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Editorial

Unani Medicine, with its deep historical roots and holistic approach to health, continues to evolve and adapt to modern healthcare challenges. With a focus on both prevention and cure, this system of medicine offers unique perspectives on managing diseases through natural remedies, personalized treatment, and a strong emphasis on the balance of humours. In recent years, there has been a growing recognition of the need to scientifically validate and integrate traditional therapies into contemporary medical practice. The Central Council for Research in Unani Medicine remains at the forefront of this effort, conducting extensive research that seeks to bridge traditional wisdom with modern science.

The Hippocratic Journal of Unani Medicine (HJUM) has long served as a platform for disseminating groundbreaking research, enabling scholars and practitioners to explore the vast potential of Unani therapies. With this issue, we continue our mission of promoting evidence-based research that upholds the rich heritage of Unani Medicine while addressing modern healthcare needs.

In this Volume 16, Issue 4 of HJUM, we present a collection of papers that delve into both the theoretical and clinical applications of Unani Medicine, offering fresh insights into how this ancient system remains relevant in today's healthcare landscape.

The first paper, *Qillat-i-Darqiyyat Aşlı (Primary Hypothyroidism) and its Management in Unani System of Medicine*, addresses a pressing endocrine disorder and highlights the potential of Unani therapeutics in managing hypothyroidism. With a focus on restoring balance and improving thyroid function, the paper presents traditional insights that could contribute to holistic management of this increasingly prevalent condition.

Next, the review titled *Momiyā`ī or Silājūt (Pissasphalt), a Unique Healing Drug of Unani Medicine*, explores the healing properties of this ancient remedy. Known for its regenerative and strengthening effects, *Momiyā`ī* has been a cornerstone in Unani healing practices. This paper presents a comprehensive review of its uses and pharmacological properties, underscoring its potential as a versatile therapeutic agent.

The third paper, *Potential Role of Khamīrah-i-Banafsha in Outbreaks of Respiratory Illnesses: A Critical Review*, examines a widely used Unani formulation for respiratory conditions. In the context of frequent outbreaks of respiratory illnesses, the study critically assesses the benefits of *Khamīrah-i-Banafsha*, providing a compelling case for its integration into mainstream treatments for respiratory infections.

The paper titled *Functional Explanation of Reproductive Organs in Perspective of Unani Medicine* explores the structure, faculties, and temperament of reproductive organs according to classical Unani texts. The review highlights the continued relevance of Unani perspectives in reproductive health and calls for further research to scientifically validate these concepts.

Sore throat, a common ailment that impacts daily life, is addressed in the study *Safety and Efficacy Evaluation of Unani Pharmacopoeial Formulation La`ūq Bādām in Patients with Khushūna al-Ḥalq (Sore Throat) (NUMC: C-119): An Open-Label Single-Arm Study*. This investigation into *La`ūq Bādām*, a time-tested remedy for sore throat, affirms its safety and efficacy, reinforcing its use in clinical settings.

Lastly, the paper titled *Identification of the Vulnerable Section among the Service Class and the Modes Adopted for Resilience* takes a sociological perspective, examining the factors that contribute to vulnerability in certain sections of the service class. This study also highlights the adaptive strategies employed to build resilience, offering insights that are particularly relevant in today's stressful working environments.

These papers collectively reflect the versatility and continued relevance of Unani Medicine in addressing a diverse range of healthcare challenges. The studies presented in this issue offer evidence-based solutions that draw from the rich therapeutic heritage of Unani Medicine.

We extend our deepest gratitude to the authors and reviewers who have contributed to this issue. Their dedication and scholarship continue to enrich the knowledge in Unani Medicine, helping to propel this ancient system into the future. We are confident that this issue will serve as a valuable resource for researchers, practitioners, and students, as we collectively work towards integrating Unani Medicine into modern healthcare.



(Dr. N. Zaheer Ahmed)
Editor-in-Chief

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Qillat-i-Darqiyyat Aşlī (primary hypothyroidism) and its management in Unani system of medicine

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Abstract

Qillat-i-Darqiyyat Aşlī (primary hypothyroidism) refers to reduced production of thyroid hormone caused by intrinsic disorder of the thyroid gland and characterized by low serum T4 and raised serum TSH, usually >20mIU/L. Hypothyroidism is a common endocrine disorder, affecting over 1% of the general population and about 5% of individuals over age 60 years. Women are affected approximately six times more frequently than men. As such, hypothyroidism has not been described in Unani classical literature, but some of its clinical features, such as bradycardia, low volume pulse, sluggishness of skeletal muscles, puffiness, peripheral oedema, cool peripheral extremities, and sluggish thinking, are similar to those described in the context of *Sū`i-Mizāj Bārid* (abnormal cold temperament) or *Ghalba-i Balgham* (preponderance of phlegm). In conventional medicine, treatment of hypothyroidism with thyroid hormone replacement is usually life-long, which may be associated with detrimental effects on the heart and bones. In this review, an attempt has been made to describe Unani therapies for hypothyroidism, which are comparatively safer; scientific reports also revealed thyroid stimulating activity of some single Unani drugs based on the herbs, such as *Brahmī* (*Bacopa monnieri*), *Asgand* (*Withania somnifera*), *Muqil* (*Commiphora mukul*), *Kachnār* (*Bauhinia purpurea*), *Injīr* (*Ficus carica*), *Ām* (*Mangifera indica*), etc., which may play an important role in the management of *Qillat-i-Darqiyyat Aşlī* (primary hypothyroidism). However, there is a need to conduct randomised controlled clinical trials on these Unani herbal drugs to evaluate their therapeutic efficacy in hypothyroidism.

Keywords: Thyroid-stimulating activity, Hypothyroidism, *Qillat-i-Darqiyyat Aşlī*, Unani Medicine

Introduction

Qillat-i-Darqiyyat Aşlī (primary hypothyroidism) refers to deficiency of thyroid hormone caused by intrinsic disorder of the thyroid gland, and characterized by low serum thyroxine (T4) and elevated serum thyroid stimulating hormone (TSH), usually in excess of 20mIU/L (Ralston *et al.*, 2018; Anonymous, 2012). It accounts for approximately 99% of cases, with <1% being secondary hypothyroidism or central hypothyroidism caused by deficiency of serum TSH (Munjaj *et al.*, 2012).

Hypothyroidism is a common endocrine disorder, affecting over 1% of the general population and about 5% of individuals over the age of 60 years (Papadakis *et al.*, 2019). Women are affected approximately six times more frequently than men (Ralston *et al.*, 2018). It continues to increase significantly in India. A survey conducted by the Indian Thyroid Society depicts one in ten adults in India suffer from hypothyroidism. A significant proportion of patient population may go undetected and untreated even as it continues to impair the quality of life, work performance, and economic productivity (Unnikrishnan *et al.*, 2013).

Thyroid is a butterfly-shaped endocrine gland located at the base of the neck and wraps around the trachea just below the cricoid cartilage. The functional unit of the thyroid gland is the follicle; there are about three million follicles in the adult human thyroid gland. Follicular cells produce the classical thyroid hormones, thyroxine and triiodothyronine. Thyroxine was the first thyroid hormone isolated in 1914. Triiodothyronine, a more potent hormone than thyroxine was discovered in 1954. Both thyroid hormones are

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rich in iodine, which consists of more than 50% of their molecular weight. Thyroxine is abbreviated as T4, because it contains four atoms of iodine; triiodothyronine has three atoms of iodine, so it is abbreviated as T3 (Goodman, 2009).

Thyroid hormones maintain the level of metabolism in the tissues that is optimal for their normal function. These hormones stimulate O₂ consumption by most of the cells in the body, help regulate lipid metabolism, increase the absorption of carbohydrates from the intestine, and thereby influence body mass and mentation (Barrett *et al.*, 2019). Thyroid hormone deficiency affects almost all body functions (Papadakis *et al.*, 2019).

The symptoms of hypothyroidism include tiredness, weakness, dry skin, feeling cold, hair loss, difficulty concentrating, poor memory, constipation, weight gain with poor appetite, dyspnoea, hoarse voice, menorrhagia (later oligomenorrhoea or amenorrhoea), paraesthesia, impaired hearing; and signs like dry coarse skin, cool peripheral extremities, puffy face, hands, and feet (myxoedema), diffuse alopecia, bradycardia, peripheral oedema, delayed tendon reflex relaxation, Carpal Tunnel Syndrome, and serous cavity effusions (Kasper *et al.*, 2015).

Hypothyroidism, if left untreated, may lead to complications such as infertility, delirium, dementia, cerebellar ataxia, seizures, psychosis (myxoedema madness), confusion, myxoedema coma, hypothermia, severe cardiac failure (myxoedema heart), pericardial effusions, etc. In conventional medicine, levothyroxine is being used effectively in the management of hypothyroidism, but it can suppress thyroid stimulating hormone (TSH) to subnormal range and can cause serious adverse effects on bone density and cardiac function, such as osteoporosis, atrial fibrillation, myocardial ischaemia, etc. A recent survey conducted by the American Thyroid Association (ATA) demonstrated that patients taking natural preparations rather than synthetic hormone replacement therapy or combination therapy, were more satisfied with their treatment (ATA, 2018).

Unani Concept of *Qillat-I-Darqiyyat* (Hypothyroidism)

As such, hypothyroidism has not been described in Unani classical literature, but some of its clinical features are similar to those described in the context of *Sū'-i-Mizāj Bārid* (abnormal cold temperament). According to the classical literature of the Unani system of medicine, the normal temperament of thyroid gland is hot (Ahmad, 1980), but in hypothyroidism, it changes from hot to abnormal cold temperament (*Sū'-i-Mizāj Bārid*). Some Unani scholars consider hypothyroidism as *Balghmaī* (phlegmatic) disease. *Ghalba-i-Balgham* (preponderance of phlegm) is characterized by bradycardia, low volume pulse, sluggishness of skeletal muscles, puffiness, peripheral oedema, cool peripheral extremities, and sluggish thinking. These signs and symptoms are found in patients with hypothyroidism (Saifi *et al.*, 2017). The signs and symptoms of *Sū'-i-Mizāj Bārid* (abnormal cold temperament) include *Khushk wa Khurdurī Jild* (dry and coarse skin), *Shuhūb* (skin pallor), *Lisān Samīk* (thick tongue), *Faṭ al-Nawm* (excessive sleep), *Takān wa Kaslmandī* (lethargy and somnolence), *Nabḍ Baṭī' wa Mutaḥawit* (low volume pulse), *Khafaqān* (palpitation), *Tahabbuj* (puffy face), *Kund Dhehnī* (diminished intellectual functions), *Du'fal-Shahwa* (loss of libido), *Huṣr* (constipation), and *Du'fal-Ishtihā'* (decreased appetite) (Jurjānī, 2010; Majūsī, 2010; Ibn Sīnā, 2007; Zaidī, 2011; Ibn Rushd, 1984; Ahmad, 1983; Rāzi, 1991). These features coincide with the clinical manifestations of *Qillat-i-Darqiyyat* (hypothyroidism). Thus, *Sū'-i-Mizāj Bārid* (abnormal cold temperament), including *Sū'-i-Mizāj Balghmaī* (abnormal phlegmatic temperament), may be interpreted with the clinical presentations of *Qillat-i-Darqiyyat* (hypothyroidism). However, ancient

Unani physicians have described a common disorder of thyroid gland in their literature as goitre (enlargement of thyroid gland) and its treatment.

Buqrāt (Hippocrates) (460-337 BC) narrated in the context of glands that “when glands of the neck become diseased themselves, they become tubercular and produce struma.” The term “struma” is still used in some European countries (e.g., Austria, Italy) as the medical designation of goitre. Ismā‘il Jurjānī’s ‘*Treasure of Medicine*’ first mentioned exophthalmos (protrusion of eyes), which may be associated with Grave’s disease (goitre). ‘Alī ibn ‘Abbās Majūsī (d. 994 AD) stated that *Waram* (inflammation), which occurs due to *Balgham-i-Ghalīz* (thick phlegm) results in *Ghayngha* (goitre), which is similar to glands. Ibn Hubal Baghdādī (1121-1213 AD) mentioned exophthalmic goitre under the heading *Juḥūz al-‘Ayn* (exophthalmos) in his book, “*Kitāb al-Mukhtārāt fi’l Ṭibb*”. He described the accumulation of matter as the main cause of *Juḥūz al-‘Ayn* (exophthalmos). The matter may be liquid or gaseous in nature, and it accumulates in the vessels of the eyes resulting in dilatation of the vessels. The increased pressure pushes the eyes out of the socket, leading to exophthalmos.

