum. There are various causes of ulceration which include acrid phlegmatic mater, bile mixed with phlegm or the matter accumulated in the stomach which is secreted from another organ (Qarshi, 1914).

Buqrāṭ (460-375 BC) and *Zakariyya Rāzī* (850-923 AD), well-known Unani physicians, have mentioned the detailed description of various disorders of gastrointestinal tract (GIT) such as *Qarḥa-i-Marī* (ulcer of oesophagus), *Qarḥa-i-Mi'da* (gastric ulcer) and *Qarḥa-i-Am'ā'* (intestinal ulcer) (Tabari, 1997; Razi, 1997). It has been stated that the main cause of the *Qarḥa Ithnā Asharī Muzmin* (chronic duodenal ulcer) is the hyper irritation owing to the action of the *Ruṭūbat-i-Turshī* (acid secreted in the stomach) on the mucous membrane of the duodenum (Jurjani, 1903). Ibn Sīnā (Avicenna) (980-1037 AD) in his book *Al-Qānūn fi'l-Ṭibb* (The Canon of Medicine) has described various types of peptic ulcerations found in different parts of GIT (Ibn Sina, 2010).

Causative Factors of Peptic Ulcer

It may be due to intake of hot and acrid food, sour and irritated material like *Sirka* (vinegar), alcohol, spices and *Rā'ī* (black mustard) (Jurjani, 1903; Arzani, 1931; Majusi, 1996) as they cause irritation on the walls of the stomach and intestine (Razi, 1997). Any solid food can also cause mechanical injury to the stomach and intestine during passage which leads to abrasion/ulceration. The ulcers in *Am'ā' Diqāq* (duodenum and jejunum) do not heal on time (Ibn Sina, 1990).

Clinical Features of *Qarḥa Ḥumūḍī* (Peptic Ulcer)

Clinical features of *Qarḥa Ḥumūḍī* according to Unani Medicine are pain in *Qism*

Sharāsīfī (epigastrium), which is precipitated by food in gastric ulceration and occurs 2-3 hours after a meal and is relieved by food in duodenal ulceration; dryness of mouth and tongue; foul smelling eructation; *Bakhr al-Fam* (halitosis); *Buṭlān al-Haḍm* (indigestion); *Buṭlān al-Ishtihā'* (anorexia); *Ghathayān wa Qay'* (nausea and vomiting) and *Ḥummā Khafīf* (mild fever) (Ibn Sina, 1990 & 2010; Razi, 1997; Jurjani, 1903; Khan, 2003). There may be cast in vomiting in case of *Qarḥa-i-Mi'da* (gastric ulcer) and cast in stool in case of *Qarḥa-i-Am'ā'* (intestinal ulcer) (Jurjani, 1903).

Tashkhīṣ (Diagnosis)

The diagnostic criteria for *Qarḥa Ḥumūḍī* (peptic ulcer) are based on the clinical findings (related to gastric ulcer or duodenal ulcer) which include pain in *Qism Sharāsīfī* (epigastrium). Pain in epigastrium is precipitated by taking food in case of *Qarḥa-i-Mi'da* (gastric ulcer) and the epigastric pain occurs 2-3 hours after a meal which is relieved by food in case of duodenal ulcer (Jurjani, 1903; Ibn Sina, 1990 & 2010).

Taḥaffuz (Prevention)

Preventions to be taken for *Qarḥa Ḥumūḍī* (peptic ulcer) are to avoid intake of irritant drugs, hot, salty and spicy food substances and sour stuff like *Sirka* (vinegar) and *Rā'ī* (black mustard) (Ibn Sina, 1990 & 2010; Razi, 1997; Jurjani, 1903), avoid taking excessive food filling stomach at night (Jurjani, 1903; Khan, 2003). Extra care should be taken while consumption of hard food to prevent mechanical injury to stomach and intestine (Ibn Sina, 1990 & 2010).

Uṣūl-i-'Ilāj (Principles of Treatment)

In Unani classical literature, the emphasis has been given to treat the diseases like *Qarḥa Ḥumūḍī* (peptic ulcer) by adopting the principles of treatment like *Tanqiya-i-Qurūḥ* (cleansing of ulcers) with the help of *Munaqqī* (cleansing) drugs like *Mā' al-'Asal* (honey water) followed by removal of causative substance (*Mādda*) with the aid of *Mulayyin Adviya* (laxative drugs). Thereafter, *Indimāl-i-Qurūḥ* (ulcer healing) with the help of ulcer healing drugs and later on strengthening GIT with the help of *Muqawwī Mi'da wa Am'ā' Advia* (stomach and intestine tonic) (Ibn Sina, 1990 & 2010; Jurjani, 1903; Khan, 2003). In case of nausea and excessive secretion of bile, vomiting can be suppressed by *Āb-i-Anār Tursh*. The patient may be given *Mā' al-Sha'īr* (barley water) to prevent uneasiness related to nausea (Jurjani, 1903).

Conclusion

There is a tremendous scope of treatment in Unani Medicine which offers well integrated stepwise plan for treating *Qarḥa Ḥumūḍī* (peptic ulcer). In this context,

Unani Medicine is helpful in curing such diseases by its modes of treatment like '*Ilāj bi'l-Ghidhā*' (dietotherapy) and '*Ilāj bi'l-Dawā*' (pharmacotherapy). By adopting unique methods of prevention and treatment of Unani Medicine, *Qarḥa Ḥumūḍī* (peptic ulcer) may be managed.

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सारांश

क़रहा हुमूज़ी (पेप्टिक अल्सर) : एक अवलोकन

***अन्जु, रासिख़ जावेद, गज़ाला जावेद**

पेप्टिक अल्सर आजकल एक बड़ी चिकित्सीय एवं सामाजिक समस्या बन गई है। यह यूनानी क्लासिकल साहित्य के अनुसार *क़रहा हुमुज़ी* के समान है। यह ऊपरी जठरांत्र संबंधी मार्ग (जीआईटी) के श्लेष्मिक परत का एक घाव है। यह गैस्ट्रो–ड्योडेनल श्लेष्मिक परत और जीआईटी के रक्षा तंत्र जो इसे घाव से बचाता है के बीच असंतुलन के कारण होता है। यूनानी क्लासिकल साहित्य के अनुसार *क़रहा हुमूज़ी* (पेप्टिक अल्सर) को ग्रहणी सहित मेदा (पेट) की परत के विच्छेदन रूप में परिभाषित किया गया है। ऊपरी जठरांत्र संबंधी मार्ग के सबसे सामान्य विकारों में रेट्रोस्टेरनल जलन, निगलने में कठिनाई, अपच, दर्द (भोजन करने से पहले या बाद में), मतली और उल्टी को बताया गया है। यूनानी चिकित्सकों ने अल्सर के कारणों में तीक्ष्ण कफमय पदार्थ, पित्त कफ़ के साथ मिश्रित या पेट में जमा हुआ पदार्थ जो अन्य अंग से स्रावित होता है का उल्लेख किया है। इस समीक्षा पेपर में यूनानी चिकित्सा के अनुसार *क़रहा हुमूज़ी,* इसके प्रकार, कारणों और उपचार के बारे में विस्तृत उल्लेख किया गया है।

शब्दकुंजी: *क़रहा हुमूज़ी,* पेप्टिक अल्सर, *एच. पाइलोरी,* यूनानी चिकित्सा

Evaluation of Pharmacopoeial Standards with HPTLC Profile of *Ḥabb Hindī Chashm*, a Compound Unani Formulation

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Abstract

The recent increase in the demand of herbal drugs has pressed the need for their standardization and quality control. The Drug Standardisation Research Unit under the Central Council of Research in Unani Medicine is engaged in developing the standards of classical Unani formulations. *Ḥabb Hindī Chashm* is one such Unani polyherbal formulation which was taken up for standardization by the unit in order to fix its quality parameters. The drug is used locally for ophthalmic diseases like *Sabal* (vascular keratitis), *Sulāq* (blepharitis/tarsitis) and *Nuzūl al-Mā'* (cataract). The study drug was prepared as per the formula and method described in National Formulary of Unani Medicine. The formulation was subjected to various quality control parameters such as organoleptic evaluations (color, odor, taste, and consistency), physicochemical evaluations (loss on drying, total ash, acid insoluble ash, pH of 1% and 10% solution, water soluble matter, hexane soluble and alcohol-soluble matter) and HPTLC analysis. The evaluation of contaminants such as heavy metals, aflatoxins, pesticide residues, and microbial contamination was also carried out in the formulation to lay down the quality standards.

Keywords: Standardization, Pharmacopoeial standards, Pharmacognosy, HPTLC, Heavy metals

Introduction

There is increased general awareness about the necessity of developing standards of herbal drugs for the purpose of quality control by the manufacturers, drug control authorities and consumers. The assessment of the safety, efficacy and quality of herbal medicines is a prerequisite for their global acceptance.

Ḥabb Hindī Chashm, used in the present study, is a Unani compound formulation mentioned in National Formulary of Unani Medicine (Anonymous, 2006). The drug is prescribed for the treatment of ophthalmic diseases like *Sabal* (vascular keratitis), *Sulāq* (blepharitis/tarsitis) and *Nuzūl al-Mā'* (cataract) (Khan, 1302H). *Ḥabb Hindī Chashm* has *Jālī* (detergent) action (Khan, 1302H) which can be attributed to the presence of ingredients like *Maghz-i-Tukhm-i-Rīthā* (kernel of *Sapindus mukorossi* Gaertn), *Maghz-i-Tukhm-i-Samander Phal* (kernel of *Barringtonia acutangula* L. (Gaertn) and *Āb-i-Limū* (juice of *Citrus aurantifolia* (Christian) Swingle). Kernels of *Khirnī* (*Manilkara kauki* (L.) Dubard) are powdered and mixed with milk and prescribed for the treatment of *Ramad* (opthalmia) in Unani Medicine (Kabiruddin, YNM).

In order to lay down the standard operating procedures (SOPs) and pharmacopoeial standards, the formulation was prepared at laboratory scale at DSRU, New Delhi.

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The present paper describes the salient features of preparation, microscopic analysis, physicochemical analysis, and thin-layer chromatographic studies, heavy metal estimation, aflatoxins, microbial loads and pesticide estimation not reported so far.

Materials and Methods

Preparation of drug

All the ingredients were procured from local raw drug dealer and identified botanically (Wallis, 1967; Trease & Evans, 1972) using pharmacognostical methods. The ingredients were further validated by comparing with the monographs available in Unani Pharmacopoeia of India (UPI) and Ayurveda Pharmacopoeia of India (API) (Anonymous, 2001). All the ingredients taken were of pharmacopoeial quality. The ingredients were cleaned and dried under shade to remove the moisture, if any. The ingredients S. No. 1 to 5 (Table 1) were crushed separately in an iron mortar to obtain coarse powder. The coarse powder was further ground in a mixer grinder to get the fine form. The fine powder was mixed thoroughly and sieved through mesh no. 80. Then sufficient quantity of ingredient no. 6 was added to the mixture and again mixed thoroughly to obtain the *Lubdī* (mass). The *Ḥabb* was prepared from the *Lubdī* (mass) by mechanical process and dried under shade. The prepared drug was stored in tightly closed glass container free from moisture and kept in a cool and dry place. The drug was prepared in three batches, each batch comprising a minimum of 500 *Ḥubūb*, weighing about 250-300 mg per *Ḥabb*.

Table 1: Formulation composition

S. No.	Ingredients	Botanical name / English name	Part used	Form
1.	*Maghz-i-Tukhm-i-Samandar Phal*	*Barringtonia acutangula* L. (Gaertn)	Kernel	Powder
2.	*Maghz-i-Tukhm-i-Rīthā*	*Sapindus mukorossi* Gaertn	Kernel	Powder
3.	*Maghz-i-Tukhm-i-Khirnī*	*Manilkara kauki* (L) Dubans	Kernel	Powder
4.	*Maghz-i-Tukhm-i-Balila*	*Terminalia bellerica* Roxb	Kernel	Powder
5.	*Halila Siyāh*	*Terminalia chebula* Retz	Fruit	Powder
6.	*Āb-i-Limū*	*Citrus aurantifolia* (Christian) Swingle	Fruit juice	Liquid

Microscopy

5 gm of the powdered drug was taken and stirred gently with hot water in a beaker. The supernatant was discarded and the residue was washed with the distilled water. A little residue was stained with iodine solution and mounted in 50% glycerin. Some of the residue was heated in chloral hydrate solution and mounted in 50% glycerin and a little residue was boiled in 2% potassium hydroxide solution, washed with distilled water and mounted in 50% glycerin (Johansen, 1940; Wallis, 1967).

Physico-chemical analysis

The physico-chemical parameters of *Ḥabb Hindī Chashm* such as removal of foreign matters, moisture contents, extractive values (solubility in water, ethanol and hexane), ash values (total ash and acid insoluble ash) and pH values (1% and 10% aqueous solution) and volatile oil estimation were analyzed by standard methods (Anonymous, 1987; WHO, 2011).

Quality control analysis

Quality control parameters like microbial load, heavy metals, aflatoxins and pesticidal residues for the samples of the drug were undertaken and analyzed. The microbial load estimation was carried out as per the guidelines (WHO, 2007). Heavy metal analysis was done by atomic absorption spectrophotometer (AOAC, 2005). Analysis of aflatoxins was performed by TLC method (WHO, 2007). Pesticide residues were analyzed using GC-MS Agilent instrument equipped with mass selective detector as per the methods of AOAC (2005) and AOAC (2000).

HPTLC analysis

The prepared drug was extracted separately with chloroform and ethanol under refluxing conditions on a water bath for about 30 minutes and then filtered. The extracts were concentrated and made up to 10ml in a volumetric flask separately. These solutions were used for HPTLC finger print analysis by employing CAMAG Linomat IV sample applicator on aluminum TLC plate pre-coated with silica gel 60 F_{245} (E. Merck). The plate was developed up to the distance of 8cm in the chamber (10x10), using 10ml of the developing system Toluene; ethylacetate (9:1) as mobile phase. The plate was dried at room temperature, observed and scanned under UV 254mm and UV 366mm. Further the plate was dipped in 1% vanillin-sulphuric acid reagent and heated at 105°C till colored spots appeared (Wagner & Bladt, 1984, Sethi, 1996; Stahl, 1996).

Observations

Ḥabb Hindī Chashm is dark brown pill with characteristic odor, astringent taste and solid consistency. The drug did not show any filth, fungus or objectionable matter while the sample was spread in a petri dish (Fig. 1).

The microscopy shows the presence of following plant tissues. Fragment of the parenchymal cells of the endosperm filled with abundant oil globules and starch grains that are single or compound measuring 9-18µ in diameter (*Maghz-i-Samandar Phal*); parenchymal cells filled with oil globules and simple; spherical starch grains measuring 4.5-9µ in diameter (*Maghz-i-Tukhm-i-Rīthā*); fragment of the parenchyma cells of the endosperm and cotyledon filled with oil globules and starch grains that are simple, spherical having diameter 4.5-13.5µ (*Maghz-i-Tukhm-i-Khirnī*); fragment of parenchymal cells filled with oil globules and rosette crystals of calcium oxalate (*Maghz-i-Tukhm-i-Balila*); group of fibres and scleroides (*Halila Siyāh*) (Fig. 2a & 2b).

The results observed for the physico-chemical data, microbial load, aflatoxins, pesticidal residues, heavy metals and HPTLC profile are shown in Table 2, 3, 4, 5, 6 & 7 respectively.