According to Ibn Sīnā (Avicenna), the signs of phlegmatic predominance are excessive pallor, flabbiness of body, cold and moist skin, excessive salivation, and viscid saliva. Thirst is diminished, especially in elderly people. A weak digestion with acid eructation, pale urine, excessive sleepiness, flabby muscles, mental dullness, and a soft pulse of slow rate and speed are characteristics of this condition. Clinical features of abnormal cold temperament described in Unani Medicine may be correlated with the clinical presentation of primary hypothyroidism in conventional medicine (Table 1) (Alam, 2019).

Table 1: Correlation between clinical features of abnormal cold temperament and hypothyroidism

Abnormal Cold Temperament	Hypothyroidism
<i>Farbahī</i>	Weight gain
<i>Intithār al-Sha‘r</i>	Loss of hair
<i>‘Adm Taḥammul al-Bard</i>	Cold intolerance
<i>Kāhīlī</i>	Lethargy
<i>Qabḍ</i>	Constipation
<i>Tahabbuj</i>	Oedema
<i>Ḍu‘f al-Ishtihā‘</i>	Loss of appetite
<i>Istisqā‘</i>	Ascites
<i>Ḍu‘f al-Shahwa</i>	Loss of libido
<i>Khafaqān</i>	Palpitation
<i>Kathra al-Nawm</i>	Excessive sleeping
<i>Nisyān</i>	Dementia
<i>Yubs al-Jild</i>	Dry and coarse skin
<i>Kund Dhehnī</i>	Diminished intellectual function
<i>Nabḍ Baṭī‘ wa Mutafāwīt</i>	Low pulse volume
<i>Kathra al-Lu‘āb</i>	Excessive salivation
<i>Ḍu‘f-i-Aam</i>	General weakness
<i>Buḥḥa al-Ṣawt</i>	Hoarseness of voice
<i>Waja‘ al-Mafāṣil</i>	Joint pain
<i>Khasham</i>	Anosmia
<i>Naḥkh al-Mi‘da</i>	Flatulence

Asbāb (Aetiology)

According to conventional medicine, primary hypothyroidism may be associated with goitre or an atrophic gland, and each of these entities may be either congenital or acquired in etiology.

Primary hypothyroidism with goitre (Goitrous): Its acquired causes are Hashimoto's thyroiditis (chronic lymphocytic thyroiditis), iodine deficiency disorders, goitrogen exposure (drugs, e.g., lithium, amiodarone, carbimazole, methimazole, etc.), and antithyroid drug treatment (propylthiouracil); its congenital causes include iodide transport or utilization defect (NIS or pendrin mutations) and defects in thyroid hormone genesis.

Primary hypothyroidism with atrophic gland (non-goitrous): Its acquired causes include atrophic thyroiditis (primary idiopathic hypothyroidism) and post-ablative hypothyroidism (radioactive iodine ablation, after thyroidectomy); its congenital causes are thyroid agenesis and thyroid dysplasia. Transient primary hypothyroidism may be caused by post-partum thyroiditis (Pizzorno *et al.*, 2016; Munjal *et al.*, 2012). In patients with primary hypothyroidism, serum antibodies against thyroid proteins – thyroglobulin (TG) or thyroperoxidase (TPO) are present, but about 10-15% patients can be antibody negative (Sharma *et al.*, 2015).

According to Unani Medicine, risk factors for the development of hypothyroidism include alteration in *Asbāb Sitta Darūriyya* (six essential factors of health), excessive consumption of *Ghidhā' Kathīf* (viscid diet), excessive intake of *Ghidhā' Bārid wa Raṭb* (cold & moist diet), excessive use of *Bārid Mashrūbāt* (cold drinks), and *Namaṭ-i-Hayāt Mustaqirr* (sedentary lifestyle). Causes of hypothyroidism include *Balgham Ghayr Tabī'ī* (abnormal phlegm), *Ḍu'f al-Dimāgh* (cerebrasthenia), *Ḍu'f al-Kabid* (hepatic insufficiency), *Ḍu'f al-Ṭihāl* (splenic insufficiency), and *Sū' al-Qinya* (anaemia with hypoproteinaemia) (Kabīruddīn, 2006, Nafīs, 1954).

Hypothyroidism may also be due to the use of dietary goitrogens, such as turnips, cabbage, mustard greens, radish, broccoli, soybean, peanuts, pine nuts, millet, etc. Thyroid hormones are made from iodine and the amino acid tyrosine. Goitrogens are substances that disrupt the production of thyroid hormones by interfering with iodine uptake in the thyroid gland. Goitrogens combine with iodine, making it unavailable to thyroid. Thus, goitrogens may block iodine use, leading to hypothyroidism (Pizzorno *et al.*, 2016).

'Alāmāt (Clinical Features)

Symptoms of typical hypothyroidism include weight gain, diminished sweating, hoarseness of voice, paraesthesia, dry skin, impaired hearing, constipation, lethargy, excessive salivation, general weakness, flabbiness, loss of appetite, and hair loss.

Since thyroid hormones increase oxygen consumption and heat production, their deficiency is characterized by decreased tolerance to cold (Goodman, 2009). Signs of typical hypothyroidism are oedema, ascites, palpitations, low volume pulse, dry and coarse skin, slow movements, delayed ankle reflexes, and periorbital puffiness (Kasper *et al.*, 2015; Munjal *et al.*, 2012). Increased blood cholesterol (hypercholesterolaemia), mainly in the form of low density lipoproteins (LDL) is also found (Goodman, 2009).

There is a characteristic accumulation of a mucus-like material in extracellular spaces, particularly in the skin. This material consists of protein complexed with hyaluronic acid and chondroitin sulfate, and due to its osmotic effect, it causes water to accumulate in these spaces, leading to the boggy appearance of the skin and subcutaneous tissues in patients with severe hypothyroidism and the condition is termed myxoedema (Munjal *et al.*, 2012; Goodman, 2009).

Tashkhīṣ (Diagnosis)

The measurement of serum TSH is the best initial diagnostic test to assess primary hypothyroidism, and its normal or reduced value excludes primary hypothyroidism. Low serum T4 with elevated serum TSH confirms the diagnosis of primary hypothyroidism, while normal serum T4 with an isolated elevation of serum TSH leads to the diagnosis of subclinical hypothyroidism (Munjal *et al.*, 2012).

In patients with autoimmune thyroiditis, the titers of antibodies against thyroperoxidase (anti-TPO) and thyroglobulin (anti-TG) are high. Basal body temperature (BBT), i.e., the temperature of the body at rest, is the most sensitive functional test of thyroid function. The delayed ankle reflex is also an important indicator of thyroid dysfunction (Pizzorno *et al.*, 2016).

For the clinical diagnosis of hypothyroidism, Zulewski's Clinical Score (Table 2) and the Billewicz Diagnostic Index (Table 3) may be used. A total Zulewski's score of >5 points defines hypothyroidism, while a score of 0–2 points defines euthyroidism.

The Billewicz score includes all the signs and symptoms, and the total score ranges from +67 to -47, with the highest score being given to a delayed ankle jerk and slow movements. A total Billewicz score of +25 or more suggests hypothyroidism, while a score of -30 or less excludes the disease (Table 3) (Kalra *et al.*, 2011).

Table 2: Zulewski's Clinical Score for Hypothyroidism (Kalra *et al.*, 2011)

Clinical Features		Score	
		Present	Absent
Symptoms			
1. Diminished sweating	Sweating in the warm room or a hot summer day	1	0
2. Hoarse voice	Speaking voice, singing voice	1	0
3. Paraesthesia	Subjective sensation	1	0
4. Dry skin	Dryness of skin, noticed spontaneously, requiring treatment	1	0
5. Constipation	Bowel habit, use of laxative	1	0
6. Impaired hearing	Progressive impairment of hearing	1	0
7. Weight gain	Recorded weight increase, tightness of clothes	1	0
Physical Signs			
1. Slow movements	Observe patient removing his/her clothes	1	0
2. Delayed ankle reflex	Observe the relaxation of the reflex	1	0
3. Coarse skin	Examine hands, forearms, elbows for roughness and thickening of skin	1	0
4. Periorbital puffiness	This should obscure the curve of the malar bone	1	0
5. Cold skin	Compare temperature of hands with examiner's	1	0
Sum of all symptoms and signs present		12	0

Table 3: Billewicz Diagnostic Score for Hypothyroidism (Kalra *et al.*, 2011)

Clinical Features	Present	Absent
Symptoms		
Diminished sweating	+6	-2
Dry skin	+3	-6
Cold intolerance	+4	-5
Weight gain	+1	-1
Constipation	+2	-1
Hoarseness	+5	-4
Deafness	+2	0
Signs		
Slow movements	+11	-3
Coarse skin	+7	-7
Cold skin	+3	-2
Periorbital puffiness	+4	-6
Pulse rate	+4	-4
Ankle jerk	+15	-6

Ilāj (Management)

Hypothyroidism cannot be cured, but it can be treated. In conventional medicine, it requires lifelong thyroid hormone replacement therapy, with levothyroxine being the drug of choice for treating hypothyroid patients. Some clinicians prescribe a combination of T4 and T3 for certain patients, such as those who have undergone a total thyroidectomy. While some people feel better with the combination, the improvement does not last, and others may feel worse after combined therapy. Additionally, taking too much T3 can seriously harm the heart (Pizzorno *et al.*, 2016).

In Unani system of medicine, the principles of treatment (*Uşūl-i-Ilāj*) are *Tanqiya* (elimination of morbid material from the body) and *Ta 'dīl-i-Mizāj* (temperamental alteration). Accordingly, disease causing humour, i.e., *Balgham* (phlegm) needs to be evacuated from the body, for which *Munḍij-i-Balgham* (phlegmatic concoctive) drugs, e.g., *Bīkh Kāsni*, *Bīkh Bādiyān*, *Bīkh Idhkhār*, *Bīkh Karafs*, *Barg-i-Gaozabān*, *Gul-i-Gaozabān*, *Tukhm Khaṭmī*, *Tīn*, etc., and *Mushil-i-Balgham* (phlegmatic purgative) drugs, such as *Turbud*, *Sanā Makkī*, *Tukhm Ḥanzal*, *Qust*, *Ghārīqūn*, *Muqil*, *Sūranjān*, etc. should be used (Hamdānī, 1998). When a temperamental abnormality is simple, i.e., without any complicating factor, the line of treatment is *Ilāj bi'l- Didd* (heterotherapy) (Ibn Sīnā, 2007). Accordingly, Unani drugs possessing hot temperament are used to treat hypothyroidism, as it is caused by *Sū' -i-Mizāj Bārid*. Hence, *Musakhkhin* (calorific) drugs are used for *Ta 'dīl-i-Mizāj* after *Tanqiya-i-Balgham*. Single *Musakhkhin* drugs, such as *Bisbāsa*, *Filfil Siyāh*, *Qaranful*, *Dārchīnī*, *Zīra*, *Zanjabīl*, *Za 'frān*, *Ambar*, *'Asal* (honey), *Adhārāqī*, etc. and compound *Musakhkhin* drugs like, *Jawārish Bisbāsa*, *Jawārish Kamūnī*, *Jawārish Jālīnūs*, *Ma 'jūn Zanjabīl*, *Ma 'jūn Chobchīnī*, etc. may be used (Kabir, 2002; Hamdānī, 1998). Goitrogenic foods, such as turnips, cabbage, mustard greens, radish, broccoli, soybean, peanuts, pine nuts, millet, etc. should be avoided.

In addition, other causes, including *Du'f al-Dimāgh* (cerebrasthenia), *Du'f al-Kabid* (hepatic insufficiency), *Du'f al-Tihāl* (splenic insufficiency), and *Sū al-Qinya* (anaemia with hypoproteinaemia) should be corrected. Risk factors like sedentary lifestyle and excessive consumption of *Ghidhā' Kathīf* (viscid diet), *Ghidhā' Bārid wa Raṭb* (cold & moist diet), and *Bārid Mashrūbāt* (cold drinks) should be avoided. Moderation in *Asbāb Sitta Darūriyya* (six essential factors of health) is also important for the management of *Qillat-i-Darqiyyat Aslī* (primary hypothyroidism).