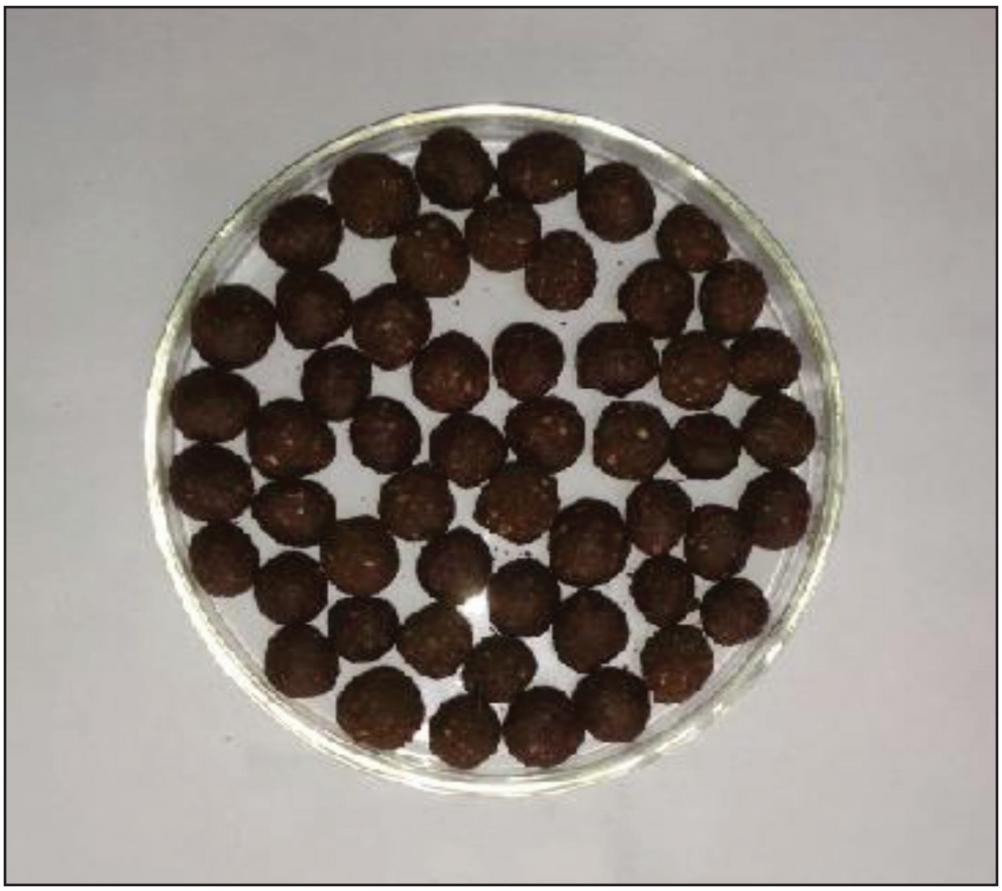
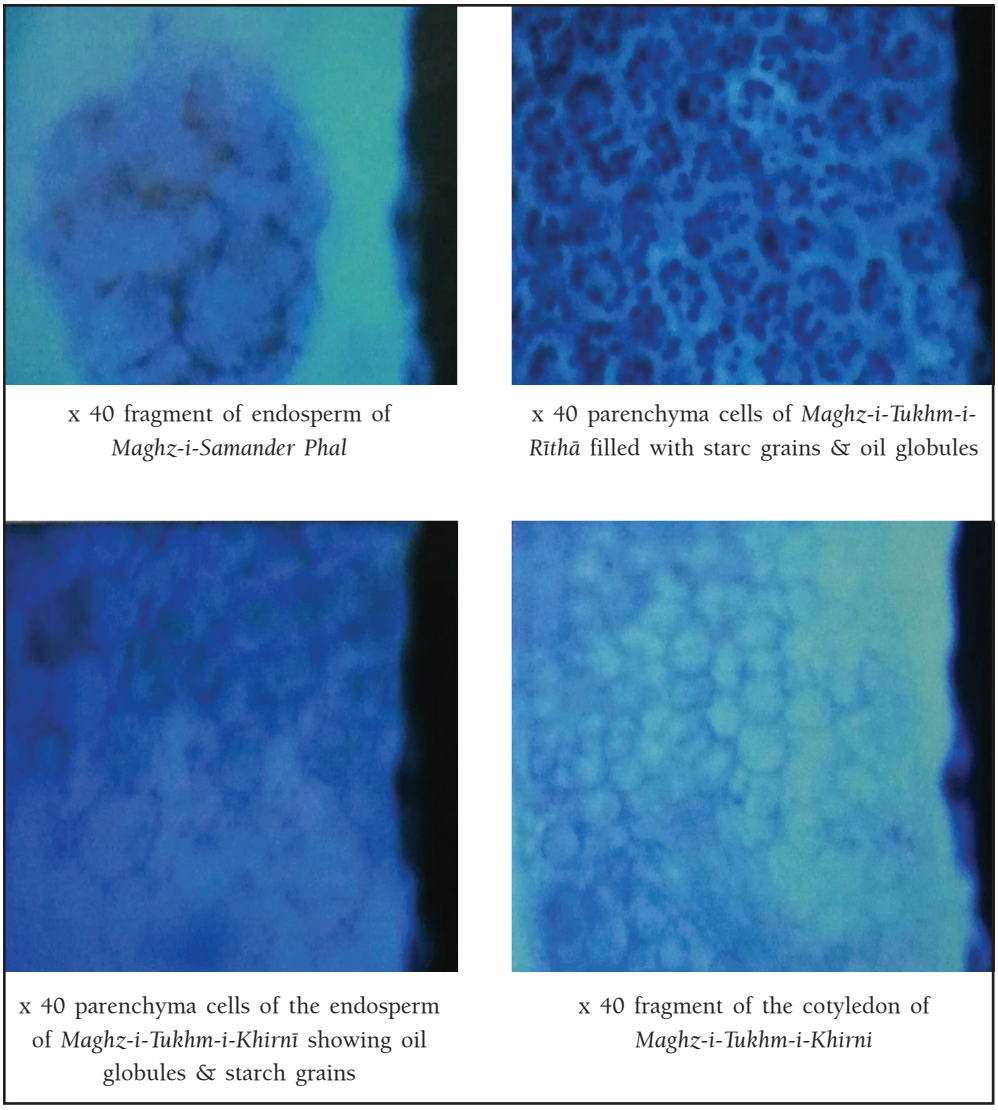


Fig. 1: *Ḥabb Hindī Chashm*



x 40 fragment of endosperm of *Maghz-i-Samander Phal*

x 40 parenchyma cells of *Maghz-i-Tukhm-i-Rīthā* filled with starc grains & oil globules

x 40 parenchyma cells of the endosperm of *Maghz-i-Tukhm-i-Khirnī* showing oil globules & starch grains

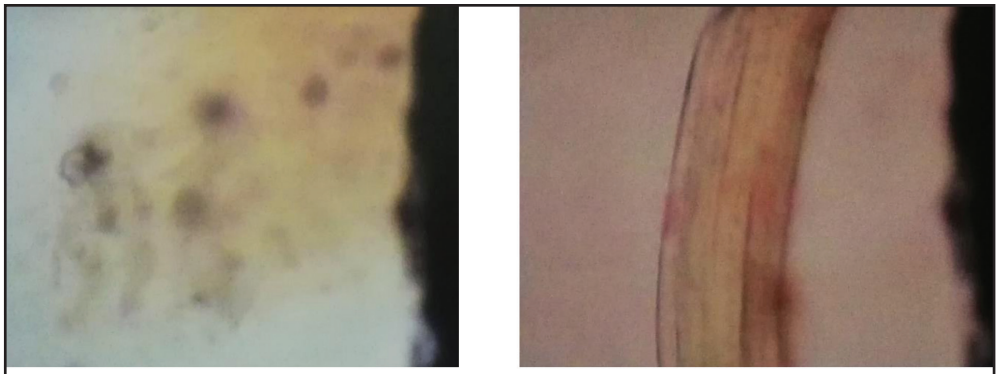
x 40 fragment of the cotyledon of *Maghz-i-Tukhm-i-Khirni*

Fig. 2(a): *Ḥabb Hindī Chashm*

Results and Discussion

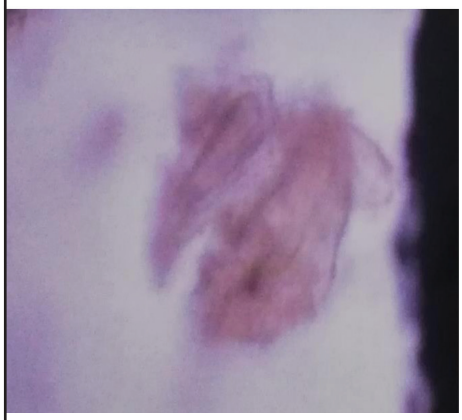
Physico-chemical analysis

The physico-chemical data of the drug *Ḥabb Hindī Chashm* are shown in Table 2. The low value of water soluble extractive values (19.25–20.37%) shows the absence of any inorganic constituents in the drug. The alcohol and hexane soluble extractive values were similar which indicates that the phytoconstituents of the drug were equally soluble in both the solvents. The low value of total ash (3.08-3.49%) and acid insoluble ash (0.97-1.05%) reveals the presence of negligible amount of siliceous matter. The moisture content in drug was low as the loss in weight on drying at 105°C occurred below 10%. The aqueous extract of the drug was slightly acidic as pH falls in the range of 5-6.

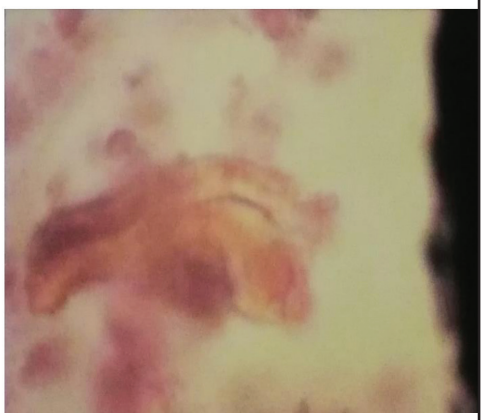


x 40 parenchyma cells of *Maghz-i-Tukhm-i-Balila* showing oil globules & calcium oxalate crystals

x 40 group of fibres of *Halila Siyāh*



X 40 sclereids of *Halila Siyāh*



x 40 sclereids of *Halila Siyāh*

Fig. 2(b): *Ḥabb Hindī Chashm*

Table 2: Physico-chemical parameters

S. No.	Parameters	Results (%)
1.	Water soluble extractive (%)	19.25-20.37
2.	Alcohol soluble extractive (%)	15.16-16.55
3.	Hexane soluble extractive (%)	19.01-19.95
4.	Loss in wt. on drying at 105°C	8.36-9.17
5.	Total ash (%)	3.08-3.49
6.	Acid Insoluble ash (%)	0.97-1.05
7.	pH of 1% aqueous soln.	6.04-6.09
8.	pH of 10% aqueous soln.	5.44-5.47
9.	Volatile oil	1.05-1.72

Quality control analysis

Microbial load

Microbial content of the drug is given in Table 3. The estimation gives the tentative idea to assess the quality and safety of the drug prepared. The assessment is done for estimating the total viable count of bacteria, total fungus count, count of bacteria belonging to the *Enterobacteriaceae* family, count of pathogens like *E. coli, Staphylococcus aureus*, *Salmonella spp*, etc. The results indicate the microbial load to be within the permissible limit of WHO stating that the drug is safe for internal use for the treatment of the prescribed aliments.

Aflatoxins

The results of aflatoxins in the drug are given in Table 4. Aflatoxins are toxic metabolites produced by a variety of molds such as *Aspergillus flavus, A. parasiticus* and *A. nomius*. The results do not show any evidence for the presence of any of the aflatoxins contents (B1, B2, G1, and G2).

Table 3: Microbial load

S. No.	Parameter analyzed	Results	Permissible limit as per WHO
1.	Total bacterial count	3 x10^1 cfu / gm	10^5 cfu / gm
2.	*Enterobacteriaceae*	Absent	Nil
3.	*Salmonella spp.*	Absent	Nil
4.	*Escherichia coli*	Absent	Nil
5.	*Staphylococcus aureus*	Absent	Nil
6.	*Pseudomonas aeruginosa*	Absent	Nil
7.	Total *fungal* count	Less than 1 cfu/gm	10^3 cfu / gm

Table 4: Aflatoxins level

S. No.	Parameter analyzed	Results	Permissible limit as per WHO
1.	B1	Not detected	< 2ppb
2.	B1+B2+G1+G2	Not detected	< 5ppb

Pesticidal residues

The results of pesticidal residues are given in Table 5. Production of herbal drugs according to good agricultural practices with no pesticides is very difficult due to several factors. Estimation of pesticides in the samples became a major task and the drug was analyzed using GC-MS (detection limit up to 0.01 ppm). The results indicated the drug to be free of pesticide residues and safe for use.

Table 5: Pesticide residue

S. No.	Parameter analyzed	Results	Permissible limit as per WHO (mg/kg)
1.	Alachor	BLQ	0.02
2.	Aldrin	BLQ	0.05
3.	Azinphos-methyl	BLQ	1.0
4.	Chlordane (cis & trans)	BLQ	0.05
5.	Chlorfenvinphos	BLQ	0.5
6.	Chlorpyrifos	0.052	0.2
7.	Chlorpyrifos-methyl	BLQ	0.1
8.	Cypermethrin	BLQ	1.0
9.	DDT	BLQ	1.0
10.	Deltamethrin	BLQ	0.5
11.	Diazinon	BLQ	0.5
12.	Dichlorvos	BLQ	1.0
13.	Dimethoate	BLQ	0.1
14.	Dieldrin	BLQ	0.03
15.	Endosulphan	BLQ	3.0
16.	Endrin	BLQ	0.05
17.	Ethion	BLQ	2.0
18.	Fenitrothion	BLQ	0.5
19.	Fenvalerate	BLQ	1.5
20.	Heptachlor	BLQ	0.05
21.	Hexacholobenzene	BLQ	0.06
22.	Lindane (gamma HCH)	BLQ	0.6
23.	Malathion	BLQ	1.0
24.	Parathion	BLQ	0.5
25.	Parathion-methyl	BLQ	0.2
26.	Permethrin	BLQ	1.0
27.	Phosalone	BLQ	0.1
28.	Primiphos methyl	BLQ	0.1

BLQ = Below limit of quantification

Heavy metal analysis

The results of heavy metal estimation are given in Table 6. Heavy metals are hazardous to human and animal health, their content in any drug used for consumption or medicinal purpose must be limited. The heavy metal content in *Ḥabb Hindī Chashm* was found to be within the permissible limit of WHO & Pharmacopoeia Commission of Indian Medicine & Homoeopathy (PCIM&H) indicating that the drug is safe and free from any type of heavy metal contamination.

HPTLC profile

The results of HPTLC profile are given in Table 7. HPTLC profiling is very reliable and convenient for identification of crude drugs as well as compound formulations as plant species produce a distinct chromatogram. HPTLC photograph of *Ḥabb Hindī Chashm* with both the solvent systems was observed under UV 254NM, UV 366nm and after derivatization. The chromatogram of chloroform extract shows 1 spot under UV 254nm, 5 spots under UV 366nm and 10 spots after derivatization. The chromatogram of ethanol extract shows 1 spot under UV 254nm, 3 spots under UV 366nm and 7 spots after derivatization (Fig. 3a, 3b & 3c).

Conclusion

It can be concluded that organoleptic parameters are not much reliable in identification of polyherbal formulation as the ingredients are powdered and mixed together for preparing compound formulation. The present study therefore holds high significance as the microscopic features; various physico-chemical parameters, HPTLC profile, etc. provide criteria for easy identification of the drug *Ḥabb Hindī Chashm* and quality control analysis ensures the authenticity, quality and efficacy of the medicine.

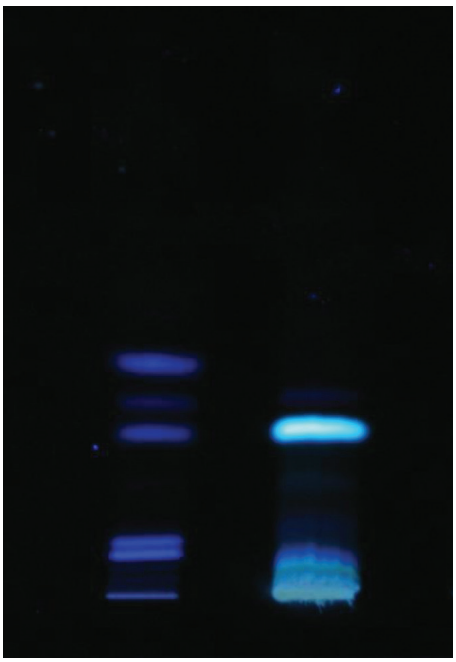
Table 6: Heavy metals

S. No.	Parameter analyzed	Results	Permissible limit as per WHO (ppm)
1.	Lead	Not detected	10.00
2.	Cadmium	Not detected	0.30
3.	Arsenic	Not detected	3.00
4.	Mercury	Not detected	01.00

Chloroform ext. Ethanol ext.

UV 254nm

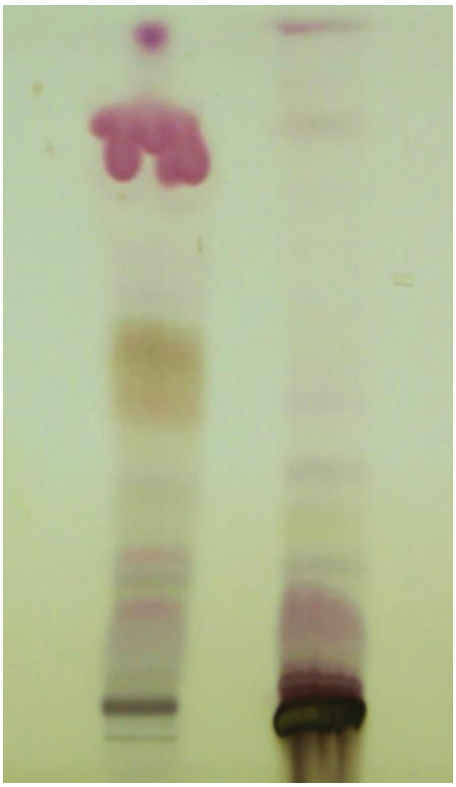
Fig. 3(a)



Chloroform ext. Ethanol ext.

UV 366nm

Fig. 3(b)



Chloroform ext. Ethanol ext.

After derivatization

Fig. 3(c)

Table 7: HPTLC results

S. No.	Extract	Solvent system	Developing reagent	R_f values with color		
				UV 254nm	UV 366nm	After derivatization
1.	Chloroform	toluene: ethyl acetate (9:1)	1% vanillin-sulphuric acid	0.53 (light green)	0.06 (blue)	0.05 (black)
					0.09 (blue)	0.18 (pink)
					0.28 (blue)	0.25 (pink)
					0.39 (blue)	0.23(light purple)
						0.35 (very light purple)
						0.52 (light brown)
						0.60 (very light purple)
						0.64 (very light purple)
						0.83 (dark purple)
						0.95 (pinkish purple)
2.	Ethanol	toluene: ethyl acetate (9:1)	1% vanillin-sulphuric acid	0.06 (black)	0.08 (blue)	0.06 (black)
					0.29 (fluorescent blue)	0.18 (pink)
					0.35 (very light blue)	0.24 (light purple)
						0.36 (light purple)
						0.45 (light pinkish purple)
						0.82 (light pink)
						0.95 (pinkish purple)

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सारांश

एक यौगिक यूनानी मिश्रण *हब्बे हिन्दी चश्म* के एचपीटीएलसी प्रोफ़ाइल के साथ भेषजकोशीय मानकों का मूल्यांकन

***असमा सत्तार ख़ान, फ़रह अहमद, अख़लाक़ मुस्तफ़ा, शोएब अहमद अंसारी, किरण नेगी, अनस इक़बाल अल्वी, असमा मिर्ज़ा, उमर हुसैन, ज़की अहमद सिद्दक़ी, आर. पी. मीणा**

हर्बल औषधियों की मांग में हुई हालिया वृद्धि से इनके मानकीकरण और गुणवत्ता नियंत्रण की आवश्यकता बढ़ी है। केन्द्रीय यूनानी चिकित्सा अनुसंधान परिषद् के अधीन कार्यरत औषधि मानकीकरण अनुसंधान एकक क्लासिकल यूनानी मिश्रणों के मानकों के विकास के लिए कार्यरत है। *हब्बे हिन्दी चश्म* उन पॉलीहर्बल मिश्रणों में से एक है जिनको गुणवत्ता मापदंड तय करने हेतु मानकीरण के लिए चुना गया। यह औषधि नेत्र संबंधी रोगों जैसे *सबल* (वस्क्यूलर केरेटाइटिस), *सुलाक़* (ब्लेफेराइटिस/टारसाटिस) और *नुज़ूल अल–मा* (मोतियाबिंद) में बाहरी रूप से उपयोग की जाती है। अध्ययन औषधि नेशनल फॉर्मूलरी ऑफ यूनानी मेडिसिन में बताए गए मिश्रण और विधि के अनुसार तैयार की गई। मिश्रण को विभिन्न गुणवत्ता नियंत्रण मापदण्डों जैसे इंद्रियग्राही मूल्यांकन (रंग, गंध, स्वाद और स्थिरता), भौतिक रासायनिक मूल्यांकन (सूखने पर हानि, कुल राख, एसिड में अघुलनशील राख, 1% और 10% घुलनशील का पीएच, जल में घुलनशील पदार्थ, हेक्सेन घुलनशील और एल्कोहल में घुलनशील पदार्थ) और एचपीटीएलसी विश्लेषण पर परखा गया। गुणवत्ता मानकों को निर्धारित करने के लिए मिश्रण में दूषित पदार्थों जैसे भारी धातुओं, एफ्लाटॉक्सिन, कीटनाशक अवशेषों और सूक्ष्मजीवी पदार्थों का भी मूल्यांकन किया गया।

शब्दकुंजीः मानकीकरण, भेषजकोशीय मानक, फार्माकोग्नॉसी, एचपीटीएलसी, भारी धातु

Physicochemical Standardization of *Tha'lab Miṣrī* (*Orchis latifolia* L.): An Important Drug of Unani Medicine

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Abstract

Tha'lab Miṣrī (*Orchis latifolia* L), commonly known as salep, is a medicinal plant belonging to the family Orchidaceae. It is commonly used for sexual function improving effect by the physicians of Unani Medicine. However, its different varieties are available in the market and the genuine sample is often confounded with other varieties giving rise to divergence in biological and therapeutic effect. Further, due to natural variations, a several natural products have significantly different biological activity and varied clinical efficacy. Therefore, the determination of its physicochemical attributes to set a standard of its constants is necessary. It will ensure the identity, quality and purity of the genuine sample and in turn will ascertain its therapeutic utility. In the present study, *Tha'lab Miṣrī (Orchis latifolia)* has been standardized according to the parameters mentioned in Unani Pharmacopeia of India and the documents of WHO on plant drugs. The ash values (Total ash, acid insoluble ash, water soluble ash), successive extractive values, loss on drying, pH at 1% and 10%, bulk density (poured and tapped density) and moisture content were determined using appropriate measures. Qualitative analysis and chromatographic study (TLC) were also performed.

Keywords: Standardization, *Tha'lab Miṣrī, Orchis latifolia*, Quality Control

Introduction

Herbal drugs grow in different climatic and soil conditions. Therefore, a particular herb may develop different attributes in different conditions; even different samples of the same species may have attributes different from each other and may be responsible for different degrees of pharmacological effect. Furthermore, in certain cases, drugs having physical and morphological resemblance are usually mixed and sold in the market as genuine samples. Even if such a drug possesses a similar pharmacological effect as that of the genuine sample, there are chances that the degree of effect and the mechanism of action may not be the same. In certain cases, two drugs despite having morphological similarity may have an entirely different pharmacological effect which may be injurious to the patients. Therefore, the standardization of herbal drugs is essential in order to maintain their safety, quality and efficacy. One of the major problems faced by the herbal drug industry is the unavailability of strict quality control measures for herbal medicines and their formulations. That is why the spurious, confounded and adulterated materials find a way into the market, and are used by the pharmaceutical companies to prepare various products. Given the importance of the traditional medicines and the herbal drugs which are used by

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the physicians to manage a number of diseases, the WHO has evolved guidelines to support the member countries in their efforts to formulate national policies on traditional medicine, and study their potential usefulness including evaluation of safety and efficacy (Srivastava *et al.,* 2010) and provide guidelines for the standardization of herbal and natural drugs. The quality control of herbal drugs and their preparations is a fundamental requirement of the pharmaceutical industry and other organizations dealing with Unani and herbal products, as no drug constituent can be used in pharmaceutical processing without passing the tests for its genuineness and authenticity.

Tha'lab Miṣrī (TM) (*Orchis latifolia* L.) is commonly used by the physicians of Unani Medicine mainly as an aphrodisiac and nervine tonic for the improvement of sexual and general health. For this purpose, it is included as an important ingredient in different formulations. TM is a tuberous root that is occasionally confounded with the roots of other plants of the family and sold in the name of TM. The tuberous roots of the orchids and allied species are sold in the market under the name of 'salep misri'. These roots, finely powdered and boiled with milk, form a nutritious article of diet and given in pthisis, diabetes, chronic diarrhoea and dysentery (Chopra *et al.*, 1958). In Unani Medicine, this root is an important drug used in clinical practices for the improvement of sexual and general health. Plants of TM commonly grow between Western Himalaya and Kashmir at an altitude of 3000 to 4000 meters (Bhattacharjee, 2004). These are herbaceous containing mucilage, glycoside, some nitrogenous and inorganic matter, sugar and albumin and a trace amount of volatile oil.

TM is used in different formulations but has not been evaluated for its physicochemical and phytochemical standards. Therefore, the present study was carried out to fix its physicochemical standards.

Materials and Methods

TM was procured from Dawakhana Tibbiya College, Aligarh Muslim University, Aligarh. The Pharmacognosy Section, Department of Ilmul Advia, Ajmal Khan Tibbiya College, Aligarh Muslim University, Aligarh identified the drug samples. The samples of the test drug were submitted to *Mawālīd Thalātha* Museum of the Department with the voucher No.Sc-0246/18 for future reference.

The roots of TM were ground to get a coarse powder. The powder was then subjected to physicochemical and phytochemical studies to determine various constants.

Determination of Organoleptic Characteristics

Organoleptic evaluation refers to the evaluation of the drug by its appearance, colour, odour, taste and texture (Table 1).

Physicochemical Study

The physicochemical study included the determination of extractive values of the test drug in different solvents, moisture content, ash values, loss of weight on drying, bulk density and pH values (Table 2).

Ash Values

Total Ash

About 2 to 3 gm accurately weighed powdered drug was incinerated in silica dish at a temperature not exceeding 450°C, until free from carbon. It was then cooled and weighed. The percentage of ash was calculated with reference to the air-dried drug (Anonymous, 2007).

Water Soluble Ash

The ash was boiled for 5 minutes with 25 ml of water. The insoluble matter was collected on an ashless filter paper, washed with hot water, and ignited for 15 minutes at a temperature not exceeding 450°C. The weight of the insoluble matter was subtracted from the weight of the ash; the difference in weight represented the water soluble ash. The percentage of water soluble ash was calculated with reference to the air dried drug (Anonymous, 2007).

Acid Insoluble Ash

The ash was boiled for 5 minutes with 25 ml of dilute hydrochloric acid. The insoluble matter was collected on ashless filter paper, washed with hot water and ignited to constant weight. The percentage of acid insoluble ash was calculated with reference to the air dried drug (Anonymous, 2007).

Moisture Content

The drug was kept in a flask along with a sufficient quantity of toluene. The level of toluene was kept above the level of the drug to allow the latter to get submerged. Then, it was distilled for sufficient time. The distillate was collected in a measuring receiver along with the toluene, and a separated upper layer was measured in the receiver (Afaq *et al.,* 1994).

Loss of Weight on Drying

The known weight of the test drug was spread uniformly as a thin layer in a shallow Petri dish. It was heated at a regulated temperature of 105°C, cooled in a desiccator and weighed. The process was repeated many times till two consecutive weights were found constant. The percentage of loss in weight was calculated with respect to the initial weight (Jenkins *et al.*, 2008).

pH Value

The determination of pH was carried out by a synchronic digital pH meter (model no. 335) equipped with a combined electrode. The instrument was standardized by using a buffer solution of 4.0, 7.0, and 9.20 to ascertain the accuracy of the instrument prior to the experiment. The pH value of 1% and 10% aqueous solution of the powdered drug was thus measured (Anonymous, 2007).

Bulk Density

It was measured by a digital bulk densitometer. A clean, dry, and previously washed bottle of 250 ml capacity was filled with 100 gm of the powdered drug. It was allowed to tap till the time when no further decrease in the level of drug was observed. It was calculated by the following formulae:

Poured bulk density=Mass of powdered drug/Volume (poured) of the test drug

Tapped bulk density=Mass of powdered drug/Volume (tapped) of test drug (Jenkins *et al.*, 2008).

Qualitative Analysis

The qualitative analysis of different chemical constituents present in the test drug was carried out according to the scheme proposed by Bhattacharjee and Das (1969). The powder of the test drug was extracted with petroleum ether (BP.60-80°C). The petroleum ether extract (I) was tested for free phenols, alkaloids and sterols/terpenes. A part of this extract was saponified and this portion (II) was tested for fatty acids, whereas, unsaponified portion (III) was tested again for phenols and sterols/terpenes for confirmation. The defatted marc was divided into two portions. One portion was extracted with hot water and the other with ethanol (70%). The aqueous (IV) and alcoholic (V) extracts were tested for alkaloids, flavonoids, saponins, sugars and tannins. The aqueous extract was extracted with ether and ether soluble portion (VI) was tested again for alkaloids, sterols/terpenes, whereas water-soluble portion (VII) was tested for glycosides. The water-soluble portion was again hydrolyzed with 5% hydrochloric acid and extracted with chloroform. The aglycone portion (VIII) was tested for the insoluble hydrochloride of alkaloid. Chloroform soluble portion (IX) was tested for alkaloids and sterols/terpenes, whereas water-soluble fraction (X) was tested for alkaloids. One part of this water-soluble portion was basified with alkali (ammonia) and extracted with an immiscible solvent (ether). The solvent soluble part (XI) was again tested for alkaloids (Table 3).

Test for Alkaloids

A drop of Dragendroff's reagent was added in the extract. The brown precipitate showed the presence of alkaloids.

Test for Carbohydrate / Sugars

Fehling's Test

In the aqueous extract, a mixture of equal parts of Fehling's solution A and B previously mixed was added and heated. A brick red precipitate of cuprous oxide indicates the presence of reducing sugars.

Molisch Test

In an aqueous extract, α-naphthol was added. Afterwards, concentrated sulphuric acid was gently poured. A brown colour ring at the junction of the two solutions indicates the presence of the sugar.

Test for Flavonoids

A piece of Magnesium ribbon was added to the alcoholic extract of the drug followed by drop-wise addition of concentrated HCL. Colour ranging from orange pink to red is a confirmatory test for flavonoids.

Test for Glycosides

The test solution was filtered and sugar was removed by fermentation with baker's yeast. The acid was removed by precipitation with magnesium oxide. The remaining alcoholic extract that contained the glycosides was subsequently detected by the following method:

The hydrolysis of the solution was done with concentrated sulphuric acid and the sugar was determined with the help of Fehling's solutions.

Test for Tannin

Ferric chloride solution was added in the aqueous extract of the drug. A bluish-black colour, which disappeared on the addition of dilute sulphuric acid followed by a yellowish brown precipitate shows the presence of tannin.