Single Unani drugs with anti-hypothyroidism activity

Several preclinical *in-vitro* and *in-vivo* studies have been carried out to observe anti-hypothyroidism effect of so many single Unani herbal drugs, which have been proven for their thyroid-stimulating activities. The phytochemicals present in these drugs may have the potential to act as preventative or therapeutic agents against hypothyroidism. Some of these single herbal drugs are listed below:

1. *Brahmī* [*Bacopa monnieri* (L.) Wettst.]

Brahmī (*Bacopa monnieri*) has been attributed with several medicinal properties. It increases T4 concentration without affecting hepatic lipid peroxidation, which suggests that it can be used as a thyroid stimulating agent (Nadkarni, 1976). *Brahmī* stimulates thyroid activity and increases the secretion of its hormone – T4. It helps to improve memory, concentration, and detoxify the nervous system. *Bacopa monnieri* (Indian pennywort) extract has been observed to increase both T4 and T3 levels in male mice (Sharma *et al.*, 2015). *Brahmī* has been known for its thyroid stimulatory activity (Vasundhara *et al.*, 2013)

2. *Asgand* [*Withania somnifera* (L.) Dunal]

Asgand (*Withania somnifera*) is a popular adaptogenic medicinal plant that is attributed with numerous medicinal values. It helps in regulating all functions of the body by acting on thyroid gland and stimulating thyroid activity. It also regulates the endocrine activities of body so as to make it healthy. It is a well-known immunomodulator. Its roots are useful in autoimmune thyroid disorders. Preclinical research revealed its thyroid hormone balancing effect. A preclinical study showed a combination of some medicinal plants, including *C. mukul*, *B. purpurea* and *W. somnifera* to be an effective therapy for hypothyroidism (Sharma *et al.*, 2015). In a preclinical study conducted in adult male mice, serum triiodothyronine (T3) and tetraiodothyronine (T4) concentrations were increased after daily administration of *Withania somnifera* root extract (1.4 g/kg body wt.) for 20 days. *Asgand* may also stimulate thyroid activity indirectly, as its root extract significantly reduced lipid peroxidation in the liver and increased the activity of antioxidant enzymes such as superoxide dismutase and catalase (Panda & Kar, 1998). *Asgand* root extract stimulates thyroidal activity. In a preclinical study conducted in female mice, serum thyroxine (T4) level was significantly increased after daily administration of *Withania somnifera* root extract (1.4 g/kg body wt.) for 20 days (Panda & Kar, 1999). *Asgand* (*W. somnifera*) enhances serum T4 level, and it also helps in lowering cortisol levels in body. It is used for treating stress related disorders and in women with sterility. Its paste is used as local application in scrophulous and glandular swellings (Nadkarni, 1976).

3. *Muqil* [*Commiphora mukul* (Hook. ex Stocks) Engl.]

Muqil (Gum Guggul) is an oleo-gum-resin obtained from the medicinal plant – *Commiphora mukul* (Indian Bdellium). It contains steroids – guggulsterones E and Z, which are its characteristic constituents. Guggulipid is hypocholesterolaemic (Khare, 2007). Guggul resin increases catecholamine biosynthesis and activity in cholesterol-fed rabbits, inhibits platelet aggregation, exhibits anti-inflammatory activity and activates thyroid gland in rats and chicken. Z-guggulsterone may increase uptake of iodine by thyroid gland and increase oxygen uptake in liver and bicep tissues (Tripathi *et al.*, 1984). Preclinical studies showed that *C. mukul* enhanced tri-iodo thyronine (T3)/ thyroxine (T4) ratio in female mice (Sharma *et al.*, 2015). Many studies have suggested that guggul enhances the conversion of T4 to T3, thus increases T3 levels. Preclinical studies have revealed thyroid stimulating effect of *Muqil* (Gum Guggul) (Panda & Kar, 2005). It has potential to improve hypothyroidism and has potent anti-oxidative properties (Panthi & Gao, 2015).

4. *Kachnār* (*Bauhinia purpurea* L.)

Kachnār (*Bauhinia purpurea* L.) is a flowering plant commonly known as butterfly tree and orchid tree. Its flowers contain astragalins, quercetin, isoquercetin, and anthocyanins, and seeds contain chalcone glycosides (Khare, 2007). Bark of *B. purpurea* is used in thyroid gland disorders, as it has balancing effect on it. It reduces excess production and increases any deficiency. It is known to be a specific medicinal plant for swollen lymph nodes, scrophula, cervical adenitis and other glandular swellings in general. A preclinical study showed increased thyroidal weight and active thyroidal histology, thus enhancing thyroid function in hypothyroid rats. A research on female mice suggests that the use of *B. purpurea* increases serum T3 and T4 concentrations (Sharma *et al.*, 2015). It has been known for its enhancing effects on serum T3 and T4 levels (Panthi & Gao, 2015). In a preclinical study conducted in female mice, serum triiodothyronine (T3) and thyroxine (T4) levels were significantly increased after daily administration of *Bauhinia purpurea* bark extract (2.5 mg/kg body wt.) for 20 days. It reveals that this plant extract is capable of stimulating thyroid function in female mice (Panda & Kar, 1999).

5. *Tīn* (*Ficus carica* L.)

Tīn (*Ficus carica* L.) commonly known as fig plant is a native of Carica in Asia. It grows in nearly all tropical and sub-tropical countries (Vasundhara *et al.*, 2013). It contains various minerals, vitamins and phenolic compounds, which help in the management of healthy living. It has been proved to have anti-inflammatory, antimicrobial, anticarcinogenic and antioxidant effects (Rahmani & Aldebasi, 2017). Leaves extract of *F. carica* helps regulating and controlling the metabolic activities of the body by enhancing thyroid hormones levels. Studies showed that *F. carica* elevates synthesis of T3 and T4 levels by acting on thyroid gland follicles (Nadkarni, 1976).

6. *Ām* (*Mangifera indica* L.)

Ripe fruit of *Ām* (*Mangifera indica* L.) contains sugars, citric acid, ascorbic acid, and β -carotene. Its seed kernel contains α - and β -amyrins, gallotannin, glucogallin, and several sterols. The leaves contain pentacyclic triterpene alcohol, indicol, taraxerol, friedelin, lupeol, and β -sitosterol (Khare, 2007). Its bark contains tannins – protocatechuic acid, mangiferin, alanine, glycine, α -aminobutyric acid, kinic and

shikimic acid (Anonymous, 2007). Many studies revealed protective role of mango in hypothyroidism. In a preclinical study, *Mangifera indica* extracts showed elevation of serum T3 and T4 levels (Parmar & Kar, 2009).

Conclusion

This review article explores therapeutic potential of select Unani herbal drugs as natural remedies for managing *Qillat-i-Darqiyyat Aşlī* (primary hypothyroidism). A critical analysis of the literature indicates that these Unani drugs possess thyroid-stimulating properties and may be beneficial in managing hypothyroidism. However, it is essential to conduct randomised controlled clinical trials to validate their safety and efficacy in hypothyroid patients. Such studies will help to mitigate the adverse effects of hormonal therapy and provide safe and effective herbal alternatives for hypothyroidism management.

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क्रिल्लत-ए-दरक्रिय्या असली (प्राथमिक हाइपोथायरायडिज्म) और यूनानी चिकित्सा पद्धति में इसका उपचार

जुवेरिया जबीन, कमरुद्दीन, मुनव्वर हुसैन काज़मी

सारांश

क्रिल्लत-ए-दरक्रिय्या असली (प्राथमिक हाइपोथायरायडिज्म) थायरॉइड ग्रंथि के आंतरिक विकार के कारण थायरॉइड हार्मोन के कम उत्पादन को संदर्भित करता है, जिसे निम्न सीरम T4 और उच्च सीरम TSH (>20mIU/L) द्वारा पहचाना जाता है। हाइपोथायरॉइडिज्म एक सामान्य अंतःस्त्रावी विकार है, जो सामान्य जनसंख्या के 1% से अधिक और 60 वर्ष से अधिक आयु के व्यक्तियों के लगभग 5% को प्रभावित करता है। महिलाओं में यह विकार पुरुषों की तुलना में लगभग छह गुना अधिक होता है। यूनानी क्लासिकल साहित्य में हाइपोथायरॉइडिज्म का विशेष रूप से वर्णन नहीं किया गया है, लेकिन इसके कुछ नैदानिक लक्षण, जैसे ब्रेडिकार्डिया (धीमी हृदय गति), निम्न मात्रा की नाड़ी, कंकाल की मांसपेशियों की शिथिलता, सूजन, परिधीय शोथ, ठंडी परिधीय अंग और धीमी सोच उन लक्षणों से मेल खाते हैं जो सू-ए-मिज़ाज बारिद (असामान्य शीत प्रकृति) या ग़लबा-ए-बल्ग़म (बलगम की प्रधानता) के संदर्भ में वर्णित हैं। पारंपरिक चिकित्सा में हाइपोथायरॉइडिज्म का उपचार थायरॉइड हार्मोन प्रतिस्थापन के साथ आमतौर पर जीवनभर किया जाता है, जो हृदय और हड्डियों पर हानिकारक प्रभाव डाल सकता है। इस समीक्षा में हाइपोथायरॉइडिज्म के लिए यूनानी चिकित्सा उपचारों का वर्णन करने का प्रयास किया गया है, जो तुलनात्मक रूप से सुरक्षित हैं। वैज्ञानिक रिपोर्टों से पता चला है कि कुछ यूनानी एकल औषधियों, जैसे ब्रह्मी (*Bacopamonnieri*), असगंध (*Withaniasomnifera*), मुकिल (*Commiphoramukul*), कचनार (*Bauhinia purpurea*), अंजीर (*Ficus carica*), आम (*Mangiferaindica*) आदि, में थायरॉइड को उत्तेजित करने वाली गतिविधि होती है, जो क्रिल्लत-ए-दरक्रिय्या असली (प्राथमिक हाइपोथायरॉइडिज्म) के उपचार में महत्वपूर्ण भूमिका निभा सकती हैं। हालांकि इन यूनानी हर्बल औषधियों की उपचारात्मक प्रभावकारिता का मूल्यांकन करने के लिए इन पर और अधिक यादृच्छिक नियंत्रित नैदानिक परीक्षणों की आवश्यकता है।

कुंजीशब्द: थायरॉइड-उत्तेजक गतिविधि, हाइपोथायरॉइडिज्म, क्रिल्लत-ए-दरक्रिय्या असली, यूनानी चिकित्सा

Momiyā`ī or Silājīt (pissasphalt), a unique healing drug of Unani Medicine: A review

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Abstract

Momiyā`ī, a natural viscous substance, is distinguished from synthetic coal tar by its origin in petroleum hydrocarbon oxidation. Also known as asphalt, bitumen, *Silājīt*, and more, it is prevalent in mountainous regions like Afghanistan and Tibet. Historically, it was misinterpreted as Egyptian mummy in Europe, used for various treatments. Its composition includes active compounds like dibenzo- α -pyrones (DBPs) and fulvic acid, contributing to its physiological effects. *Habb`Ambar Momiyā`ī*, a popular Unani formulation, is widely used as an aphrodisiac. Toxicological studies affirm its safety for human consumption. Preclinical and clinical research highlights its therapeutic efficacy, including potential anticancer properties. This review explores its historical healing uses, therapeutic applications, chemical composition, and safety profiles.