Test for Proteins

Xanthoproteinic Reaction

In the test solution, concentrated nitric acid was added and consequently, a yellow precipitate appeared. A strong solution of ammonia was added to it. The appearance of yellow colour shows the presence of proteins.

Biurette´s Reaction

In the hot test solution, 1 ml concentrated sodium hydroxide was added, followed

by one drop of copper sulfate solution. A violet or red colour indicates the presence of proteins.

Test for Sterol/Terpenes

Salkowski Reaction

In the test solution of chloroform 2 ml sulphuric acid (concentrated) was mixed from the side of the test tube. The colour of the ring at the junction of the two layers was observed. A red colour ring indicates the presence of sterols/terpenes.

Test for Amino Acids

The alcoholic extract was mixed with ninhydrin solution (0.1% in acetone). After heating gently on a water bath for a few minutes, it gives a blue to red-violet colour that indicates the presence of amino acids.

Thin Layer Chromatography

Thin layer chromatography of the test drug was carried out on aluminium plates precoated with Silica gel-G (Layer thickness 0.20-0.25 mm) for all extracts in various phases later sprayed by different spraying reagents. The Rf value of spots was calculated by the following formulae (Anonymous, 2007):

Rf value - Distance traveled by the spot / Distance traveled by the solvent

Observations and Results

The organoleptic evaluation carried out has been given below in Table 1.

The amount of total ash, water soluble ash and acid insoluble ash of TM (*Orchis latifolia*) were found to be 7.28±0.187, 2.33±0.24 and 5.15±0.15, respectively. Loss of weight on drying, moisture content, poured bulk density and tapped bulk density were found to be 6.28±0.153, 1.63±0.026, 0.73±0.0142 and 0.94±0.013,

Table 1: Organoleptic Characters

S. No.	Organoleptic Characters	Observations
1.	Appearance	Palm like
2.	Colour	Whitish yellow
3.	Odour	As like the semen
4.	Texture	Rough surface
5.	Taste	Sweety

pH was found to be 5.6 ± 0.104 in 1 % solution and 5.6 ± 0.360 in 10% solution. The extractive values by successive extraction with different solvents were found to be 0.04±0.005 in petroleum ether, 0.176±0.0085 in diethyl ether, 0.08±0.005 in chloroform, 0.26±0.0057 in acetone, 6.4±0.030 in alcohol and 49.34±0.64 in distilled water.

The qualitative test for chemical constituents demonstrated that alkaloids, glycosides, flavonoids, proteins, amino acids, tannins and steroids were present.

Table 2: Physicochemical Parameters

S. No.	Parameters	Results
1.	Ash value	Total Ash: 7.28±0.187 Water Soluble: 2.33±0.24 Acid Insoluble Ash: 5.14±0.15
2.	Moisture content	1.63±0.026
3.	Bulk density: Poured density Tapped density	0.73±0.0142 0.94±0.013
4.	Loss on drying at 105°C	6.28±0.153
5.	pH values	1% pH- 5.6± 0.1049 10% pH- 5.6 ± 0.3606
6.	Extractive values	Petroleum ether 0.04±0.005 Diethyl ether 0.176±0.0085 Chloroform 0.08±0.005 Acetone 0.26±0.0057 Alcohol 6.4±0.030 Distilled water 49.34±0.64

Table 3: Qualitative Analysis of *Tha'lab Miṣrī* (*Orchis latifolia*)

S. No.	Chemical Constituents	Tests/Reagent	Inference
1.	Alkaloid	Dragendroff's reagent	–
		Hager's test	–
		Mayer's reagent	–
2.	Carbohydrate	Molisch's test	+
		Fehling's test	+
3.	Glycoside	NaOH test	+
4.	Flavonoids	Mg ribbon and Dil. Hcl	+
5.	Tannin	Ferric chloride test	+
6.	Protein	Xanthoproteinic test	+
		Biurette's test	+
7.	Steroid	Salkowski reaction	–
8.	Amino acid	Ninhydrin solution	+

Table 4: TLC Profile of *Thaʿlab Miṣrī* (*Orchis latifolia*)

Extract	Solvent System (Mobile Phase)	Treatment	Number of Spots	R_f Values and Colour of Spots
Petroleum ether	Petroleum ether: Diethyl ether (4:1)	Day light	4	.26(BW), .32(LB), .59(LY), .78(FW)
		UV short	4	.26(BW), .32(LB), .59(LY), .78(FW)
		UV long	4	.26(BW), .32(LB), .59(LY), .78(FW)
		Iodine vapours	4	.26(BW), .32(LB), .59(LY), .78(FW)

Y = yellow; FW = Florescent white; LB = Light blue; LY = Light yellow; LB = Light brown, BW = Bluish white

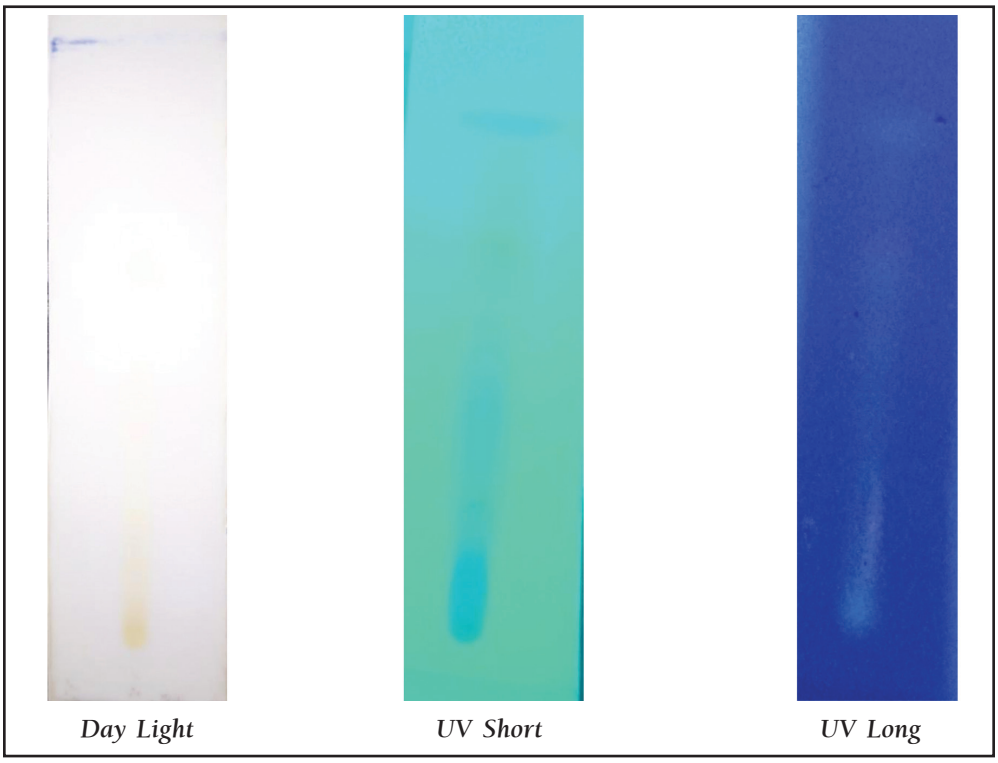

Fig. 1: TLC of petroleum ether extract of *Thaʿlab Miṣrī* (*Orchis latifolia*)

Discussion

Standardization is an essential measure for ensuring the quality of crude drugs. In the case of herbal drugs, it assumes more significance because of the unrestrained supply of spurious raw materials that are used to formulate the medicinal products. The physical resemblance of *Thaʿlab Miṣrī* with other drugs of the family and some other plant drugs often leads to confounding and adulteration. Therefore the chances of using substandard samples to prepare the formulations and plant products are too high. Since it possesses few very peculiar actions that have very specific therapeutic effect which may be compromised because

of the low or spurious quality the important ingredient and certain undesired pharmacological effects may also be produced. Therefore, the physicochemical attributes of TM must be established to ensure its identity and quality so that it can be used for specific and safe pharmacological effects. The present study covers different physicochemical aspects related to standardization. The physicochemical characteristics and qualitative determination of the phytoconstituents that are considered responsible for biological activity have been fixed through the findings of the present study. These findings will ensure the quality standards of *Thaʿlab Miṣrī* and serve as a reference for future studies.

The findings will also help in distinguishing it from similar varieties that possess a few common characters. The present study determines a comprehensive range of physicochemical characters of the drug according to the parameters used mainly in Unani pharmacopoiea. Therefore, these findings may be used as the standards for ensuring the purity and quality of *Thaʿlab Miṣrī* (*Orchis latifolia*). The generated information of the present study will provide data that may be helpful in the correct identification and authentication of the test drug and may help in preventing it from being adulterated.

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सारांश

यूनानी चिकित्सा की एक महत्वपूर्ण औषधि *सालब मिस्री* (*ऑर्किस लेटीफोलिया* एल.) का भौतिक रासायनिक मानकीकरण

***मोकर्रम अली, नईम ए. ख़ान, गुफ़रान अहमद, सऊद अहमद**

सालब मिस्री (*ऑर्किस लेटीफोलिया* एल.) आमतौर पर सालेप के नाम से जाना जाने वाला एक औषधीय पौधा है जोकि ऑर्किडेसि प्रजाति से संबंधित है। यूनानी चिकित्सकों द्वारा इसे आमतौर पर यौन क्रिया में सुधार के लिए उपयोग किया जाता है। लेकिन बाज़ार में इसकी विभिन्न क़िस्में उपलब्ध हैं और वास्तविक नमूने को अक्सर अन्य क़िस्मों के साथ मिलाकर भ्रमित किया जाता है जिससे जैविक और चिकित्सीय प्रभाव में भिन्नता पैदा होती है। इसके अतिरिक्त प्राकृतिक विविधताओं के कारण कई प्राकृतिक उत्पादों में महत्वपूर्ण रूप से विभिन्न जैविक गतिविधि एवं विविध नैदानिक प्रभावकारिता होती है। इसलिए स्थायी मानक निर्धारित करने के लिए इसके भौतिक रासायनिक गुणों का निर्धारण आवश्यक है। यह वास्तविक नमूने की पहचान, गुणवत्ता और शुद्धता को सुनिश्चित करेगा और परिणामस्वरूप इसकी चिकित्सीय उपयोगिता को अभिनिश्चित करेगा। वर्तमान अध्ययन में भारतीय यूनानी फार्माकोपिया और औषधीय पादपों पर डब्ल्यूएचओ के दस्तावेजों में वर्णित मापदंडों के अनुसार *सालब मिस्री* (*ऑर्किस लेटीफोलिया* एल.) का मानकीकरण किया गया है। राख मान (कुल राख, एसिड में अघुलशील राख, पानी में घुलनशील राख), क्रमिक निष्कर्षध मूल्य, सुखाने पर नुकसान, पीएच 1% और 10%, थोक घनत्व (डाला हुआ और टैप किया गया घनत्व) और नम सामग्री को उचित उपायों का उपयोग करके निर्धारित किया गया। गुणात्मक विश्लेषण और क्रोमैटोग्राफिक अध्ययन (टीएलसी) भी किया गया।

शब्दकुजी: मानकीरण, सालब मिस्री, ऑर्किस लेटीफोलिया, गुणवत्ता नियंत्रण

A Cross-sectional Descriptive Study on Status of Family Planning Practices in Rural Scheduled Castes of District Aligarh, Uttar Pradesh, India

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Abstract

A cross-sectional descriptive study was carried out in which preliminary data was collected during October 2018–February 2019 from five villages of Lodha Block, Aligarh predominantly having scheduled caste population. As per the Census 2011, the total scheduled caste population of Aligarh district of Uttar Pradesh was 20.6% of total population, majority of them residing in rural areas. The aim *of* this study was to assess the awareness about contraception and family planning in rural scheduled castes and find out the relation between the socio-economic and demographic variables and family planning practices in the study area. The study revealed that nearly 66% of married women were practicing family planning, majority of them were using modern methods, and especially 38% eligible couples were using barrier method. It was found that the family planning practices were improving with increment of education level. The user percentage according to the levels of education such as primary, middle, secondary, graduate and post graduate was 36.74, 50, 63.64, 83.33 and 100 respectively.

Keywords: Family Planning, Contraception, Aligarh, Scheduled Castes

Introduction

Firstly in the world an official population policy was adopted by India in 1952. From that time, planned efforts were made for stabilizing the population in the country under the National Family Planning Programme which was renamed as the National Family Welfare Programme in 1977. These efforts create a major component of the National Rural Health Mission since 2005 (Chaurasia & Singh, 2013). Two main objectives are being tried to achieve by family planning through contraception: firstly having only the desired number of children and secondly to maintain proper spacing of pregnancies. For integrating positive approach among couples towards the methods and measures of family planning, education is the most active and significant tool. Information of contraceptive is nearly worldwide, 98.0% women and 98.6% men know one or more methods of contraception. A total of 66% married women in India were found using contraceptive in National Family Household Survey-3 (NFHS-3) while 55% in NFHS-2 (IIPS, & Macro International, 2007). Education, religion, caste and wealth are the factors that influence methods of contraception used by married couples (Gogoi *et al.,* 2017). In India, 57.3% (46.3–67.6) was the contraception prevalence in 2010, the rise in contraceptive prevalence that occurred between 1990 and 2010 was attributable to an increase in the use of modern methods (Alkema *et al.,* 2010).

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The policy of the Government of India for family planning is to encourage more eligible couples to accept contraceptives. Advices, facilities and services to help eligible couples for family planning are provided free of charge in all sub-centers, primary health centers (PHCs), community health centers (CHCs) and rural family welfare centers, district hospitals, etc. all over the country. ASHA (Accredited Social Health Activists), ANM (Auxiliary Nurse Midwife) and AWW (Anganwadi Workers) are playing a major role in promoting and providing contraception in rural areas. They are promoting health and family planning by going door to door for creating awareness. The Scheduled Caste Sub Plan (SCSP) was introduced in 1979 during the Sixth Five-Year Plan for the development of scheduled castes in physical and financial terms. The principle aim of this plan is helping the major occupational groups amongst scheduled castes such as agricultural labourers, small and marginal farmers, share-croppers, fishermen, sweepers and scavengers, urban un-organized labourers below the poverty line. The strategy of SCSP is aimed at economic development, Basti-oriented schemes for infrastructure development and educational and social development of schedule castes (Planning Commission, 2006). The Central Council for Research in Unani Medicine (CCRUM) is an autonomous research body, functioning under the Ministry of AYUSH, Government of India. The Council is entrusted for implementation of a health programme under SCSP for the benefits of schedules castes. As per the Census 2011, the total population of Aligarh district of Uttar Pradesh was 3,673,889, of which 20.6% population was schedule castes (SC) while schedule tribe (ST) was 0% of total population.

In this study, an effort has been made to assess present awareness about contraception and family planning in rural schedule castes and how the socio-economic and demographic variables are influencing the family planning practices in the study area.

Materials and Method

A population based cross-sectional study was conducted in five villages of Lodha Block, Aligarh, predominantly schedule castes populated area during October 2018–February 2019. The data was collected from five villages; Shahpur Qutub, Ilyaspur, Haridaspur, Amarpur Nehra and Ibrahimpur by SCSP Team, Regional Research Institute of Unani Medicine, Aligarh. The respondents were 234 married women of reproductive age who attended SCSP Mobile OPD. Only adult females, married women of reproductive age were included in the study. Unmarried, separated, divorced, and widowed females were excluded from the study. The women were interviewed by a team of researchers and the details were recorded in a predesigned structured questionnaire provided by the CCRUM, New Delhi. The dependent variables were awareness, attitude, practice and preference of contraceptive methods. Independent variables were family structure, education

level, family income, age at marriage, age at menarche. Data was analyzed using simple tabulation.