Keywords: *Momiyā`ī*, Pissasphalt, Fulvic acid, *Qafr al-Yahūd*, Unani Medicine, *Silājīt*

Introduction

Unani Medicine prescribes drugs of mineral and animal origins, besides plant-based medicines for curing ailments. *Momiyā`ī* (موميائي) is a drug which is described to have multiple origins in Unani texts. However, it is mineral origin *Momiyā`ī* which is mostly used in medicinal preparations. In literature, it has been described as *Momiyā`ī* as well as *Silājīt* (سلاجيت) and said to have originated from mountainous rocks (Azhar *et al.*, 2011). In the present review, origin, composition, therapeutic uses of the drug will be highlighted. Further, historical, pharmacological and clinical studies conducted on *Momiyā`ī* or *Silājīt* will also be discussed. *Momiyā`ī* or *Silājīt* is described as a sticky semi-solid or liquid brown to black coloured effusion oozed from rocks as a result of oxidation of petroleum hydrocarbons (Wilson *et al.*, 2011). It is a tar-like substance, of white over yellow to black colour, which is used in traditional medicine worldwide. It is known by different names in different geographies, as *Mumiyo*, *Mumie* or *Mumiyo* in Russia, *Silājīt* in India, Kao-tun, meaning blood of the mountain, in Burma, *Barachgschin*, meaning oil of the mountain, in Altai Mountains, *Brogschaun*, meaning mountain juice, in Mongolia and as *Araq al-Jabal*, meaning mountain sweat, in Iran, Kazakhstan, Uzbekistan and Kyrgyzstan (Aiello *et al.*, 2011).

Material and Method

The present review captures complete description, viz. temperament, action, therapeutic uses, dosage, etc. of the drug from Unani classical literature. Databases such as Academia, PubMed, Ovid SP, Google Scholar, ResearchGate and Science-Direct have been referred for historical data, pharmacological actions, clinical trials, toxicity and other aspects to prove the importance of *Momiyā`ī* or *Silājīt*.

Description of *Momiyā`ī* in Ancient Text

Dioscorides (40–90 AD) in his treatise has described various types of *Momiyā`ī* – Judean, Moist, and Naptha. The shiny, purple coloured and heavy with a strong scent type is called Judean *Momiyā`ī* (*Qafr al-Yahūd*). It is considered better than other varieties. The black coloured with foul smell is adulterated with added pitch (tar).

Moist *Momiyā`ī* is found floating in wells in the country of the Agrigentines (Sicily). The countrymen use it for lamps instead of oil, and falsely call it Sicilian oil. Sometimes,

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it is carried down from the Ceraunian mountains of Albania by water and deposited on the shore as a knob having a smell of pitch mixed with bitumen. This is called *pissasphaltos*.

Naptha *Momiyā`ī* is the white or black variety which is strained Babylonian *asphaltus*. It attracts fire because it draws it to itself from a distance. All types of *Momiyā`ī* described by Dioscorides are mineral origin (Dioscorides, 2000).

Al-Beruni (973-1052 AD), the Persian scholar and scientist, in his treatise *Kitāb al-Jamāhīr fī Ma`rifat al-Jawāhir* has described *Momiyā`ī* (pissasphalt) as a mineral origin special drug obtained from caves in mountainous grounds. *Al-Beruni* has also described *Silājīt* under the chapter of *Momiyā`ī* as an Indian origin drug obtained from mountains (*Al-Beruni*, 1989).

The famous Unani scholar Ibn Sina (980–1037 AD) in his book ‘*The Canon of Medicine*’ has mentioned asphalt by the name ‘*Qafr al-Yahūd*’ and *Momiyā`ī* obtained from mountains (*Ibn Sina*, 1998).

Ibn Hubal Baghdadi (1122–1213 AD) in his book *Kitāb al-Mukhtārāt fī l-Ṭibb* has mentioned that *Momiyā`ī* is a mineral origin drug (*Ibn Hubal*, 2005).

The famous Arabic physician, botanist, pharmacist and scientist Ibn Bayṭar (1197–1248 AD) in his book on single drugs *Kitāb al-Jāmi` li-Mufradāt al-Adwiya wa`l-Aghdhiya* has quoted Dioscorides for description of *Momiyā`ī* as a mineral origin drug (*Ibn Baytar*, 1999).

Ali bin al-Husain al-Ansari alias Zayn Attar (1329–1404 AD) in his treatise *Ikhtiyārāt Badī`ī* on pharmacology has also quoted Dioscorides for describing *Momiyā`ī* as obtained from rocks (*Attar*, 1888).

The famous Egyptian physician of fifteenth century Dauwd al-Antaki (1543–1599 AD) in his treatise on single drugs *Tadhkira ‘Ūli`l-Albāb wa`l-Jāmi` li`l-‘Ajab al-‘Ujāb* has mentioned that *Momiyā`ī* is obtained from rocks (*Antaki*, 2008).

The renowned Indian physician of eighteenth-century Mohammad Husain Shirazi (d. 1769 AD) in his treatise *Makhzan al-Adwiya* has defined *Momiyā`ī* as a tar like substance obtained from cavities of mountains. *Momiyā`ī* obtained from the mountains of *Dārāb* is considered better than others. In his treatise, Shirazi has mentioned that *Silājīt* is a type of *Momiyā`ī* found in Indian mountains (*Shirazi*, 1975a, 1975b).

Mohammad Azam Khan (1814–1902) in his book *Muḥīt-i-‘Azam* (The Great Ocean) has mentioned that *Momiyā`ī* is originated from various sources – *Ma`dinī* or *Kānī* (mineral origin), *Insānī* (human origin), *Shajarī* (plant origin) and *Kalbī* (dog origin). However, Azam Khan is of the view that when we use the term *Momiyā`ī*, it is generally referred to mineral origin *Momiyā`ī*. The mineral *Momiyā`ī* is obtained from rocks and mountains. Human origin *Momiyā`ī* is referred to Egyptian mummies used as *Momiyā`ī* in ignorance. Plant origin *Momiyā`ī* is an extract of a plant. The description of dog-origin *Momiyā`ī* is not defined clearly by the author. Azam Khan further mentioned that a material similar to *Momiyā`ī* is also found in the mountains of India which is inferior to *Momiyā`ī* in quality. Indians refer to this material as *Silājīt* (*Khan*, 2018).

Vernacular names: *Arabic* – *Qafir al-Yahūd*, '*Araq al-Jibāl*'; *English* – Pissasphalt, bitumen, asphaltum, mineral pitch, Jews pitch; *Greek* – Asphaltos; *Hindi* – *Silājīt*; *Persian* – *Momiyā'ī*, *Momiyā*; *Latin* – Bituminis, asphaltum, bitumen judaicum; *Sanskrit* – Silajit, shilajatu; *Urdu* – *Silājīt* (Ibn Sina, 1998; Ibn Hubal, 2005; Shirazi, 1975a; Khan, 2018; Ghani, 2010; Al-Harawi, 2022).

Occurrence: It is found in the Himalayan mountain regions and other mountains in Afghanistan, Bhutan, China, Nepal, India, Iran, Pakistan, Tibet as well as Ural, Baykal, Sayan, Caucasus, and Altai Mountain regions in Russia, Tajikistan, Uzbekistan, and Kazakhstan, where it is gathered in small quantities from steep rock faces at altitudes between 1 and 5 km. In Iran, it is obtained from the *Dārāb* mountains of *Fārs* province and the mountains of *Estahban* and *Kohgiluyeh* (Schepetkin *et al.*, 2002; Barouji *et al.*, 2020).

Difference between bitumen (*Momiyā'ī*) and coal tar/coal tar pitch: Both the bitumen and coal tar are basically hydrocarbons. The bitumen (*Momiyā'ī*) is a naturally occurring substance while coal tar is a synthetic substance. A dark, thick liquid obtained as by-product during the process of the production of coke from coal or from the destructive distillation of coal in coking ovens is called coal tar. Coal tar products are used in various industries including roofing, aluminium, smelting, road paving, rubber production, etc. as well as in medicinal products used to treat skin diseases such as psoriasis (Wexler, 2005).

How Egyptian Mummies were used as *Momiyā'ī*

The use of *mummy* as a medicinal substance is one of the biggest misunderstandings in the history of medicine and an example of medical cannibalism. During the 12th to 17th centuries, the use of *mummies* in the Europe as a drug was prevalent as Egyptian mummies were supposed to cure various ailments like epilepsy, migraines, healing of wounds, i.e. ulcers, fractures and as an aphrodisiac. By the 16th century, *Mummiā vera* was the most sought-after drug throughout the Europe in elite class. Even in the early 19th century, it was a fashion in the Europe to hold dinner parties and guests were entertained by the unwrapping of an authentic Egyptian mummy. The *mummiā* as a medicine could be ordered from the catalogue of the Merck pharmaceutical company as late as 1908 (Ruiz, 2001; Gorini, 2005).

The usage of the term “*mummiā*” to denote mummies, and the original application of the mineral bitumen, can be comprehended as follows:

The earliest use of asphalt/bitumen dates back to the fifth millennium BC in the early Indus Valley sites like Mehrgarh and Mohenjo-daro for waterproofing and as an adhesive for construction of a great bath and to line baskets used for gathering crops (McIntosh, 2008). The word “asphalt” has been derived from the Greek word “asphaltos”, which means to make secure, in reference to its binding activity. In Persian language, asphalt is known as “*Momiyā*”, which is likely related to its use in mummification. The word *Momia* was primarily used for wax but later the Arabs used this word for natural bitumen of Dead Sea and to the “bitumen” with which mummies were embalmed in Egypt (Rpp, 2009; Dawson, 1927).

The problem arose due to confusion between naturally occurring minerals, i.e. *asphalt/bitumen*, with the substances found on or in the embalmed bodies of the ancient Egyptians. In the twelfth century, Italian translator of scientific books from

Arabic into Latin Gerard of Cremona (1114–1187 AD) translated the works of the Baghdad physician Rhazes (d. 923) and defined *mumia* as a substance similar to pitch produced by embalmed bodies. Since then, it was assumed that the substances used to embalm ancient Egyptian bodies had medicinal value. It was a short step towards using mummy as a drug. The word *mumia* then became double in meaning, referring both to the natural bitumen and to the dark substance found on these ancient Egyptian mummies. This misinterpretation led to substitution of bitumen with blackened flesh of the entire mummy. Further, genuine mummies were also substituted by desiccated or dried bodies of human travellers or even with dead animals found in deserts due to high demand and higher price of genuine mummies (Elliott *et al.*, 2017). It is also said that shortly after the crusades (12th–13th centuries) the use of mummies as a medicinal tool was introduced in the Europe by the Arabs. The mummies were dug out of the tomb and ground into powder, balms and ointments and exported to the Europe from Egypt (Gorini, 2005).

After the sixteenth century, many argued that eating mummies as a drug is superstition and a gradual rejection of mummies as a medicinal tool took place. Initially, the use of *mummy* as medicine was criticized by a French military surgeon, Ambrosio Pare (1510-1590). His criticism was based upon experiences shared by Gui de la Fontaine, doctor of the king from Navarra who gained it during travel to Alexandria in 1564. There he saw that a Jew dealing with mummies confessed that the bodies used as mummies were not older than four years. This adulteration was done due to increased demand. As soon as it was proved during the renaissance that translating mineral pitch (bituminous *mumia*) as mummy was a mistake, physicians stopped using mummy as a drug (Veiga, 2009).

Stories related to healing effect of *Momiyā`ī* in literature

In his book, Al-Beruni recounted a story narrated by a Turkoman who had served the Shah of Khwarazm. The story detailed the healing properties of *Momiyā`ī* in treating bone fractures. Once, the supervisor of the watchmen who looked after the falcons broke the wing of the falcon especially beloved of the Shah. Khwarazm Shah was furious at this and ordered the leg of the supervisor to be maimed. The executioner lashed at the ankle of the supervisor so hard that the whole bone broke into fragments and his instep was joined to the ventral part of the knee. Then the supervisor was taken to Shah. Shah asked his servants to give *Momiyā`ī* to the supervisor. One year later, the supervisor was seen on a horse with a falcon in his hand. But he could not walk naturally and had to use a stick as a prop (Al-Beruni, 1989).

While describing *Momiyā`ī*, Shirazi wrote that ‘during the regime of King Freyduun, a group of soldiers went for hunting in the area of *Dārāb* hills and all of sudden one of them hit an arrow to a male sheep (rams) which pierced through the leg and stuck there. Even after injury, the sheep disappeared from the sight of the soldiers. The same group of soldiers visited the area a week later and saw that the sheep was still alive and wandering with a hanging arrow in the skin. The sheep was grazing in a manner that no injury had taken place. The group was surprised to see it and they grabbed the sheep and examined the injured area and found that there was a material stuck in and around the wound. The sheep would have rubbed the injured area in a place where *Momiyā`ī* was present. The *Momiyā`ī* would have healed the wound. When this news reached King Freyduun, he ordered the physicians to experiment with the material. They found that it was useful in healing wounds and fractures.