Results and Discussion

The study included 234 married women of reproductive age from five villages of Lodha block, Aligarh. The socio-economic and demographic information are described in Table 1.

Table 1: Distribution of respondents by different socio-economic and demographic characteristics

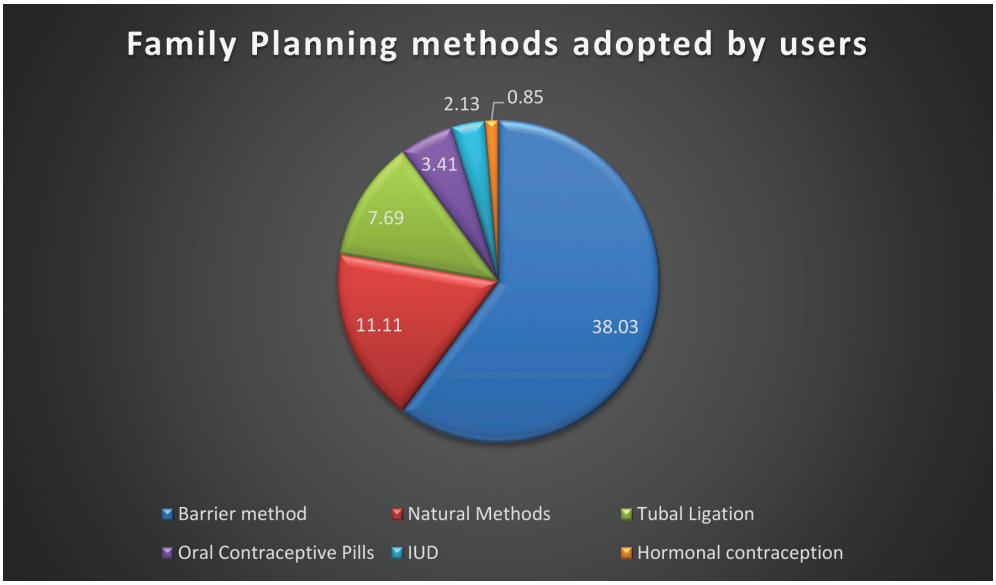
Socio-economic and demographic characteristic	Frequency (N=234)	Percentage (%)
Type of Family		
Joint	108	46.15
Nuclear	126	53.85
Educational Status		
Illiterate	112	47.86
Primary	49	20.94
Middle	30	12.82
Secondary	33	14.10
Graduate	6	2.56
Post Graduate	4	1.71
Family Income (in Indian rupees per month)		
< 5000	19	8.12
5000 to 10000	156	66.67
10000 to 20000	45	19.23
20000 to 30000	11	4.70
30000 and above	3	1.28
Marriage Age (in years)		
Less than 20 (18)	116	49.57
20-24	107	45.73
25-29	10	4.27
30-34	1	0.48
More than 34(42)	0	0
Age of Menarche (in years)		
<12	13	5.56
12-14	209	89.32
15-17	12	5.19
18 and above	0	0

It has been observed that more than half of the respondents (53.85%) belong to nuclear family and 46.15% respondents belong to joint family. Majority of the respondents (47.86%) are not educated and only 2.56 % and 1.71 % are educated up to graduate and post graduate level respectively. Majority of the married women in their reproductive age belong to families having monthly income from 5000 to 10000 in Indian rupees. Almost half of the women (49.57%) reported that they got married before the age of 20 years and very few respondents reported that they got married late after the age of 25 years. Majority of the female respondents (89.32%) achieved menarche during 12 to 14 years of age.

The various methods adopted by the respondents for family planning are given in Table 2 and Figure 1. Out of 234 female respondents, 55.98% adopted some

Table 2: Family planning methods adopted among respondents

Methods	Frequency (N=234)	Percentage (%)
Non Users	79	33.76
Users	131	55.98
Permanent Contraception		
• Tubectomy	18	7.69
• Vasectomy	0	0
No Response	24	10.26



kind of family planning methods whereas 33.76% were not using any measure for family planning, and there were few (10.26%) who did not respond. It is a very positive indication towards controlling fertility. According to National Family Health Survey-4 (2015-16), 43.5% schedule caste women were using any one or combination of family planning methods in Uttar Pradesh (IIPS & ICF, 2017). The present study indicated that the percentage of SC population in Aligarh adopted contraception is more as compared to the previous findings of NFHS-4. Majority (38.03%) of the users adopted barrier method (condom) as compared to other contraceptive methods. The reason is often attributed to easy availability, cost effectiveness, user friendly, free from side effects and protection against various STDs (Park, 2006). Taking oral contraceptive pills (OCPs) regularly daily is the best protection method, it is the most reliable and effective contraceptive method available today. Findings of NFHS-4 reported use of OCP in only 1.5 percent population of schedule caste women in UP, which is again less as compared to the findings of the study, taking pill was preferred among 3.41 percent respondents of SC women in Aligarh. The reason for high acceptability of pill is that it is easy to take and reversible. Also, after unprotected sex, it can be used as emergency method. Side effects include that combined OCPs contain a high amount of estrogen so these adversely affect the quantity and quality of milk in lactating women. Users of combined pills experienced a 42% decline in milk production after 18 weeks (WHO, 1975). Female sterilization is a well-established contraceptive method for women desiring no more children. According to the Ministry of Health and Family Welfare's Standards for Female and Male Sterilization Services (2006), the age of females desiring sterilization should not be less than 22 years or more than 49 years. It was reported by 7.69 percent of married women population of Aligarh while in NFHS-4 it was reported as 19.5 percent. There were no users of male sterilization for family planning. A significant amount of the participants had low knowledge about permanent contraceptive methods, particularly vasectomy. This negative trend may be attributed to fear of losing fertility permanently. Intra Uterine Device (IUD) is a small device; a skilled family planning worker inserts it inside the uterus. It is very effective, reversible, long-term method but some women expressed fear about intrauterine device as it might cause excessive bleeding, infertility, infection or cancer. The user of IUD is 2.13% where in NFHS-4 it was reported as 0.9 percent. Under the National Family Welfare Programme, Cu-T-200 B is being used in India, Cu-T-380 A is in use from 2002 in this programme (MoHFW, 2004). 0.85% women were found using injectables where in NFHS-4 it was reported as 0.3 percent. DMPA (Depot-Medroxyprogesterone Acetate) has been in use since 1960, in 99% women it give protection for at least 3 months (WHO, 1982). Natural method includes: Abstinence, Basal body temperature, Calendar method, Cervical mucus method, Maternal breast feeding (Jahan *et al.,* 2017), and 11.11% women were using natural methods for contraception.

Table 3: Age of respondents on contraceptives

Age groups	Frequency	%
<21	3	2.29
21-34	74	56.49
>34	54	41.22
Total	131	100

As far as age is concerned, contraceptive use was lower (2.29%) among young women less than 21 years of age, because females in the initial stage of their married life were planning to conceive. The majority (56.49%) of contraception use was seen among females between 21 to 34 years age group.

Table 4: Educational level versus current contraceptive user's status

	Contraceptive User's Status			
	n(%)			
Education Level	Total n=234	User n=131	Non User n=79	No Response n=24
Illiterate	112	68(60.72)	33(29.46)	11(9.82)
Primary	49	18(36.74)	23(46.94)	8(16.33)
Middle	30	15(50)	14(46.67)	1(3.33)
Secondary	33	21(63.64)	8(24.24)	4(12.12)
Graduate	6	5(83.33)	1(16.67)	0(0)
Postgraduate	4	4(100)	0(0)	0(0)
Total	234	131(55.98)	79(33.76)	24(10.26)

It has been observed that 47.86% of the respondents are illiterate and 60.72% of these illiterate female respondents are practicing any kind of family planning methods to delay or avoid getting pregnant which is a positive indication for population control. Data show that the use of family planning practices is directly proportional to the level of education. The user's percentage according to the levels of education such as primary, middle, secondary, graduate and postgraduate is 36.74%, 50%, 63.64%, 83.33% and 100% respectively. So, education has a positive impact on the use of family planning methods.

Conclusion

The study reveals that about 56 percent of rural married women of scheduled castes in the study area in their reproductive period are using some of the birth

control measures. It shows that the level of awareness among the study group is satisfactory. The present study has established that rural area of scheduled castes has more contraceptive users in comparison to recent National Family and Health Survey-4 in 2015-16. It is also obvious that condom is used more among the female of reproductive span as it is easily available and cheap. Pill and IUD are also used in a high rate in comparison to NFHS-4 but the percentage of female sterilization is decreasing rapidly as other methods of contraception are easily available nowadays. Natural methods of contraception were found second highest practicing methods. Here, the remarkable outcome is that illiterate married female population is also practicing family planning methods in abundance. No significant difference between illiterate women and educated women up to the level of higher education has been observed. These illiterate women are being educated socially by the peer team including ASHA, ANM and Anganwadi workers or by the health professionals. A majority of respondents belong to the family having income below 10000 Indian rupees per month. Due to their low income they don't want more children so majority in this economic group is adopting contraception. Finally, it can be concluded that after more than fifty years of implementation of family welfare programmes in India, a large rural scheduled caste population is aware and practicing birth control measures.

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सारांश

ज़िला अलीगढ़, उत्तर प्रदेश, भारत की ग्रामीण अनुसूचित जनजातियों में परिवार नियोजन प्रथाओं की स्थिति पर एक क्रास–सेक्शनल वर्णनात्मक अध्ययन

रिफ़ाक़त, सरताज अहमद, परवेज़ ख़ान, *तमन्ना नाज़ली, अब्दुल रहीम, शगुफ़्ता परवीन

एक क्रास–सेक्शनल वर्णनात्मक अध्ययन किया गया जिसमें लोधा ब्लॉक, अलीगढ़ के पांच गांवों में जहां मुख्य रूप से अनुसूचित जाति की आबादी है अक्टूबर 2018–फरवरी 2019 के दौरान प्रारंभिक डाटा एकत्रित किया गया। 2011 की जनगणना के अनुसार उत्तर प्रदेश के अलीगढ़ ज़िले की अनुसूचित जाति की आबादी कुल आबादी का 20.6% थी जिनमें से अधिकांश ग्रामीण क्षेत्रों में आबाद थे। इस अध्ययन का उद्देश्य ग्रामीण अनुसूचित जातियों में गर्भनिरोधक और परिवार नियोजन के बारे में जागरूकता का आकलन करना और अध्ययन क्षेत्र में सामाजिक–आर्थिक तथा जनसांख्यिकीय चर और परिवार नियोजन प्रथाओं के मध्य संबंध का पता लगाना था। अध्ययन से पता चला कि लगभग 66% विवाहित महिलाएं परिवार नियोजन को अपना रही थीं जिनमें से अधिकांश महिलाएं आधुनिक तरीकों का उपयोग कर रही थीं और विशेषरूप से 38% योग्य जोड़े रोध विधि का उपयोग कर रहे थे। यह पाया गया कि शिक्षा के स्तर में वृद्धि होने से परिवार नियोजन में सुधार हो रहा था। शिक्षा के स्तरों जैसे प्राथमिक, मध्य, माध्यमिक, स्नातक और स्नातकोत्तर के अनुसार उपयोगकर्त्ता का प्रतिशत क्रमशः 36.74, 50, 63.64, 83.33 और 100 था।

शब्दकुंजी: परिवार नियोजन, गर्भनिरोधक, अलीगढ़, अनुसूचित जनजातियां

Antihyperglycaemic Activity of Extracts of *Hiran Khurī* (*Convolvulus arvensis* L.) in Streptozotocin Induced Diabetic Rats

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Abstract

Hiran Khurī (*Convolvulus arvensis* L., family - Convolvulaceae) is one of the less explored Unani drugs although it possesses interesting pharmacological effects such as purgative, anti-inflammatory, aphrodisiac and antihyperglycaemic and is used in constipation, eczema, spermatorrhoea, cough & coryza and diabetes mellitus, etc. In the present study, the antihyperglycaemic effect of aqueous and 50% hydroalcoholic extracts of the whole herb of *Convolvulus arvensis* L. was investigated in streptozotocin induced diabetic rats. The effect of low and high doses of aqueous and hydroalcoholic extracts (95 and 190 mg/kg and 145 and 290 mg/kg, respectively treated orally for 28 days) was compared with Glibenclamide (0.25 mg/kg p.o.). Fasting and Postprandial blood sugar was measured on days 0, 7, 14, 21 and 28. After 28 days, the animals were sacrificed and blood was investigated for HbA1c and liver glycogen. The effect of the test drug on body weight and glycosuria was also determined. The low dose of aqueous extract and the high dose of hydroalcoholic extract significantly ($p<0.01$) reduced the elevated fasting and postprandial blood glucose levels. The low dose of aqueous extract exhibited significant reduction (6.4±0.256%) in HbA1c level after 28 days in comparison to the diabetic control group (10.49±0.467). Liver glycogen increased to 44.95±8.185/100 gm and 61.03±4.442/100 gm in low dose of aqueous and high dose of hydroalcoholic extracts respectively as compared to the diabetic control group (21.86±1.02/100 gm). The study indicated that the test drug possesses antihyperglycaemic effect.

Keywords: *Convolvulus arvensis, Hiran Khurī*, Streptozotocin, Aqueous Extract, Hydroalcoholic Extract, Antihyperglycaemic

Introduction

Hiran Khurī is one of the less explored Unani drugs which consists of the whole herb of *Convolvulus arvensis* L. belonging to the family Convolvulaceae. The plant is a creeping or twining herb commonly found in cultivated fields of wheat throughout India and used as good cattle fodder. The leaf looks like a hoof of a deer (Anonymous, 1950). Many convolvulus species are known for their medicinal utility and exhibit interesting biological properties such as purgative, CNS disturbing and antidepressant, antioxidant, hypoglycaemic, antinociceptive, anticancer, anti-ulcerogenic and antidiarrhoeal activities (Shabana *et al.*, 1990; Noda *et al.*, 1990; Sairam *et al.*, 2001). Calystegins (polyhydroxytropanes) isolated from *Convolvulus arvensis* are known as potent glycoside inhibitors (Molyneux *et al.*, 1993). The drug in the literature of Unani Medicine is attributed to act as purgative, antiinflammatory, aphrodisiac, spermatogenic, hepatoprotective and antihyperglycaemic, and used in constipation, leprosy, eczema, spermatorrhoea,

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cough & coryza and diabetes mellitus (Azam Khan, 1987; Nabi, 2007; Ghani, 2010; Kirtikar *et al.,* 1987). This plant drug has been investigated for several pharmacological effects (Al-Snafi, 2016) but its hypoglycemic effect is yet to be studied. Given its hypoglycemic effect as described in the literature and the age-old practice of Unani physicians to manage the diabetes mellitus with the products prepared from this herb, the present study was designed to explore the antihyperglycaemic effect of the aqueous and 50% hydralcoholic extracts of dried herb of *Convolvulus arvensis* L. in streptozotocin induced diabetes mellitus in albino rats.

Materials and Methods

Collection of Plant Material

The study was conducted at the Department of Ilmul Advia, Aligarh Muslim University, Aligarh. The fresh herb of *Convolvulus arvensis* was collected directly from the field of wheat crop of Pilakhna village near Aligarh. The drug was identified in the Pharmacognosy Section, Department of Ilmul Advia, Ajmal Khan Tibbiya College, Aligarh Muslim University Aligarh and authenticated by National Institute of Science Communication and Information Resources (NISCAIR), New Delhi (NISCAIR/RHMD/Consult/2015/2843/36-2) and herbarium sample was prepared and submitted to *Mawālīd Thalātha* Museum of the department for future reference with voucher number SC-0172/15.