Some say that one day King Freyduun himself went for hunting and hit an arrow to a deer which pierced across the leg area. Then he hit another arrow in the leg and the deer walked stumbly. He followed the deer. The injured deer reached near a pit and licked a material several times and also rubbed the injured area on this material and after getting relief the deer ran away before Freyduun reached there. The king was surprised and called physicians there and narrated the story. After examination of the area, it was found that a resinous material oozed out from slits of mountains was present near pit. The deer had rubbed that material. Further, seeing the healing property of the material, the king ordered to cordon off the area and security personnel were deployed there to collect the material and present it in the palace of the King (Shirazi, 1875a).

Genesis of *Momiyā`ī*

Researchers hypothesize that *Momiyā`ī* is decomposed plant material or plant organisms, with the decomposition occurring over centuries. Various plant species or organisms, such as *Euphorbia royleana*, *Trifolium repens*, *Asterella*, *Dumortiera*, *Marchantia*, *Pellia*, *Plagiochasma*, *Stephenrencella-Anthoceros*, and molds such as *Barbula*, *Fissidens*, *Minium*, and *Thuidium*, are considered responsible for the genesis of *Momiyā`ī* (Carrasco-Gallardo, 2012). According to its origin, *Momiyā`ī* is categorized into three types:

Petroleum Mumie: Formed from the transformation of deep petroleum products in mountains.

Plant Mumie (Mumie-asil): Formed from the long-term humification of *Euphorbia*, *Trifolium* (clover) plants, and lichen.

Mumie-kiem: Formed from the long-term humification of guano (feces) of alpine rodents, particularly the rock vole *Alticola strelzow* (Schepetkin, 2002).

How to test genuineness of *Momiyā`ī*: Dissolve *Momiyā`ī* in *Rowghan Adhārāqī* (*Nux vomica* oil), take the liver of sacrificed goat and cut it while still hot. Apply this oil to the cut area of the liver, if the damaged area heals, it is presumed that *Momiyā`ī* is genuine, otherwise it is considered adulterated. According to another method, break the leg of an old hen so that the broken ends are symmetrical. Dissolve ½ g of *Momiyā`ī* in rose oil and put some drops of the solution in the mouth of the hen and apply some to the broken area. If the broken ends heal within 24 hrs, the *Momiyā`ī* is considered genuine or pure; otherwise, it is adulterated. Additionally, pure *Momiyā`ī*, if taken in hands, becomes soft like a wax (Al-Beruni, 1989; Shirazi, 1875b; Khan, 2018).

Temperament: *Momiyā`ī* is characterized as hot and dry, and according to Ibn Sina, it is hot and dry in the third degree (Ibn Sina, 1998; Ibn Hubal, 2005; Khan, 2018; Ghani, 2010; Al-Harawi, 2022).

Actions: As per Unani literature, it is *Mufarriḥ* (exhilarant), *Muqawwī-i-Qalb* (cardiac tonic), *Muqawwī-i-Bāh* (aphrodisiac), *Muqawwī-i-A`dā` Zāhira wa Bāṭina* (Tonic to external and internal organs), *Jālī* (detergent), *Muḥallil Mawād Bārida* (resolvent to cold causing substance), *Mujaffif-i-Ruṭūbat* (desiccant), *Musakkīn-i-Alam* (analgesic) and *Dāfi` Amrād Balghamiya* (anti-phlegmatic diseases) (Ibn Sina, 1998; Ibn Hubal, 2005; Shirazi, 1875b; Khan, 2018; Ghani, 2010; Razi, 1991)

Therapeutic Uses

Wound healing property: It reduces wound inflammation and accelerates healing. Local application of *Momiyā`ī* is effective for relief from pain and early tissue repair in case of nerve or muscle tearing. Local application of an ointment made by melting 500 mg *Momiyā`ī* and 3.5 g pig fat in olive oil is effective in healing ulcerated chronic wounds. Local application as well as oral intake of a paste made by dissolving *Momiyā`ī* in rose oil or sesame oil is beneficial in healing internal and external injuries caused by arrow. A mixture of *Gil-i-Makhtūm* (Terra sigillata) and *Momiyā`ī* is an effective wound healer and a useful remedy for repair of duodenal ulcer and intestinal erosive ulcers (Ibn Sina, 1998; Ibn Hubal, 2005; Shirazi, 1875b; Khan, 2018; Ghani, 2010; Shahriari, 2018).

Joints and bone ailments (fracture and dislocation): Local application of *Momiyā`ī* dissolved in rose oil or in any other suitable oil is beneficial in painful conditions associated with dislocation, fracture, injury and fall. It prevents post-trauma inflammation, swelling and accelerates scar healing. In cases of fracture of extremities, local application as poultice improves healing process and alleviates pain. Oral intake of *Momiyā`ī* in the dose of 500–750 mg along with juice of broad bean or 2–3 egg yellow is a proper remedy for joint dislocation, pain and ankle sprain (Ibn Sina, 1998; Ibn Hubal, 2005; Shirazi, 1875b; Khan, 2018; Ghani, 2010; Shahriari, 2018).

Central nervous system ailments: Snuffing of 125 mg *Momiyā`ī* with the water of *Marzanjosh* (sweet marjoram) is useful in migraine, cold headache, epilepsy, giddiness and vertigo. Oral intake of 250 mg *Momiyā`ī* with the decoction of *Ša`tar Fārsī* (*Persian origanum*) is useful in heaviness of the tongue. Oral intake of 64 mg of *Momiyā`ī* with decoction of cinnamomum leaves is beneficial in case of hysteria. Snuffing of 32 mg *Momiyā`ī* along with 32 mg *Jund Bedastar* (castoreum) and oil of *Bān* (Persian lilac) is useful in helmet headache and chronic headache. Oral intake of 208 mg *Momiyā`ī* with decoction of *Ša`tar Fārsī* (*Persian origanum*) is useful in cold induced tremors of old ages. Oral use and local application as liniment are useful in paralysis and facial palsy (Ibn Sina, 1998; Ibn Hubal, 2005; Shirazi, 1875b; Khan, 2018; Ghani, 2010; Shahriari, 2018).

Cardiopulmonary ailments: It boosts heart potency. Oral use of *Momiyā`ī* in the dose of 250 mg with cumin, *Ajwā`in* and caraway is useful in cases of palpitation. Oral intake of 60 mg *Momiyā`ī* with the water of *Unnāb* (*Ziziphus vulgaris*), barley water and *Sapistān* (*Cordia myxa*) for three consecutive days on empty stomach is a remedy for cough. *Momiyā`ī* in the dose of 180 mg with *Nabīdh Jumhūrī* (non-alcoholic beer) is beneficial in case of haemoptysis and purulent cough. *Momiyā`ī* in a dose of 250 mg with *Sikanjabīn* (oxymel) is used for the treatment of diphtheria. It is a time-tested drug for diphtheria. For diphtheria, gargling of 64 mg *Momiyā`ī* with water of liquorice for three days is also beneficial. Oral intake of 250 mg *Momiyā`ī* with the rob of mulberry or the decoction of lentil is useful in throat pain (Ibn Sina, 1998; Ibn Hubal, 2005; Shirazi, 1875b; Khan, 2018; Ghani, 2010; Shahriari, 2018).

Gastrointestinal ailment: For *Du`f-i-Mi`da* (weakness of stomach), oral intake of 250 mg with the water of *Zīra Sabz* (*Cuminum cyminum*), *Zīra Siyāh* (*Carum carvi*) and *Ajwā`in* (*Trachyspermum ammi*) is beneficial. For phlegmatic nausea and injuries in chest, stomach and liver caused by fall, its oral use in a dose of 250 mg with 12 g of Armenian clay, 6 g of *Za`frān* (*Crocus sativus*) in the water of *Mako* (*Solanum nigrum*) or *Khiyārshambar* (*Cassia fistula*) is beneficial. For hiccups, *Momiyā`ī* soaked in

decoction of *Ajmūd* (*Apium graveolens*) seed is beneficial. For halitosis, *Momiyā'ī* with *Mā' al-'Asal* (honey water) is beneficial. For spleen diseases such as splenic pain or splenomegaly, *Momiyā'ī* in a dose of 250 mg with *Ajmūd* (*Apium graveolens*) juice is beneficial. For nausea, flatulence of stomach and intestine, *Momiyā'ī* soaked in decoction of *Trachyspermum ammi*, *Cuminum cyminum* and *Carum carvi* is beneficial. For oedema due to liver disease, local application of a poultice prepared with 250 mg of *Momiyā'ī* dissolved in decoction of *Afīmūn* (*Cuscuta reflexa*) is beneficial. Use of 64 mg of *Momiyā'ī* with clarified butter of cow once a week is beneficial in cases of non-bleeding piles and stomach ache (Ibn Sina, 1998; Ibn Hubal, 2005; Shirazi, 1875b; Khan, 2018; Ghani, 2010; Shahriari, 2018).

Genitourinary ailments: For male sexual stimulation, local application of *Momiyā'ī* with coconut oil on penis and adjoining area along with oral intake of 64 mg *Momiyā'ī* with water of broad bean or 32 mg *Momiyā'ī* with yellow of half boiled hen egg for consecutive three days is beneficial. According to Razi, oral intake of 60 mg of *Momiyā'ī* dissolved in 17.5 g white honey just before ejaculation is beneficial for regaining seminal fluid.

Individuals of hot temperament should take it with suitable syrups. In cases of ulcers of the meatus and bladder, it is taken orally with milk in a dose of 250 mg. Application of a suppository prepared from a small quantity of *Momiyā'ī* together with flour helps in bearing pain caused by retention of urine and dribbling of urine. Application of suppository prepared with olive oil is helpful in cases of dribbling of urine, atony of anal sphincter and incontinence of urine.

Ear ailments: Instilling as a drop prepared with jasmine (oil) is useful in ear-ache. Application of a suppository prepared with 62 mg of *Momiyā'ī*, rose oil and juice of unripe grapes is useful in cases of pus in the ear (Ibn Sina, 1998; Ibn Hubal, 2005; Shirazi, 1875b; Khan, 2018; Ghani, 2010; Shahriari, 2018).

Poisoning: Oral intake in a dose of 250 mg with the decoction of caltrops and asafoetida is beneficial in poisoning. Local application of 250 mg with pure wine or cow's butter on the affected part is effective in scorpion bite (Ibn Sina, 1998; Ibn Hubal, 2005; Shirazi, 1875b; Khan, 2018; Ghani, 2010; Shahriari, 2018).

Miscellaneous use: Oral intake of 250 mg *Momiyā'ī* with decoction of *Afīmūn* (*Cuscuta reflexa*) is beneficial in leprosy, vitiligo, melasma and elephantiasis stage 1. Oral intake of 250 mg *Momiyā'ī* with decoction of absinthium is beneficial in phlegmatic, melancholic and chronic fevers (Ibn Sina, 1998; Ibn Hubal, 2005; Shirazi, 1875b; Khan, 2018; Ghani, 2010; Shahriari, 2018).

Adverse action: According to Unani literature, *Momiyā'ī* can produce adverse effects on the spleen (Khan, 2018; Ghani, 2010)

Correctives: To counter adverse effects of *Momiyā'ī*, *Mā' al-Uşūl* (water of roots) has been recommended by scholars (Khan, 2018; Ghani, 2010).

Purification: Dissolve *Momiyā'ī* in a vessel containing fresh water and stir well. After sometime, impurities like stone particles, etc. settle down at the bottom of the vessel. Decant the dissolved *Momiyā'ī* into an earthen pot without disturbing the sediment. Repeat the process till some impurities remain in the solution. Keep the pot in the sun till the solution becomes a viscous mass (Anonymous, 2006).

Physical properties and chemical composition: *Momiyā'ī* is soluble in water, and about 30–50% of its ingredients moves into the liquid phase and the sediment includes mineral and plant residues. The solubility of *Momiyā'ī* in water depends on the purity of the sample (Barouji, 2020).

Extensive research has been carried out to find out the chemical composition of *Momiyā'ī*. Basically, *Momiyā'ī* has 60–80% organic, 20–40% inorganic compounds and trace elements (Fe, Ca, Cu, Zn, Mg, Mn, Mo, P). The organic compound includes benzoic acid, hippuric acid, fatty acid, resin and waxy materials, gums and albuminoids. Major constituents of *Momiyā'ī* responsible for physiological actions are bioactive dibenzo alpha-pyrones along with humic and fulvic acids (Bariuji, 2020; Agarwal, 2007).

The chemical composition of *Momiyā'ī* varies according to the region of the production, plant-species, geological nature of the rock and soil, local temperature, humidity, and altitude, etc. A study found that *Momiyā'ī* obtained from the Kumaon region of India contains a higher percentage of fulvic acids (21.4%) in comparison to *Momiyā'ī* obtained from Nepal (15.4%), Pakistan (15.5%) and Russia (19.0%), while bioactive low molecular compounds were found in high quantities in Nepal origin *Momiyā'ī*. The pH of 1% aqueous solution of *Momiyā'ī* also varies according to its place of origin, e.g. Indian (Kumaon) sample – 6.2, Nepal (Dolpa) – 7.5, Pakistan (Peshawar) – 6.8 and Russia (Tien-Shan) – 8.2. Similarly, humic constituents in all samples obtained from these countries also vary (Agarwal, 2007).

Konstantinov *et al.* conducted a study on four pharmaceutical mumijo preparations from Altai mountains (Russia), Himalayas (India), Tian Shan (Kyrgyzstan), and Dzungarian Alatau (Kazakhstan) to know their molecular composition using size-exclusion chromatography (SEC), Fourier transform ion cyclotron resonance mass spectrometry (FTICR MS), and ¹H and ¹³C NMR spectroscopy. It was concluded that all the samples had two principal components. The first one is of fulvic nature, and the second represents a range of vegetative and animal metabolites (Konstantinov *et al.*, 2013). An inorganic analysis of Afghani and Pakistani origin *Momiyā'ī* samples through energy dispersive X-ray fluorescence (ED-XRF) revealed that Afghani *Momiyā'ī* sample contained calcium (50.298%), sulfur (21.299%), potassium (17.194%) and chlorine (8.405%) while the Pakistani *Momiyā'ī* had potassium (24.309%), calcium (20.933%), chlorine (18.614%), and silicon (15.197%) (Al-Salman, 2020).

A study conducted to know the chemical composition of a mumijo (-related) product collected from a fossil deposit of Antarctica revealed that the composition of the tested sample was almost similar to other samples previously analyzed. The sample was found to contain mainly wax esters (70% wt), with considerable amounts of free fatty acids (20% wt). Triglycerides and/or diglycerides were not detected in the tested sample, while previously examined oil samples were found to contain triglycerides. This difference might be a consequence of slow lipolysis in an age-old sample (Aiello *et al.*, 2011).

Active constituents of *Momiyā'ī* and their mechanism of action: The dibenzo- α -pyrones (DBP's), DBP chromoproteins (DCP's), fulvic acid, and various polymeric forms of fulvic acid are considered responsible for physiological and pharmacological actions of *Momiyā'ī* (Stohs *et al.*, 2014). As a carrier molecule, fulvic acid facilitates the transportation of nutrients into the deep tissues in humans and removes deep-

seated toxins from the body. Fulvic acid also facilitates iron absorption into the body and stimulates haemoglobin formation in the body. It maintains the equilibrium of catabolism and anabolism and stimulates the immune system in the body. *Momiyā`ī* promotes energy production in the body (Meena *et al.*, 2010).

Safety and toxicity studies of *Momiyā`ī*: Various studies have been reported to rule out its toxic effects on animals and humans in different dose levels.

Preclinical and clinical studies: In repeated dose of 200 mg/kg to 5000 mg/kg for more than 90 days (sub-chronic toxicity study), the drug caused no adverse effects on the heart, liver, kidneys, blood cells, or nervous and endocrine systems and even embryotoxic or teratogenic effects in pregnant rats were not observed and no histological changes were found in any organ (Anisimov *et al.*, 1982; Velmurugan *et al.*, 2012). There were no significant differences from the baseline to end of the study in glucose, urea, creatinine, uric acid, total protein, albumin, albumin/globulin ratio, alkaline phosphatase, SGPT, or SGOT in clinical safety trial of *Silājīṭ* in the dose of 2 g/day for 45 days (Sharma *et al.*, 2003). Similarly, no difference in the parameters of male subjects was found in the dose of 200 mg/day in a 90-day study (Biswas *et al.*, 2010).

Studies related to healing activity of *Momiyā`ī*: In Unani Medicine, it is used to heal the various types of wounds including bone fracture. This claim has been established by preclinical and clinical studies.

Preclinical studies: Mummy (*Momiyā`ī*) showed significant wound healing property as topical medicine in six fold cutaneous wound in rabbit compared to control group (Kheirandish *et al.*, 1970). At a dose of 100 mg/kg orally twice a day in rats, *Silājīṭ* (*Momiyā`ī*) exhibited antiulcerogenic activity as it decreased the gastric ulcer index and increased the carbohydrate/protein ratio, indicating an increased mucosal barrier. The anti-ulcerogenic effect of *Silājīṭ* is due to the presence of fulvic acids and biphenyls as they protect the gastrointestinal mucosa with less shedding of mucosal cells (Stohs, 2014). In a study conducted on rats, Mumijo (*Momiyā`ī*) extract in the dose of 100 mg/kg/daily exhibited potent antiulcer activity and this activity may be due to reduction in gastric acid secretion and pepsin levels (Shahrokhi *et al.*, 2015). Incidence of gastric ulcer is reported to be high in oxidative stress and inflammatory conditions. Antiinflammatory and antioxidant activities exhibited by *Momiyā`ī* may be responsible for its antiulcerogenic effect (Barouji *et al.*, 2020). *Silājīṭ* (*Momiyā`ī*) also showed faster healing effects in burn wound in rats compared to Silver sulfadiazine ointment (Pordeli *et al.*, 2018).

It was observed that histopathologic scores of destructive damages and synovitis were significantly reduced in the treated group in comparison to the control group osteoarthritis induced by injection of monosodium iodoacetate in the articular space of femorotibial joint in rats (Azizi *et al.*, 2018).

Clinical studies: In a controlled clinical trial on patients of femoral and tibial bone fracture, it was found that *Momiyā`ī* significantly reduced the healing time of tibial fracture in comparison to the control group (Dehghan *et al.*, 2012). In a randomised, placebo-controlled clinical trial, *Momiyā`ī* showed prominent healing effect in the test group than the control group (Moghadari *et al.*, 2018).

Other reported studies

Preclinical studies

Nephroprotective activity: *Momiyā 'ī* in the dose of 500 mg/kg and 1000 mg/kg along with Vit E significantly reduced nephrotoxic effects in rats in terms of reduction in serum creatinine, blood urea nitrogen (BUN), albumin, electrolytes, malondialdehyde (MDA) and histological changes in nephrotoxicity induced by gentamicin in rats via inhibition of lipid peroxidation (Namjoo *et al.*, 2016).

Anticancer activity: In an *in-vitro* study, the effect of mumio on urinary bladder cancer cells (T24 and 5637) in comparison to normal uroepithelial cells (SV-HUC1) was observed. It was concluded that mumio was more cytotoxic to urinary bladder cancer cells than to normal cells (Kloskowski *et al.*, 2021).

Antidiabetic activity: In various studies conducted on rats/mice, *Silājīt* alone or in combination with other drugs showed significant anti-diabetic activity (Bhattacharya, 1995; Trivedi *et al.*, 2004).

Antistress activity: In a study conducted on albino mice, *Silājīt* produced a statistically significant improvement in forced swimming induced immobility (Ghosal *et al.*, 1991).

Spermatogenic and ovogenic activity: Administration of *Silājīt* daily for 6 weeks in rats exhibited a significant increase in sperm count in male rats and increased ovulation in female rats, showing its spermatogenic and ovogenic effect (Park *et al.*, 2006).

Immunomodulatory activity: Immunomodulatory effect of *Silājīt* was studied in mice and it was found that white blood cell activity was increased by *Silājīt* extract (Bhaumik *et al.*, 1993). In another study, *Silājīt* at a dose of 25 and 50 mg/kg i.p. for 5 days significantly changed the level of neurotransmitter (reduced 5-hydroxy tryptamine, 5-hydroxy indole acetic acid and increased the level of dopamine, noradrenaline) in rat brain. These changed levels of neurotransmitter mimics increased humoral (immune) activity (Ghosal, 1990).

Antiepileptic and antipsychotic activity: In an experimental study conducted on rats and mice, *Silājīt* in doses of 25 and 50 mg/kg, p.o. once a day for 15 days significantly inhibited seizures induced by MES, INH and PTZ in a dose dependent manner. Moreover, use of *Silājīt* augmented brain GABA levels to normal, decreased by INH and PTZ in mice brain. It was concluded that *Silājīt* showed significant antiepileptic and antipsychotic activity in rodents (Durg *et al.*, 2015).

Clinical studies

Anti-hyperlipidemic activity: In a double-blind, placebo-controlled study, processed *Silājīt* (*Momiyā 'ī*) in the dose of 2 g per day for 45 days exhibited a significant decrease in serum cholesterol, LDL, VLDL, and triglycerides in comparison to the placebo group (Sharma *et al.*, 2003).

Spermatogenic activity: In a clinical study, oral intake of capsule containing 100 mg processed *Silājīt* twice a day for 90 days in oligospermic male subjects showed significant increases in normal (18.9%) and total (61.4%) sperm count and sperm motility (12.4–17.4%) (Biswas *et al.*, 2010).

Anti-AIDS activity: In a clinical study conducted on AIDS patients, administration of a multi-component natural product-formulation having *Silājūt* for 6 months showed positive signs of improvement. Their CD4 and CD8 cell counts were increased (Ghosal, 2006).

Important formulations: Some important classical Unani formulations having *Momiyā`ī/Silājūt* as an ingredient mentioned in the National Formulary of Unani Medicine are as follows: *Ḥabb `Ambar Momiyā`ī*, *Ḥabb Momiyā`ī Sāda*, *Jawāhir Mohra* (Anonymous, 2006), *Ḥabb Luknat*, *Ḥabb Suzāk Muzmin*, *Ma`jūn Reg Māhī* (Anonymous, 2007), *Ma`jūn Murawwiḥ al-Arwāh*, *Ma`jūn Momiyā`ī*, *Sharbat Silājūt* (Anonymous, 2008), *Ḥabb Muqawwī Khāṣ*, *Ḥabb Mumsik Jadīd*, *Ḥabb Nishāt Jadīd*, *Labūb Kabīr Khāṣ*, *Imsākīn*, *Ma`jūn Nishāt Angez*, *Muqawwī Mumsik*, *Shabābī* (Anonymous, 2011).

Conclusion

Momiyā`ī has been used to treat various ailments including wound healing, nerve disorders such as epilepsy, headache, gastrointestinal disorders and genitourinary disorders since ancient times (Ibn Sina, 1998; Ibn Hubal, 2005; Shirazi, 1975a, 1975b; Ghani, 2010). From above review, it can be concluded that *Momiyā`ī* is a mineral origin drug and the use of Egyptian mummy in place of *Momiyā`ī* during 12th to 17th centuries was a mistake due to misinterpretation of literature. Many of the beneficial effects mentioned in Unani literature for curing different ailments have been validated scientifically (Barouji *et al.*, 2020; Stohs *et al.*, 2014; Kheirandesh *et al.*, 1970; Shahrokhi *et al.*, 2015; Pordeli *et al.*, 2018; Azizi, 2018; Dehghan *et al.*, 2012; Sadeghi *et al.*, 2020; Moghadari *et al.*, 2018; Namjoo *et al.*, 2016; Kloskowski *et al.*, 2021; Bhattacharya *et al.*, 1995; Trivedi *et al.*, 2004; Ghosal *et al.*, 1991; Park *et al.*, 2006; Bhaumik *et al.*, 1993; Ghosal *et al.*, 1990; Durg *et al.*, 2015; Ghosal *et al.*, 2006). Unani drugs and regimens showed beneficial results in dyslipidaemia (Azhar *et al.*, 2020a, 2020b, 2021), skin ailments (Azhar *et al.*, 2020c, 2020d; Azhar & Ahmad, 2021; Ahmad *et al.*, 2021), nephro-protection and hepato-protection (Azhar *et al.*, 2004, 2005, 2008; Alam *et al.*, 2005; Javaid *et al.*, 2012; Akhtar *et al.*, 2020a, 2020b, 2021; Azhar, 2018; Azhar *et al.*, 2019, 2023) and arthritis (Ishtiyaq *et al.*, 2014). Even one study exhibited anticancer potential of *Momiyā`ī* in urinary bladder cell line. In the last few years, scholars of Unani Medicine have presented many research papers on various topics especially on Unani drugs. A careful review of these articles reveals that these drugs have the potential to cure various diseases. That's why many researchers have changed these medicines according to today's needs and made the world recognize the beneficial effects of the drugs (Husain *et al.*, 2017). To cure/manage various ailments, scientists around the globe are looking for alternatives from traditional medicines. To fill the gap, the claim of Unani physicians for different illnesses may be explored in terms of experimental and clinical studies.