Convovulus arvensis plant

Preparation of Extracts

Fresh whole plant of *Convolvulus arvensis* was dried in shade and powdered coarsely in an iron mortar. 10 gm powdered material was extracted in aqueous and hydroalcoholic (50:50) solvents, separately with the help of the Soxhlet apparatus for 6 hours. The extract was then filtered and the filtrate was evaporated and concentrated on a water bath at 36°C. The yield percentage of both the extracts was calculated with reference to the air-dried drug. The extracts obtained were stored in a refrigerator at 2-8 °C until used for the experiment.

Dose of Test Drug

The dose for rats was calculated after extrapolating the human dose (3 gm) of the test drug by the conversion factor of 7 (Friereich *et al.*, 1966). Thus, the dose of the extract of *Hiran Khurī* was calculated and found to be 95 and 190 mg/kg and 145 and 290 mg/kg in respect of aqueous and hydroalcoholic extracts, respectively.

Experimental Animals

Forty-two (42) albino rats of Wistar strain of either sex, weighing 150-200 gm were purchased from Indian Veterinary Research Institute (IVRI), Izzatnagar, Bareilly, Uttar Pradesh, India. The ethical clearance was taken from the Institutional Animal Ethics Committee (IAEC) of Jawaharlal Nehru Medical College, Aligarh Muslim University, Aligarh, Uttar Pradesh vide registration number 401/RO/c/2001/CPCSEA. The animals were maintained under standard laboratory conditions (temperature 25±2°C; humidity 45% to 64%) throughout the study with a regular 12-h light /12-h dark cycle. The animals were fed a standard rat pellet diet (Ashirwaad) and provided water *ad libitum*.

Study Design and Dosing Schedule

The animals were divided into seven groups of six animals each. Streptozotocin was dissolved in a citrate buffer solution (pH 4.5) and 0.5 ml solution was injected to all the animals intraperitoneally after overnight fasting in the dose of 50 mg/kg. However, the animals of control group (group I) were given distilled water only. Group II (negative control) was administered only streptozotocin on the first day of the study and then left untreated for entire duration of the study. In the animals of group III, Gilbenclamide in a dose of 0.25 mg/kg was given orally once a day as a standard drug after 7th day of administration of streptozotocin for the next 28 days. Animals in group IV & V were treated with low and high doses (95 and 190 mg/kg p.o. respectively) of aqueous extract of the test drug once a day for 28 days after 7th day of administration of streptozotocin. The animals in group VI & VII were given low and high doses (145 & 290 mg/kg

p.o. respectively) of 50 % hydroalcoholic extract of the test drug once a day for 28 days after 7th day of the administration of streptozotocin.

The fasting and postprandial blood glucose levels were measured on day 0, 7, 14, 21 and 28. During the experimental period, weight of the rats was determined daily and the mean change in the weight was calculated. After 28 days, the animals were sacrificed under urethane (1.2-1.5 gm/kg i.p.) anaesthesia and the blood sample was collected. Three ml of blood was kept in EDTA vial and 1 ml in a serum separating tube. The liver was dissected out immediately after collecting the blood for the estimation of liver glycogen. The urine sugar was estimated by Benedict's method.

Statistical Analysis

The results were statistically analysed using one way Analysis of Variance (ANOVA) followed by Tukey-Kramer multiple comparison test. The values represented as mean± standard error of mean and were taken as significant at $p<0.05$.

Results and Observation

Effect of aqueous and hydroalcoholic extract of test drug on fasting and postprandial blood glucose level

On repeated administration of low dose of aqueous and high dose of hydroalcoholic extract of the test drug for 28 days, a significant decrease in the fasting (121±15.3 and 138.5±16.73, [$p<0.001$ and $p<0.05$] respectively) and postprandial (151.83±13.8 and 159.5±17.62 [$p<0.05$] respectively) blood sugar level was observed as compared to the diabetic control groups (254.33±31.9 and 268.33±28.92, respectively) (Table 1-2).

Effect of aqueous and hydroalcoholic extract of test drug on HbA1c level

The low dose of aqueous extract of *Hiran Khurī* showed a significant reduction (6.4±0.256% [$p<0.001$] in HbA1c level after 28 days as compared to the diabetic control group (10.49±0.467), whereas both the doses of hydroalcoholic extract exhibited mild but statistically significant reduction (7.65±0.365% and 7.53±0.435% [$p<0.001$]) (Table 3).

Effect of aqueous and hydroalcoholic extract of test drug on liver glycogen

A significant increase in liver glycogen level (44.95±8.185 [$p<0.01$]) was observed in the animals treated with the low dose of aqueous extract as compared to the diabetic control group (21.86±1.02), whereas the high dose of aqueous and low dose of hydroalcoholic extracts showed a slight increase (30.18±2.569 and

Table 1: Effect of aqueous and hydroalcoholic extract of *Hiran Khurī* on fasting blood glucose level

Groups	Treatment	Fasting Blood Glucose Level				
		0 day	7th day	14th day	21st day	28th day
I	Control	101.66± 5.85	109.66± 3.87	103.83± 2.19	100.16± 2.16	96.5± 3.14b***
II	Diabetic control	283.83± 28.26	272.66± 45.67	268.66± 41.41	257.66± 34.42	254.33± 31.9
III	Standard (Glibenclamide, 0.25mg/kg)	283.66± 49.89	220.5± 33.90	213.16± 35.17	178.66± 29.36	139± 17.07b*
IV	*Hiran Khurī* 95mg/kg (Aq)	299.833± 21.01	244.33± 25.20	219.66± 18.88	177± 16.64	121.5± 15.38b**, f*
V	*Hiran Khurī* 190 mg/kg (Aq)	284.5± 21.78	295.83± 35.21	279.83± 33.70	250.5± 32.43	193± 29.53
VI	*Hiran Khurī* 145 mg/kg (HA)	346± 37.33	339± 32.87	311.66± 33.01	284.33± 32.70	232.33± 35.78a*
VII	*Hiran Khurī* 290 mg/kg (HA)	262.33± 35.21	239.5± 27.22	230.5± 24.49	196.33± 21.28	138.5± 16.73

Values are Mean ± SEM (n=6) one way ANOVA followed by Tukey-Kramer's test. Where *=p<0.05, **=p<0.01, ***=p<0.001 a, b, c, d, e, f and g = Group I, Group II, Group III, Group IV, Group V, Group VI and Group VII, respectively.

30.39±2.130 respectively) as compared to the diabetic control group. The high dose of hydroalcoholic was found to be 61.03±4.442 [p<0.001], which was more significant as compared to the plain control (45.17±1.31), diabetic control (21.86±1.02) and standard control (44.82±1.40) groups (Table 4).

Effect of aqueous and hydroalcoholic extract of test drug on body weight

A significant increase in the body weight (160±2.887 [p<0.05]) was observed in the animals who received the low dose of aqueous extract after 28 days as compared to other groups, whereas the high dose of hydroalcoholic extract also increased body weight of the animals (190.8±5.833 [p<0.01]) significantly after 28 days of the treatment (Table 5).

Effect of aqueous and hydroalcoholic extract of test drug on urine sugar

After 28 days of the treatment, the concentration of sugar in urine was determined and the low dose of aqueous and hydroalcoholic extract showed an absence of sugar in the urine (Table 6).

Table 2: Effect of aqueous and hydroalcoholic extract of *Hiran Khurī* on postprandial blood glucose level

Groups	Treatment	Postprandial Blood Glucose Level				
		0 day	7th day	14th day	21th day	28th day
I	Control (2ml/ kg DW)	109.5± 5.58	124.33± 3.52	120.33± 2.45	91.83± 16.44	107.16± 4.21b***
II	Diabetic control (STZ)	291± 30.03	291.66± 49.79	285.33± 45.08	267.83± 35.05	268.33± 28.92
III	Standard (Glibenclamide, 0.25mg/kg)	317.83± 67.61	238.33± 35.38	228.83± 35.68	195.83± 28.03	133.33± 14.53b**
IV	*Hiran Khurī* 95 mg/kg (Aq)	308± 13.60	249± 18.739	236.66± 18.46	195.16± 16.55	151.83± 13.83b*
V	*Hiran Khurī* 190 mg/kg (Aq)	311.33± 23.10	333.66± 30.63	297.83± 33.28	271.83± 31.01	228.33± 29.96a*
VI	*Hiran Khurī* 145 mg/kg (HA)	356.33± 35.49	350.66± 33.30	329.83± 31.43	296.16± 34.24	240.16± 34.99 a**, c*
VII	*Hiran Khurī* 290 mg/kg (HA)	266.66± 35.41	245± 27.06	238.5± 24.27	213.33± 21.45	159.5± 17.62b*

Values are Mean ± SEM (n=6) one way ANOVA followed by Tukey-Kramer's test. Where *=p<0.05, **=p<0.01, ***=p<0.001 a, b, c, d, e, f and g = Group I, Group II, Group III, Group IV, Group V, Group VI and Group VII, respectively.

Table 3: Effect of aqueous and hydroalcoholic extract of *Hiran Khurī* on HbA1c (%)

Groups	Treatment	HbA1c Level
		28th day
I	Control (2 ml DW)	5.48 ± 0.188b***
II	Diabetic control (STZ)	10.49 ± 0.467
III	Standard (Glibenclamide, 0.25mg/kg)	6.16 ± 0.271b***
IV	*Hiran Khurī* 95 mg/kg (Aq)	6.4 ± 0.256b***, e*
V	*Hiran Khurī* 190 mg/kg (Aq)	8.41 ± 0.501b**, c**
VI	*Hiran Khurī* 145 mg/kg (HA)	7.65 ± 0.365b***
VII	*Hiran Khurī* 290 mg/kg (HA)	7.53 ± 0.435b***

Values are Mean ± SEM (n=6) one way ANOVA followed by Tukey-Kramer's test. Where *=p<0.05, **=p<0.01, ***=p<0.001 a, b, c, d, e, f and g = Group I, Group II, Group III, Group IV, Group V, Group VI and Group VII respectively.

Table 4: Effect of aqueous and hydroalcoholic extract of *Hiran Khurī* on liver glycogen (mg/gm of tissue)

Groups	Treatment	liver glycogen
		28th day
I	Control (2 ml DW)	45.17± 1.31***
II	Diabetic control (STZ)	21.86± 1.02
III	Standard(Glibenclamide,0.25mg/kg)	44.82± 1.40b***
IV	*Hiran Khurī* 95 mg/kg (Aq)	44.95± 8.18b**
V	*Hiran Khurī* 190 mg/kg (Aq)	30.18± 2.56
VI	*Hiran Khurī* 145 mg/kg (HA)	30.39± 2.13
VII	*Hiran Khurī* 290 mg/kg (HA)	61.03± 4.44a***, b***, c***

Values are mean ±SEM (n=6) one way ANOVA followed by Tukey-kramer's test. Where, *= $p<0.05$, **= $p<0.01$, ***= $p<0.001$a,b, c,d,e,f and g = (group I, group II, group III, group IV, group V, group VIand group VII respectively)

Table 5: Effect of *Hiran Khurī* on body weight in streptozocin induced diabetes mellitus in albino rats

Group	Treatment	Body Weight in grams					P Value
		0-day	7-day	14-day	21-day	28-day	
I	Control Plain (2 ml/kg)	127.5 ± 9.46	136.6 ± 9.45	145.8 ± 6.11	150.8 ± 5.06	155.8 ± 5.54	
II	Diabetic Control (STZ)	153.3 ± 7.49	150.8 ± 8.20	143.3 ± 7.92	138.3 ± 7.03	131.6 ± 5.57	c**
III	Standard (Glibenclamide)	165.8 ± 8.70	161.6 ± 8.23	165 ± 6.83	169.1 ± 6.24	175 ± 5.62	b**
IV	*Hiran Khurī* 95 mg/kg (Aq)	132.5 ± 6.292	142.5 ± 5.284	145 ± 4.082	151.6 ± 3.073	160 ± 2.887	b*, g*,
V	*Hiran Khurī* 190 mg/kg (Aq)	170 ± 5.000	161.6 ± 8.333	161.6 ± 7.923	160 ± 6.455	156.6 ± 7.032	g**
VI	*Hiran Khurī* 145 mg/kg (HA)	170.8 ± 4.729	165 ± 5.627	160.8 ± 4.362	156.1 ± 5.600	155.8 ± 7.683	g**
VII	*Hiran Khurī* 290 mg/kg (HA)	177.5 ± 6.021	175 ± 5.627	178.3 ± 4.410	185.8 ± 4.167	190.8 ± 5.833	a**, b***

Values are Mean ± SEM (n=6) one way ANOVA followed by Tukey-Kramer's test. Where *=p<0.05, **=p<0.01, ***=p<0.001 a, b, c, d, e, f and g = Group I, Group II, Group III, Group IV, Group V, Group VI and Group VII respectively.

Table 6: Effect of *Hiran Khurī* on urine sugar in streptozocin induced diabetes mellitus

Groups	Treatment	Urine Sugar
I	Plain control(2 ml /kg DW)	0
II	Diabetic control(STZ)	++++ (Brick red 2 %)
III	Standard(Glibenclamide, 0.25 mg/kg)	0
IV	*Hiran Khurī* 95 mg/kg (Aq)	0
V	*Hiran Khurī* 190 mg/kg (Aq)	++ (Green 0.5%)
VI	*Hiran Khurī* 145 mg/kg (HA)	++ (Orange 1.5%)
VII	*Hiran Khurī* 290 mg/kg (HA)	0

0 = Absent; Brick red ppt = large amount of reducing sugar, yellow & green ppt = Traces of reducing sugar

Discussion

Diabetes mellitus is an endocrine disorder characterized by chronic hyperglycaemia (Brownlee, 2001). Management of diabetes mellitus without any adverse effect is still a challenge for the medical science, as most of the presently available conventional antidiabetic drugs have known adverse effects. On the other hand, plant drugs due to ease of access and in most cases fewer side effects have enjoyed a special place for the treatment of diseases (Grover *et al.*, 2002). Injection of 60 mg/kg streptozotocin in adult rats makes pancreas swell and at last causes degeneration in Langerhans islets of beta cells and induces diabetes mellitus in 2-4 days (Akbarzadeh *et al.*, 2007). Induction of diabetes with streptozotocin is associated with characteristic loss of body weight which is due to increased muscle wasting and loss of tissue protein (Swanston *et al.*, 1990). In the present study, the low dose of aqueous and high dose of hydroalcoholic extracts of the whole herb of *Convolvulus arvensis* L. exhibited a significant antihyperglycaemic effect when compared to diabetic control group. The test drug was found to decrease the fasting and postprandial blood glucose level and also the HbA1c, while it increased the liver glycogen level. The low dose of aqueous and high dose of hydroalcoholic extract of the test drug lowered the fasting blood glucose level even more than the standard drug indicating striking glucose lowering effect. Similarly, it was also found that the high dose of hydroalcoholic extract of *Hiran Khurī* increased the liver glycogen level more than the level measured in the standard group. The effect of the low dose of aqueous extract was found to be almost equal to the standard drug in lowering the HbA1c level. These findings demonstrated that the test drug is effective in diabetes mellitus. During the study, it was also observed that in aqueous extract, the significant result was shown at low doses whereas the hydroalcoholic extracts exhibited significant result at

high doses. It appears that in aqueous extract, the test drug at low doses has a particular biological effect; however, when the dose is increased, the response decreases owing to some unknown mechanism, whereas in case of hydroalcoholic extract (50:50), the possible reason for showing significant antihyperglycaemic effect of the test drug at high dose is that the active phytochemicals such as glycosidal inhibitors responsible for drug action, might have dose dependant response. Its efficacy only at low dose appears to be a blessing in disguise, as in a study it has been shown to produce serious side effects at high dose level. It indicates that *Hiran Khurī* will not produce antidiabetic effect at high dose which is liable to induce toxicity (Al-Bowait, 2007). Diabetic rats treated with low dose of aqueous and high dose of hydroalcoholic extract of *Hiran Khurī* showed an increase in body weight, which may be attributed to their effectiveness in controlling the muscle wasting. However, it is suggested that further studies on the dried herb of *Convolvulus arvensis* (*Hiran Khurī*) and its compounds should be performed to elucidate the exact mechanism of action.