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मोमियाई या शिलाजीत (पिसास्फाल्ट), यूनानी चिकित्सा की एक अनोखी उपचारात्मक दवा: एक समीक्षा

मुस्तेहसन, मिसबहुद्दीन अज़हर

सारांश

मोमिया एक प्राकृतिक चिपचिपा पदार्थ है, जो पेट्रोलियम हाइड्रोकार्बन ऑक्सीकरण में इसकी उत्पत्ति के कारण सिंथेटिक कोल टार से अलग है। इसे डामर, बिटुमेन, शिलाजीत आदि के नाम से भी जाना जाता है, और यह अफगानिस्तान और तिब्बत जैसे पहाड़ी क्षेत्रों में पाया जाता है।

ऐतिहासिक रूप से इसे यूरोप में मिस्र की ममी के रूप में गलत तरीके से समझा गया था और विभिन्न उपचारों के लिए उपयोग किया गया। इसकी संरचना में डाइबेंज़ो- α -पाइरोन (DBPs) और फुल्विक एसिड जैसे सक्रिय यौगिक शामिल हैं, जो इसके शारीरिक प्रभावों में योगदान करते हैं।

हब्ब-ए-अंबर मोमियाई एक लोकप्रिय यूनानी औषधीय मिश्रण है जिसका व्यापक रूप से कामोत्तेजक के रूप में प्रयोग किया जाता है। विष विज्ञान संबंधी अध्ययन मानव उपभोग के लिए इसकी सुरक्षा की पुष्टि करते हैं। प्रीक्लिनिकल और क्लिनिकल शोध इसकी चिकित्सीय प्रभावकारिता पर प्रकाश डालते हैं, जिसमें संभावित कैंसर विरोधी गुण शामिल हैं। प्रीक्लिनिकल और नैदानिक शोध इसके उपचारात्मक प्रभावों को उजागर करते हैं, जिसमें संभावित एंटी-कैंसर गुण भी शामिल हैं। इस समीक्षा में इसके ऐतिहासिक उपचारात्मक उपयोग, चिकित्सीय अनुप्रयोग, रासायनिक संरचना और सुरक्षा प्रोफाइल की खोज की गई है।

कुंजीशब्द: मोमियाई, पिसास्फाल्ट, फुल्विक एसिड, *क्रफ़ अल-यहूद*, यूनानी चिकित्सा, शिलाजीत।

Potential role of *Khamīrah-i-Banafsha* in outbreaks of respiratory illnesses: A critical review

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Abstract

The 21st century has been marked by influenza outbreaks spurred by three novel coronaviruses. The global community has been grappled with Covid-19, triggered by SARS-CoV-2, for over two years. Against this backdrop, herbal and traditional medicines have gained increasing attention for their potential therapeutic properties. *Viola odorata* L., a medicinal herb found across Asia, Europe, and North America, features prominently in Unani, Persian, and Iranian medicine for its touted anti-tussive, anti-pyretic, cognitive enhancement, and laxative properties. *Khamīrah-i-Banafsha*, a compound formulation derived from *V. odorata* flowers, enjoys widespread recommendation in Unani Medicine for respiratory and febrile ailments. Recent research has unveiled numerous phytoconstituents within *V. odorata*, exhibiting potent anti-inflammatory, anti-pyretic, antimicrobial, antihypertensive, and antidepressant activities. Notably, adverse effects associated with the use of *V. odorata* and its derivatives or extracts are practically nonexistent. Thus, based on a review of the literature, *Khamīrah-i-Banafsha* emerges as a promising candidate for managing respiratory infections, offering potential in both prevention and treatment of complications.

Keywords: *Banafsha*, *V. odorata*, Covid-19, Respiratory, Anti-pyretic.

Abbreviations: RCT: Randomised Controlled Trial; QoL: Quality of Life; OCD: Obsessive-Compulsive Disorder; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus-2

Introduction

The advent of the 21st century has seen unprecedented outbreaks of three different coronaviruses which have wreaked havoc across the globe (Nikhat & Fazil, 2020). The most recent is the Covid-19, caused by SARS-CoV-2, which shows little signs of receding in many parts of the world despite more than a year of extensive containment and other precautionary measures (Mishra & Tripathi, 2021). During most epidemics, certain physical and psychological disturbances are almost always associated in the patients, attendants or even those who are un-affected, for prolonged periods of time even after recovery. This holds true for the Covid-19 pandemic as well. Many patients persistently demonstrate symptoms like fatigue, alteration or loss of taste and smell, cough, arthralgia, etc. In addition, psychiatric and neurological disorders like post-traumatic stress disorder, depression, convulsive seizures, headache, dizziness, etc., have been observed in a significant number of patients after recovery from acute Covid-19 (Sher, 2021).

On the brighter side, however, scientists have developed an extensive understanding of the biological, pathological and clinical characteristics of the disease, which has been helpful in the development of potentially effective vaccines and drugs against Covid-19, including some useful compounds derived from herbal drugs such as *Tinospora sinensis* (Lour.) Merr. (Mishra & Tripathi, 2021). The experience of the previous decade has also reinforced the intuition that despite extensive developments in antibiotics, vaccines, and measures of sanitization, Covid-19 is not likely to be the last pandemic to affect human beings (Fazil & Nikhat, 2020b). In this scenario, there is a need to look beyond the conventional therapeutic measures, and to search for drugs and regimens which offer a more holistic approach and enhance natural protective mechanisms of the body.

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In Covid-19, various pharmacological studies on traditional medicines, particularly herbal drugs have demonstrated convincing evidence of specific anti-viral activity. In addition, natural drugs are well-tolerated, with an excellent safety profile in most cases, and offer several additional benefits due to the presence of numerous active constituents (Silveira *et al.*, 2020).

Khamīra is a type of semi-solid preparation (electuary) extensively used in Unani Medicine, also known as Persian medicine and Greco-Arabian medicine. For preparing *Khamīra*, the decoction or powder of drugs is added to sugar syrup. The mixture is then subjected to vigorous mixing till it acquires a white fermented appearance (Fazil & Nikhat, 2020a; Kabiruddin, 1937). Since *Khamīra* is mostly used as cardiogenic, exhilarant and vital organ tonic, they contain aromatic drugs saffron, musk, etc., which are added after the mixing process so that their volatile constituents may be preserved. Historically, *Khamīra* is believed to have been formulated on the behest of Mughal emperors who detested bad-tasting drugs due to their sophisticated nature. The nomenclature of *Khamīra* is generally done on the basis of its principle ingredient (Hameed, 1971). *Khamīra-i-Marwārīd*, *Khamīra-i-Abresham Ḥakīm Arshad Wālā*, *Khamīra-i-Abresham ‘Ūd Maṣṭagī Wālā*, and *Khamīrah-i-Khāṣ* are some of the important *Khamīra* used in Unani Medicine (Ahmad *et al.*, 2010). In this manuscript, we explore the potential pharmacological benefits of *Khamīra-i-Banafsha*, an important *Khamīra* formulation, in outbreaks of respiratory diseases.

Methodology

Important classical textbooks of Unani Medicine like *Zakhīra Khwārizm Shāhī*, *Al-Qānūn fi'l-Ṭib*, various *Qarābādīn* (compendium of drug formulations), etc., as well as government documents such as National Formulary of Unani Medicine (Published by Ministry of Health and Family Welfare, Government of India) were explored for information on *Khamīra-i-Banafsha*, its preparation and therapeutic importance. The characteristics, uses and benefits of *Banafsha* (*Viola odorata* L.), its principal ingredient, were also explored in these books. We also studied the pharmacological activities of *Banafsha* in respiratory illnesses on scientific websites such as Scopus, Medline, PubMed, and Springer, restricted to studies published in the last 10 years (2011-2021). The keywords used for the search were ‘*Viola odorata*’, ‘respiratory diseases’, ‘clinical study’, ‘cough’, etc. A total of 198 studies were found, of which 11 were included in the present study after exclusion (detailed in Fig. 1).

Khamīra-i-Banafsha

Khamīra-i-Banafsha is an important formulation of Unani Medicine which is prescribed for most kinds of respiratory illnesses including cough, catarrh, bronchial asthma, and also febrile diseases. In addition, it has a laxative action and also revitalizes the brain (Hameed, 1971). It also helps in expulsion of phlegm from the respiratory tract. *Khamīra-i-Banafsha* is based on only one principal ingredient, *Gul-i-Banafsha* (flowers of *Viola odorata* L.). For preparation, *Gul-i-Banafsha* (200 g) is soaked in water (3 litres) overnight. Next morning, it is boiled till the water is reduced to one-third. After that, sugar (1.6 kg) is added and cooked till it acquires a syrupy consistency. Then the *Khamīra* is removed from the flame and subjected to the usual vigorous mixing till it acquires an almond-like colour. It should be then preserved in a glass or china-clay vessel. The prescribed dosage is 25-50 g per day mixed in warm water (Dept. of AYUSH, 2006; Hameed, 1971).

Banafsha (Viola odorata L.), the main active ingredient of Khamīra-i-Banafsha

Banafsha (Viola odorata L.) is known in Arabic as *Banafsaj*. As described by Dioscorides (40-90 AD), it is a small plant with pleasant-smelling violet-coloured flowers. It usually grows in shady areas (Baitar, 1985). In *Zakhīra Khwārizm Shāhī* of Ahmad al-Hasan Jurjānī, *Banafsha* and its formulations are prescribed as the drug of choice for dry cough associated with a hot temperament (Jurjani, 1903). According to *Al-Qānūn fi'l-Ṭib* of Ibn Sina (Avicenna, 980-1035 AD), *Banafsha* has a cold and wet temperament in first degree, indicating that it is a mild drug. In sync with Jurjānī, he also hailed *Banafsha* as a potent drug for cough caused by hot temperament. In addition, he states that *Banafsha* helps in loosening of viscid morbid humors in respiratory tract. In both these conditions, he states that the efficacy of *Banafsha* is potentiated if it is added to sugar. In addition, *Banafsha* also relieves gastric inflammation, and acts as a mild diuretic and laxative. It particularly expels *Ṣafrāwī* (bilious) humours through laxative action (Sina, 1992). Ibn Rushd (Averroes, 1126-1198 AD) has described *Banafsha* as a sedative and laxative drug (Nikhat & Fazil, 2015; Rushd, 1987).

Botanical description

Viola odorata L. (Family: Violaceae), commonly known as sweet violet is a herb native to Asia, Europe and North America. In traditional Persian medicine, it is also known as *Banafsheh*, and is widely used therapeutically in respiratory diseases, fever, headache, epilepsy, dyspnoea, and dermatological conditions, etc. (Feyzabadi *et al.*, 2017). Its taxonomical classification is as under:

Kingdom: Plantae

Order: Malpighiales

Family: Violaceae

Genus: *Viola*

Species: *V. odorata*

The plant is evergreen and grows to a height of up to 10 cm. Flowering occurs in late winter. It has a thick stem with scales and heart-shaped leaves with slightly serrated edges. Flowers are deep purple, blue, pinkish and yellow-white. Its aerial parts are used in respiratory diseases in Unani and traditional Persian medicine. In India, it is widely distributed in Kashmir and western Himalayan region up to an altitude of 1500-1800 metres above sea-level (Mittal *et al.*, 2015). Phytochemical studies have revealed the presence of many biologically active glycosides, alkaloids, flavonoids, tannins, cyclotides, and coumarins in *V. odorata* having important therapeutic activities (Karim *et al.*, 2018; Narayani *et al.*, 2018).