Conclusion

In the light of the findings, it can be concluded that the extracts of *Hiran Khurī* tested for antidiabetic activity have shown appreciable results in decreasing the serum glucose level, glycosuria and improvement in liver glycogen level and body weight in STZ-induced diabetic rats. Further studies to find out the exact reason of its significant effect at low dose of aqueous extract and non-significant result at high dose and to identify the bioactive compounds responsible for these effects are needed.

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सारांश

स्ट्रैप्टोज़ोटोसिन प्रेरित मधुमेह चूहों में *हिरन खुरी* (*कॉन्वोल्वुलस आरवेन्सिस* एल.) के सत्त की एंटीहाइपरग्लाइसेमिक गतिविधि

***अब्दुर रऊफ़, अब्दुर रहीम, इक़बाल अहमद क़ासमी**

हिरन खुरी (*कॉन्वोल्वुलस आरवेन्सिस* एल., कॉल्वुलेसि प्रजाति) एक ऐसी यूनानी औषधि है जिस पर कम अन्वेषण किया गया है यद्यपि इसमें शुद्धिकारक, एंटी–इन्फ्लामेटरी, कामोद्दीपक और एंटीहाइपरग्लाइसेमिक जैसे दिलचस्प औषधीय प्रभाव होते हैं और कब्ज़, एक्ज़िमा, शुक्राणुशोथ, खांसी एवं नज़ला और मधुमेह इत्यादि में उपयोग की जाती है। वर्तमान अध्ययन में स्ट्रैप्टोज़ोटोसिन प्रेरित मधुमेह चूहों में *कॉन्वोल्वुलस आरवेन्सिस* एल. की पूरी जड़ी बूटी के जलीय और 50% हाइड्रोएल्कोहलिक सत्त के एंटीहाइपरग्लाइसेमिक प्रभाव की जांच की गई। जलीय और हाइड्रोक्लोरिक सत्त (क्रमशः 95 और 190 मि.ग्रा./कि.ग्रा. तथा 145 और 290 मि.ग्रा./कि.ग्रा. 28 दिनों के लिए मौखिक रूप से) की निम्न और उच्च खुराक की तुलना ग्लेबेंक्लेमाइड (0.25 मि.ग्रा./कि.ग्रा.) से की गई। भोजन से पहले और बाद में 0, 7, 14, 21 और 28 दिन पर रक्त शर्करा मापा गया। 28 दिनों के बाद जीवों को बलि कर दिया गया और एचबीए1सी और यकृत ग्लाइकोजेन के लिए रक्त की जांच की गई। शरीर के भार और मूत्र शर्करा पर परीक्षण औषधि का प्रभाव भी देखा गया। जलीय सत्त की निम्न खुराक और हाइड्रोएलकोहलिक सत्त की उच्च खुराक ने भोजन से पहले और बाद रक्त शर्करा स्तर को काफी ($p<0.01$) कम किया। जलीय सत्त की निम्न खुराक ने 28 दिनों के बाद एचबीए1सी स्तर में मधुमेह नियंत्रण समूह (10.4 9±0.467) की तुलना में महत्वपूर्ण कमी (6.4±0.256%) दिखाई। मधुमेह नियंत्रण समूह (21.86±1.02/100 ग्राम) की तुलना में क्रमशः जलीय सत्त की निम्न खुराक और हाइड्रोएल्कोहलिक सत्त की उच्च खुराक से यकृत ग्लाइकोजेन की मात्रा में 44.95±8.185/100 ग्राम और 61.03±4.442/100 ग्राम सुधार पाया गया। अध्ययन से यह संकेत मिला कि परीक्षण औषधि में एंटीहाइपरग्लाइसेमिक प्रभाव होता है।

शब्दकुंजी: *कॉन्वोल्वुलस आरवेन्सिस, हिरन खुरी,* स्ट्रैप्टोज़ोटोसिन, जलीय सत्त, हाइड्रोएल्कोहलिक, एंटीहाइपरग्लाइसेमिक

Effect of Gender, Age and Constitution (*Mizāj*) on Radial Artery Pulse Wave Parameters in a Healthy Adult Population

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Abstract

Background and Aim: In this study, radial artery pulse wave, generated by a piezoelectric transducer, was analyzed for gender, age and *Mizāj* (constitution) related variations in pulse wave parameters. The aim was to generate a normal radial pulse wave profile for healthy subjects and to verify the claim of Unani Medicine that pulse characteristics vary as per gender, age and *Mizāj*.

Experimental Procedure: Pulse wave parameters were measured in 133 women and 127 men aged between 18 to 39 years. Pulse wave parameters observed were Time to systolic peak (TP1), Amplitude of systolic peak (AP1), Interwave time (IWT), Total pulse time (TPT) and Intra wave time (ZS).

Results and Conclusion: In all pulse wave parameters, a significant difference was observed between males and females, with higher means in males as compared to females except for AP1. In different age groups, a significant variance ($p<0.05$) was found in TP1, TPT and ZS but not in AP1 and IWT. No significant variations were seen in pulse parameters in different constitutions. The results support the postulation of Unani Medicine that the characteristics of pulse vary according to age and sex. The findings, however, do not support the assumption on gender-based differences in the relative pulse strength assumed to be higher in males. Similarly, the claim of Unani Medicine that pulse characteristics vary with *Mizāj* was also not affirmed.

Keywords: Pulse wave analysis, Gender, Age, Constitution, *Mizāj*, Unani Medicine

1. Introduction

In Unani Medicine (UM), *Nabḍ* or pulse examination is a key diagnostic tool to detect diverse diseases, and a number of normal, as well as abnormal pulses, have been mentioned in its classical texts (Jalinus, 2007; Ibn Sina, 1993; Nafis, 1934). The characteristics of pulse called *Adilla-i-Nabḍ* (indicators of pulse) include ten features (Nafis, 1934; Gruner 1930; Majusi, 1889; Jurjani, 1902) which are observed for the discernment of the state of the body (health or disease). These features include the amount of expansion, quality of stroke, duration of the cycle, duration of the pause, the compressibility of the vessel, regularity, rhythm, etc. Some of these features are observed for a single beat while others in multiple consecutive beats (Ibn Sina, 1993; Nafis, 1934; Gruner, 1930). A pulse may vary in a single character or multiple characters and thereby out of their permutations and combinations, a multitude of diverse pulse variants emerge. These have been described on the basis of their singularity and in some cases even named such as Gazelle, Vermicular, Serrate, etc. in commensuration of their unique characteristics (Ibn Sina, 1993; Nafis, 1934; Gruner, 1930). Although

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most of these types are easy to be recognized and appreciated, yet many among these pulse types have merely a theoretical base. The perception of others is difficult because the differences are subtle and said to require many years of experience to differentiate (Furley & Wilkie, 1984; Boylan, 2007; Ghasemzadeh & Maziar Zafari, 2011; Broadbent, 1899). Owing to such diversity along with the difficulty in perceiving many types of the pulse, this art of diagnosis has been fabled like no other, and for the same reasons, traditional physicians are gradually losing interest in learning it. Quantitative estimation of the pulse by generating its waveform is, therefore, essential to separate real from the fake and fanciful and to observe whether all these pulse variants exist and to what extent the descriptions of pulse characteristics as mentioned in UM hold true to diagnose different diseases. Quantitative studies of the pulse are not new but started way back in the 19th century when the sphygmograph was developed (O'Rourke & Gallagher, 1996). Frederick Akbar Mahomed (1849–84) was the first to attempt a clinical measurement of high blood pressure (Ferro, Steeds & Townsend, 2012). Using his modified sphygmograph, he studied the form and pressure of the pulse in hundreds of patients and gauged arterial stiffness from the character of the pulse waveform (Ferro, Steeds & Townsend, 2012).

With the advent of high precision computerized equipment for non-invasive pressure wave recording, the pulse wave analysis is undergoing a renaissance (Davies & Struthers, 2003). There are several methods of non-invasive pulse wave measurements available now. At present, the application of pulse wave analysis is limited to the assessment of cardiovascular health only and includes an indirect assessment of aortic pressure, assessing treatment response, screening of new hypertensive treatments, vascular stiffness and prediction of future cardiovascular events (Wojciechowska *et al.*, 2002; Wimmer *et al.*, 2007; O'Rourke, 1999; Townsend, 2007; O'Rourke & Adji, 2005; Scolletta *et al.*, 2007; Adji *et al.*, 2007; Hansen *et al.,* 2006; Pauca, O' Rourke & Kon, 2001; Takazawa *et al.*, 2007). UM provides an elaborate description of radial pulse and its variations in different diseases and if validated can extend the clinical scope of pulse wave analysis. But, before embarking on a disease diagnosing aspect of *Nabḍ*, its normal variations need to be identified. Estimation of the pulse wave characteristics in healthy people is therefore essential to ascertain whether the measured differences between or within individuals reflect pathology or are merely naturally occurring variations due to factors like age or gender. This study may be considered a step towards this goal in which we developed a pulse wave analyzing module to measure normal variations in different characteristics of radial pulse wave among healthy adults. Though age and gender variations in the pulse wave contour have been studied earlier (Deary *et al.*, 2002; Zaidi & Collins, 2016; Ahn *et al.*, 2016; Jiang *et al.,* 2015) but the focus of such studies has mostly been on measuring the efficacy of the pulse wave in predicting the central aortic pressure and arterial stiffness. Our study is different in the sense that we intend to measure

variations in amplitude and time events of pulse wave without predicting the pressure, with the main aim of generating physiological data on pulse variations. Besides age and gender variations, we also tried to verify the UM claim that pulse characteristics vary in individuals having different constitutions (*Mizāj*).

2. Methodology

2.1 Technical description of the device

The device consists of a piezoelectric transducer, an oscilloscope and a PC with software. The transducer detects the periodic changes in the arterial wall diameter produced by pressure changes and converts the pressure signals into electrical potential. The changes in electric potential caused by pressure variations are measured in the oscilloscope in the form of a wave over a period and then transferred to the PC for digital storage and analysis. In an oscilloscope, the waveform is displayed on an in built grid. The grid dimensions are pre-determined by the voltage and time settings on the Oscilloscope. The X-axis shows the time duration and the Y-axis represents the voltage or amplitude. A fragment of the recorded pulse wave of the radial artery, measured by the device is shown in Figure 1.

2.2 Parameters of pulse wave

The graphical representation of different pulse wave parameters used for evaluation is shown in Figure 2. These parameters are:

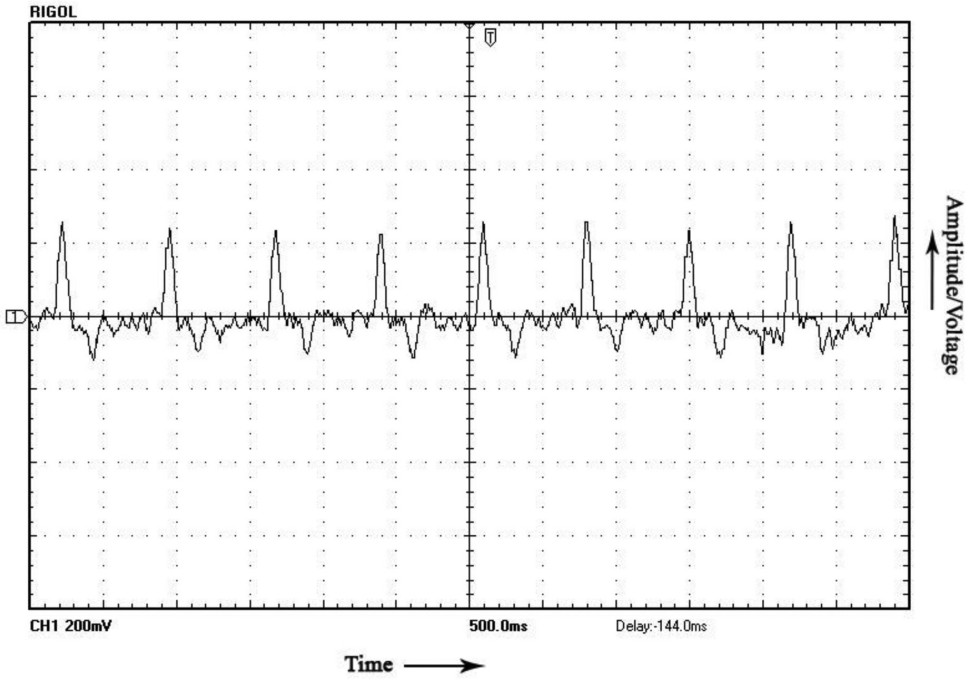

Fig. 1: Fragment of the recorded pulse wave of radial artery measured by the device

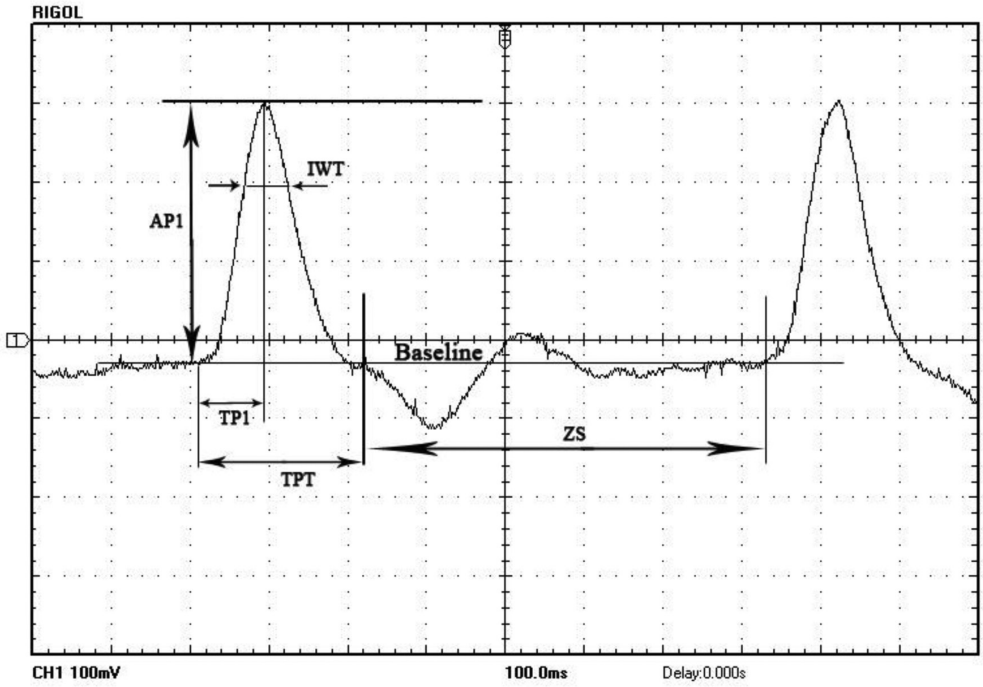

Fig. 2: Description of pulse wave parameters

Time to Systolic Peak (TP1) - It is the time for the pulse to reach its peak and is measured in milliseconds (ms).

Total Pulse Time (TPT) - It is the time duration of one complete pulse wave or the time taken by the wave to come back to baseline, and is measured in ms.

Inter Wave Time (IWT) - is a time period measured between the ascending and descending slopes of the pulse wave at a point 2/3rd of the total height of the systolic wave from the baseline and is measured in ms.

Amplitude of Systolic Peak (AP1) - is the height of the systolic wave measured from the baseline. It reflects the voltage and is measured in millivolts (mv).

Intra Wave Time (ZS) - is the time between the end of one pulse wave to the beginning of the next pulse wave. It is also measured in ms.

2.3 Selection of volunteers

The present study was conducted on 260 randomly selected, male (n=127) and female (n=133) students and staff aged between 18 to 39 years from different colleges of Aligarh Muslim University, Aligarh, mainly the Ajmal Khan Tibbiya College. A detailed clinical examination was done to rule out any disease condition. The volunteers selected for this study were normotensive, in good health, were not taking any drug, were not cigarette smokers, and were not pregnant. Blood pressure was measured by a mercury sphygmomanometer. For

analysis, age was categorised into three groups as 18-22 years, 23-27 years and 28-years-and-above.

2.4 Assessment of *Mizāj*

Mizāj is a fundamental concept in UM, wherein it is believed that every individual possesses a unique morphological, physiological and psychological profile. *Mizāj* is broadly divided into four types and assessed by observing certain characteristics called *Ajnās 'Ashara* (ten indicators of temperament). In this study, *Mizāj* of the volunteers was assessed on the basis of *Ajnās 'Ashara* as mentioned in classical texts (Ibn Sina, 1993).

2.5 Procedure adopted for pulse wave recording

The pulse of the subjects was recorded in a quiet room with a controlled temperature in order to provide a calm environment and to minimize any temperature related physiological variations in the body. All subjects were instructed to refrain from caffeine-containing beverages at least 24 hours before the measurements. The measurements were performed in the morning after 10 hours overnight fast by each subject. The pulse wave was recorded at least 10 minutes after resting in the supine position. Two sequences of measurements were performed and their means were recorded for analysis.

The wave was recorded by placing the sensor gently on the radial artery near the wrist (at a place where usually pulse is palpated by fingers) using constant pressure. The assessment of *Mizāj* and pulse analysis was done by two different observers.

2.6 Data collection and analysis

The data collected were analyzed by the statistical software SPSS trial version 17. Independent t-test was used to analyze the gender based differences. Variance in pulse parameters was measured among different age groups and different constitutions by ANOVA one way followed by post hoc multiple comparison test.

3. Results and Discussion

The age and *Mizāj* distribution of volunteers is shown in Table 1. The maximum number of volunteers 128 (49.23%) was found to be *Damwī* followed by 93 (35.77%) *Ṣafrāwī*. The age of volunteers ranged from 18 years to 39 years with a Mean ± SD of 22.14 ± 3.03. The maximum number of volunteers belonged to 18-22 years of age group with more females as compared to males. Most of the male volunteers were in 23-27 years age group. There were no female volunteers in the age group of 28-years-and-above.

Table 1: Distribution of volunteers

	Male (n=127)	Female (n=133)	Total 260
Mizāj (constitution)			
Damwī	69	59	128
Balghamī	6	13	19
Ṣafrāwī	43	50	93
Sawdāwī	9	11	20
Age (18-39 yrs)			
18-22	52	110	162
23-27	64	23	87
28 & above	11	0	11
BMI (14.9-41.9)			
<18.5 (under weight)	18	33	51
18.5 - 24.9 (normal weight)	87	87	174
25.0 - 29.9 (over weight)	21	11	32
30.0 & Above (obese)	01	02	03

3.1 Gender variations in radial pulse wave parameters

The pulse parameters TP1, TPT, AP1, IWT and ZS were measured in both sexes and the Range (Min., Max.), Mean, SD and SEM were calculated. The values are shown in Table 2. The means were compared using independent t-test. Statistically, a significant difference was found in all parameters between males and females (Table 3). In males, the mean values were higher than females except for the parameter AP1, which was higher in females. Higher means of time variables especially in ZS in males verifies the gender-related assumption of UM that pulse is relatively slow in males.

Earlier studies (Yim *et al.*, 2014; King, Cobbin & Ryan, 2002) have shown a higher amplitude of the pulse wave in males as compared to females. UM also claims a high force pulse in males than females (Gruner, 1930; Majusi, 1889; Jurjani, 1902). Lower mean AP1 in males in our study is not in agreement with the previous studies and also with the UM assumptions. This may be due to the technical difference in the types of equipment used in different studies. The reported studies used 'tonometer' which measures the pressure in the artery and

Table 2: Normal gender variation in pulse parameters

Parameter	Sex (Female = 0 Male = 1)	N	Range	Mean	Std. Deviation	Std. Error Mean
TP1 (ms)	0	133	40.00 - 118.10	63.159474	12.0574685	1.0455151
	1	127	48.65 - 117.28	72.662598	14.1571881	1.2562473
TPT (ms)	0	133	92.00 – 255.00	151.635188	24.9529656	2.1636965
	1	127	113.51 - 221.62	171.893150	22.6946128	2.0138212
AP1 (mv)	0	133	90.00 – 217.00	153.794203	25.8344253	2.2401288
	1	127	46.00 - 235.10	142.175039	33.5852934	2.9802129
IWT (ms)	0	133	20.00 – 71.00	42.982256	8.4976939	0.7368435
	1	127	27.03 - 86.49	50.284409	10.6770406	0.9474341
ZS (ms)	0	133	414.32 – 1000.00	637.305038	98.5415062	8.5446322
	1	127	415.38 – 1160.00	728.838898	128.1014021	11.3671613

Table 3: Independent samples test for gender variations

		t-test for Equality of Means		
		Sig. (2-tailed)	Mean Difference	Std. Error Difference
TP1 (ms)	Equal variances assumed	.000	-9.5031247	1.6283829
	Equal variances not assumed	.000*	-9.5031247	1.6343987
TPT (ms)	Equal variances assumed	.000*	-20.2579616	2.9623352
	Equal variances not assumed	.000	-20.2579616	2.9558516
AP1 (mv)	Equal variances assumed	.002	11.6191636	3.7061589
	Equal variances not assumed	.002*	11.6191636	3.7282497
IWT (ms)	Equal variances assumed	.000	-7.3021538	1.1940135
	Equal variances not assumed	.000*	-7.3021538	1.2002374
ZS (ms)	Equal variances assumed	.000	-91.5338600	14.1362679
	Equal variances not assumed	.000*	-91.5338600	14.2205167

* Equal variance assumed or not assumed decided by Levene's Test for Equality of Variances

therefore the amplitude of the wave corresponds to the pressure, whereas we have used a piezoelectric sensor that measures the change in pressure (Zhang, 2010) rather than the pressure as such. Therefore, AP1 in our study corresponds to the pressure change which may be higher in females. Another explanation, though a bit feeble, for this contradiction may be that the radial artery is deeper in males (Yim *et al.*, 2014) and for that reason, our sensor may have picked low signal strength in males. The findings of the present study conform with UM claim that the radial pulse parameters vary significantly between males and females, however, the claim of UM that pulse is more forceful in males as compared to females could not be corroborated.

3.2 Age variations in pulse wave parameters

A significant difference was found in pulse variables TP1, TPT and ZS in different age groups. However, no significant difference was found in AP1 and IWT. The results are shown in Tables 4 and 5. Post hoc (Tukey) analysis showed that the variation in TP1 was significant between the age groups of 18-22 years and 28-years-and-above and between 23-27 years and 28-years-above. No significant variation was found between 18-22 years and 23-27 years age groups. The TPT exhibited the same trend as TP1. The parameter ZS showed significant variation between the lower two age groups (23-27 years and below 26 years) only. However, as only adult volunteers aged between 18-39 years were included in the study, therefore, other age groups need to be studied further for better appreciation of age related differences. The comparison of pulse variables in different age groups revealed that age groups vary significantly in time variables of pulse viz. TP1, TPT and ZS (except IWT) but not in the amplitude. Interestingly, the duration of the pulse wave in TPT increased with age i.e. the waves became wider at the base with age, and this change became more marked with increasing age. On the other hand, the rise in the pulse in TP1 decreased with age, and became slower as the age increased. The parameter ZS which measures the time interval between two pulses and correlates with pulse rate also showed significant variation in different age groups. But no significant difference was found in the amplitude of the pulse wave. In UM, pulse characteristics are claimed to vary with age from children to adults and from adults to old age (Gruner, 1930; Majusi, 1889). Since the participants of this study are in the age group of 18 to 39 years, therefore no conclusion can be drawn in this context; however, within the adults aged between 18 to 39 years, a significant variation was seen between age subgroups.

3.3 *Mizāj* (Constitutional) variations in radial pulse wave parameters

The pulse parameters were measured in different constitutions. No significant difference was found in any pulse parameter between different *Mizāj* as shown

Table 4: Normal age variation in pulse parameters

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
TP1 (ms)	Below 22 years	162	66.2698	12.6614	0.9947	64.3053	68.2343	40.00	118.10
	23-27 years	87	68.8472	14.4811	1.5525	65.7608	71.9335	46.00	117.28
	Above 28 years	11	82.0845	19.3571	5.8363	69.0802	95.0888	54.05	111.68
	Total	260	67.8013	13.9374	0.8643	66.0993	69.5034	40.00	118.10
TPT (ms)	Below 22 years	162	158.8131	24.3873	1.9160	155.0293	162.5969	92.00	255.00
	23-27 years	87	163.8208	27.4930	2.9475	157.9612	169.6803	100.00	221.62
	Above 28 years	11	183.4336	24.6133	7.4212	166.8981	199.9691	131.98	213.20
	Total	260	161.5304	25.9004	1.6062	158.3673	164.6934	92.00	255.00
AP1 (mv)	Below 22 years	162	148.2248	29.9082	2.3498	143.5843	152.8652	46.00	217.00
	23-27 years	87	147.5163	31.7083	3.3994	140.7583	154.2742	87.80	235.10
	Above 28 years	11	151.3200	28.9256	8.7214	131.8874	170.7525	118.90	200.00
	Total	260	148.1186	30.3769	1.8838	144.4089	151.8283	46.00	235.10
IWT (ms)	Below 22 years	162	45.5847	9.8191	0.7714	44.0612	47.1082	20.00	75.68
	23-27 years	87	48.2155	9.9893	1.0709	46.0864	50.3445	30.00	75.68
	Above 28 years	11	47.5709	16.8860	5.0913	36.2267	58.9151	27.03	86.49
	Total	260	46.5490	10.2779	0.6374	45.2939	47.8042	20.00	86.49
ZS (ms)	Below 22 years	162	666.6971	121.5629	9.5508	647.8359	685.5583	415.38	1160.00
	23-27 years	87	710.2724	123.0370	13.1909	684.0496	736.4951	414.32	1060.00
	Above 28 years	11	684.1336	102.5418	30.9175	615.2450	753.0221	563.45	827.03
	Total	260	682.0158	122.6122	7.6040	667.0421	696.9895	414.32	1160.00

Table 5: One way ANOVA for age variance

		Sum of Squares	df	Mean Square	F	Sig.
TP1 (ms)	Between Groups	2719.231	2	1359.616	7.342	**.001**
	Within Groups	47591.921	257	185.183		
	Total	50311.153	259			
TPT (ms)	Between Groups	6929.787	2	3464.894	5.338	**.005**
	Within Groups	166816.624	257	649.092		
	Total	173746.412	259			
AP1 (mv)	Between Groups	146.124	2	73.062	0.079	.924
	Within Groups	238848.103	257	929.370		
	Total	238994.227	259			
IWT (ms)	Between Groups	403.734	2	201.867	1.925	.148
	Within Groups	26956.039	257	104.887		
	Total	27359.773	259			
ZS (ms)	Between Groups	107528.325	2	53764.162	3.649	**.027**
	Within Groups	3786213.418	257	14732.348		
	Total	3893741.743	259			

in the results in Table 6 indicating that *Mizāj* as an independent variable does not cause differences in the pulse parameters.

4. Conclusion

The study aimed to generate normal radial pulse wave data for healthy subjects and to verify the claim of UM that pulse characteristics vary as per gender, age and *Mizāj*. There were significant gender differences in all pulse parameters. The findings, however, do not support the UM assumption on gender-based differences in the relative pulse strength assumed to be higher in males. Significant variation was also seen in some parameters in different age groups. There was no support for UM claim that pulse characteristics vary with *Mizāj*. By estimating physiological variations in pulse characteristics, this study provides a helpful data for further studies to verify the diagnostic value of *Nabḍ* (pulse) in pathological conditions.

Table 6: One way ANOVA for *Mizāj* variance

		Sum of Squares	df	Mean Square	F	Sig.
TP1 (ms)	Between Groups	600.225	3	200.075	1.030	.380
	Within Groups	49710.927	256	194.183		
	Total	50311.153	259			
TPT (ms)	Between Groups	932.079	3	310.693	0.460	.710
	Within Groups	172814.333	256	675.056		
	Total	173746.412	259			
AP1 (mv)	Between Groups	420.778	3	140.259	0.151	.929
	Within Groups	238573.449	256	931.928		
	Total	238994.227	259			
IWT (ms)	Between Groups	123.918	3	41.306	0.388	.762
	Within Groups	27235.855	256	106.390		
	Total	27359.773	259			
ZS (ms)	Between Groups	82029.116	3	27343.039	1.836	.141
	Within Groups	3811712.626	256	14889.502		
	Total	3893741.743	259			

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Conflict of Interest: None

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सारांश

एक स्वस्थ वयस्क आबादी में रेडियल आर्टरी पल्स वेव मापदंडों पर लिंग, आयु और स्वभाव (मिज़ाज) का प्रभाव

एफ.एस. शिरानी, *फ़ारूक़ अहमद डार, सदफ़ यासीन

पृष्ठभूमि और उद्देश्यः इस अध्ययन में पीज़ोइलेक्ट्रिक ट्रांसड्यूसर से उत्पन्न रेडियल आर्टरी पल्स वेव का पल्स वेव मापदंडों में लिंग, आयु और *मिज़ाज* (संघटक) संबंधित विविधताओं के लिए विश्लेषण किया गया। इसका उद्देश्य स्वस्थ विषयों के लिए एक सामान्य रेडियल पल्स वेव प्रोफ़ाइल उत्पन्न करना और यूनानी चिकित्सा का दावा कि वेव के लक्षण लिंग, आयु और मिज़ाज के अनुसार बदलते हैं, को सत्यापित करना था।

प्रयोगात्मक प्रक्रियाः पल्स वेव मापदंडो को 18 से 39 के बीच की आयु की 133 महिलाओं और 127 पुरूषों में मापा गया। देखे गए पल्स वेव मापदंड टाइम टू सिस्टोलिक पीक (टीपी1), एम्प्लीट्यूड ऑफ सिस्टोलिक पीक (एपी1), इंटरवेव टाइम (आईडब्ल्यूटी), टोटल पल्स टाइम (टीपीटी) और इंटरा वेव टाइम (ज़ेड एस) थे।

परिणाम एवं निष्कर्षः एपी1 को छोड़कर सभी पल्स मापदंडों में पुरुषों एवं महिलाओं में एक महत्वपूर्ण अंतर देखा गया। महिलाओं की तुलना में पुरुषों में उच्च औसत था। विभिन्न आयु समूहों में टीपी1, टीपीटी और ज़ेडएस में एक महत्वपूर्ण फर्क़ ($p<0.05$) पाया गया परन्तु एपी1 और आईडब्ल्युटी में फर्क़ नहीं पाया गया। विभिन्न संघटको में पल्स मापदंडों में कोई महत्वपूर्ण भिन्नता नहीं देखी गई। परिणाम यूनानी चिकित्सा के सिद्धांत का समर्थन करते हैं कि पल्स के लक्षण आयु और लिंग के अनुसार परिवर्तित होते हैं। हालांकि परिणाम पुरुषों में उच्च मानी जाने वाली पल्स शक्ति के संबंध में लिंग आधारित विभिन्नता की धारणा को समर्थन नहीं करते हैं। इसी प्रकार यूनानी चिकित्सा के इस दावे की पुष्टि भी नहीं हो सकी कि मिज़ाज के साथ पल्स के लक्षण बदलते हैं।

शब्दकुंजीः पल्स वेव विश्लेषण, लिंग, आयु, संघटक, *मिज़ाज,* यूनानी चिकित्सा

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