Pharmacological studies on *V. odorata* in respiratory illnesses and associated co-morbidities

Numerous pharmacological researches have explored the therapeutic potential of *V. odorata* in respiratory diseases and the co-morbidities associated with them. Herein, *V. odorata* has immense potential as an anti-tussive, anti-pyretic, anti-microbial, and anti-allergic drug, as observed in many laboratory as well as clinical studies. The observations are summarized in Table 1.

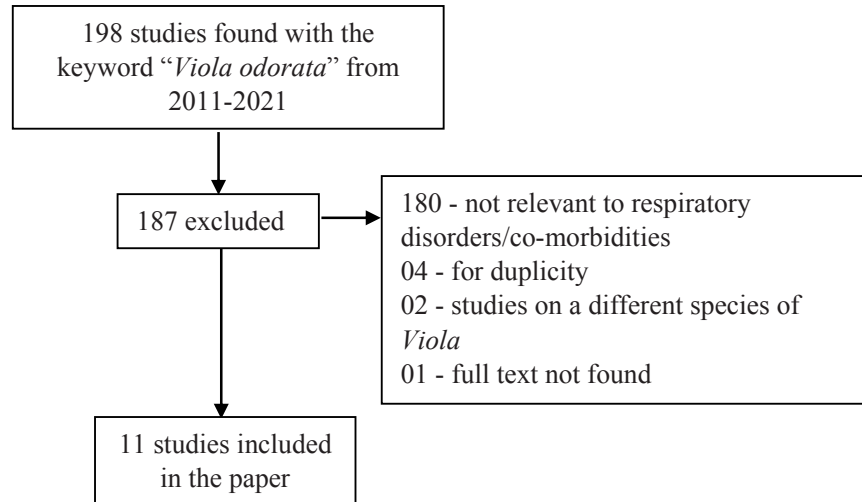


Fig. 1: Flow-diagram depicting the search and selection of studies related to role of *V. odorata* in respiratory diseases

Table 1: Therapeutic role of *V. odorata* in respiratory diseases and associated co-morbidities

S. No.	Condition/ Disease studied	Part; Method of use	Type and duration of study	Findings	Adverse events, if any	References
1.	Allergic rhinitis	Flower oil; instillation of one drop in nostrils 12 hourly	Double-blind, placebo-controlled RCT, 2 weeks	Significant improvement in symptoms, improvement in QoL	None reported	(Yazdi <i>et al.</i> , 2020)
2.	Anti-fungal activity against <i>Fusarium graminearum</i>	Peptides isolated from aerial parts of <i>V. odorata</i>	<i>In-vitro</i>	Inhibition of <i>F. graminearum</i> caused by cycloviolacin O8	None reported	(Parsley <i>et al.</i> , 2018)
3.	Fever in neutropenic children	Oil, local application of 20 drops on peripheral margins of umbilicus	Placebo-controlled RCT	Reduced temperature after 30 minutes of oil application (p=0.005)	None reported	(Tafazoli <i>et al.</i> , 2019)
4.	Dry cough in asthmatic children (2–12 years)	2.5-5 cc of syrup/ placebo thrice a day	Double-blind, placebo-controlled RCT, 5 days of therapy	50-100% reduction in cough and wheezing (p<0.001)	None reported	(Qasemzadeh <i>et al.</i> , 2015)

5.	Insomnia associated with depression and obsessive-compulsive disorder (OCD)	5 ml <i>V. odorata</i> syrup/ placebo 12 hourly	Double-blind, placebo-controlled RCT, add-on therapy, 4 weeks	Significant improvement in symptoms of insomnia, depression (p=0.009) and OCD (p=0.001)	None reported	(Shayesteh <i>et al.</i> , 2020)
6.	Animal models of hepatic and vascular dysfunction	Leaf extract of <i>V. odorata</i> and seed extract of <i>W. tingtoria</i> (300 and 600 mg /kg)	High-fat diet rat model	Reduction in biomarkers of hepatic and vascular dysfunction	None reported	(Jamshed <i>et al.</i> , 2019)
7.	Rat pheochromocytoma cell line exposed to serum/ glucose deprivation	<i>V. odorata</i> hydroalcoholic extracts	<i>In-vivo</i>	Significant increase in percentage of viable cells at 5, 25 and 50 µg/ml (p<0.01)	None reported	(Mousavi <i>et al.</i> , 2016)
8.	Patients of chronic insomnia (16-50 years of age)	<i>V. odorata</i> oil prepared according to Iranian traditional medicine; 2 drops of oil as nasal drops in each nostril at bed time	Clinical study, 6 months	Hypnotic and sedative effects	Mild adverse events (post-nasal discharge, cough, itching/ burning in throat) reported by few patients	(Feyzabadi <i>et al.</i> , 2014)
9.	Depression	Methanol extract of <i>V. odorata</i> whole plant; oral	<i>In-vivo</i> , swiss albino mice models of depression	Symptomatic and biochemical improvement in depression	None reported	(Karim <i>et al.</i> , 2018)
10.	Chronic insomnia	<i>V. odorata</i> oil; instillation as nasal drops	Double-blind, 3-arm, placebo-controlled RCT, 30 days	Significant reduction in insomnia (p<0.001)	None reported	(Feyzabadi <i>et al.</i> , 2018)
11.	Hypertension and dyslipidemia	<i>V. odorata</i> leaves extract, oral (1, 3 and 5 gm/kg)	<i>In-vitro</i> and <i>in-vivo</i>	Reduction in mean arterial blood pressure, atrial contractions, atherogenic index and total cholesterol	None reported	(Siddiqi <i>et al.</i> , 2012)

Discussion

In classical Unani literature, *Banafsha* is hailed as a drug of choice for many respiratory diseases, as a laxative, antipyretic, and as a vital organ tonic, as already described above. *Khamīra-i-Banafsha* is a simple preparation made with *V. odorata* flowers, having a palatable taste, which is widely prescribed in classical Unani literature for respiratory diseases (Hameed, 1971). In contemporary researches, phytochemical analysis of *V. odorata* has revealed the presence of many beneficial phytochemicals. Salicylic acid, quercetin, and violine (emetocathartic alkaloid) have been found in all parts of the plant. In addition, many alkaloids, flavonoids, tannins, glycosides, and saponins have been isolated in various extracts of the plant. Scientific studies on the plant and its various parts and extracts have revealed important bioactivities including neuroprotective, anti-tumor, anti-oxidant, anti-bacterial, laxative, anti-hypertensive, anti-dyslipidemic activity, etc., among many others. In addition, practically no adverse or toxic effects have been reported in any scientific study (Feyzabadi *et al.*, 2017). Hence, this manuscript was aimed to explore the beneficial role of *V. odorata* in respiratory diseases and the common co-morbid conditions associated with them.

As evident from the studies summarized in Table-1, *V. odorata* has shown promising results in patients of cough (Qasemzadeh *et al.*, 2015), rhinitis (Yazdi *et al.*, 2020), and fever (Tafazoli *et al.*, 2019) in separate randomized controlled trials. These three symptoms are most commonly associated with respiratory infections, as observed in the major coronavirus outbreaks of 21st century (Hui & Zumla, 2019). Similar complications like pneumonia, lung fibrosis, alveolar damage, and cardiac complications were also observed in the 2009 influenza epidemic caused by influenza A virus (Viasus *et al.*, 2012). It has been observed that *V. odorata* syrup can decrease eosinophil count, hence it decreases inflammation, cough, nasal discharge and headache (Yazdi *et al.*, 2020). Also, the flavonoids of *V. odorata* have anti-depressant activity, which can help in relieving the anxiety associated with the disease and during the convalescence period (Karim *et al.*, 2018).

Many studies have revealed that psychological disorders, particularly insomnia, depression, anxiety, post-traumatic stress disorder, and distress, are significantly higher in populations affected by Covid-19 (Cénat *et al.*, 2021). Due to its anxiolytic, sedative, and hypnotic activity, *V. odorata* may also help in relieving these symptoms. Additionally, since the efficacy of *V. odorata* as an anxiolytic has been demonstrated on both systemic and local use, it may be used in a variety of patients, and according to individual needs (Karim *et al.*, 2018). In the Covid-19 pandemic, several fungal co-infections were observed, associated with significant morbidity and mortality (Song *et al.*, 2020). Due to its anti-fungal activity (Parsley *et al.*, 2018), *V. odorata* may also help in prevention of fungal infections. However, the effects need to be evaluated further on scientific parameters.

Endothelial dysfunction has also been observed as a co-morbidity of SARS-CoV-2 infection, leading to an increased risk of atherosclerosis and vasculitis (Evans *et al.*, 2020). *In-vitro* and *in-vivo* studies have clearly demonstrated anti-hypertensive and anti-dyslipidemic activity of *V. odorata*, possibly attributed to its flavonoids (Siddiqi *et al.*, 2012). In addition, *V. odorata* has hepatoprotective and vasculo-protective activity which may help to mitigate the adverse effects associated with medication, or complication of illness (Jamshed *et al.*, 2019). It has also been demonstrated *in-vitro* that *V. odorata* can reverse the cellular damage caused by glucose deprivation in neurological tissues (Mousavi *et al.*, 2016). This is an important finding, and confirms

the statement of Avicenna who described it as a revitalizer of brain (Sina, 1992). Such protection against neurodegeneration can help in minimizing the complications and enhance early recovery in Covid-19 and similar diseases.

Conclusion

Based on the Unani literature review and results of contemporary researches, it may be stated that *V. odorata* can help in alleviating and mitigating many pathological processes associated with respiratory infections. In addition, it can also help in minimizing the complications and enhance a positive outcome. Hence, *Khamīra-i-Banafsha* may be a potentially beneficial medication in Covid-19 like pandemics and may be used as an adjuvant to relieve cough, gastritis associated with medication, and to improve general health. Its exhilarant and anti-depressant action may also be beneficial in relieving the anxiety and other psychological symptoms experience after the acute phase.

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श्वसन रोगों के प्रकोप में *खमीरा-ए-बनफशा* की संभावित भूमिका: एक महत्वपूर्ण समीक्षा

मोहम्मद फ़ाज़िल, सईद अहमद, बिलाल अहमद, नीलम कुहुसी, मेराजुल हक़

सारांश

21वीं सदी तीन नए कोरोनावायरस के कारण इन्फ्लूएंजा के प्रकोप से चिह्नित है। वैश्विक समुदाय दो साल से अधिक समय तक SARS-CoV-2 द्वारा उत्पन्न कोविड-19 से जूझता रहा। इस संदर्भ में हर्बल और पारंपरिक चिकित्सा ने संभावित चिकित्सीय गुणों के लिए बढ़ती रुचि प्राप्त की। *वायोला ओडोराटा* एल., एक औषधीय जड़ी-बूटी जो एशिया, यूरोप और उत्तरी अमेरिका में पाई जाती है, यूनानी, फारसी और ईरानी चिकित्सा में अपने खांसीरोधी, ज्वरनाशक, संज्ञानात्मक सुधार और रेचक गुणों के लिए प्रमुखता से मानी जाती है। *खमीरा-ए-बनफशा*, जो *वायोला ओडोराटा* के फूलों से तैयार किया जाता है, यूनानी चिकित्सा में श्वसन और ज्वर संबंधी बीमारियों के लिए व्यापक रूप से अनुशंसित है। हाल के शोधों ने *वायोला ओडोराटा* में कई फ़ाइटोकेमिकल्स को उजागर किया है, जो शक्तिशाली सूजनरोधी, ज्वरनाशक, एंटीमाइक्रोबियल, रक्तचाप नियंत्रक और अवसादरोधी गतिविधियों का प्रदर्शन करते हैं। *वायोला ओडोराटा* और इसके व्युत्पन्नों या अर्क के उपयोग से जुड़े प्रतिकूल प्रभाव लगभग न के बराबर हैं। इसलिए, साहित्य की समीक्षा के आधार पर, *खमीरा-ए-बनफशा* श्वसन संक्रमणों के उपचार के लिए एक संभावित औषधि के रूप में उभरता है, जो जटिलताओं की रोकथाम और उपचार दोनों में संभावनाएं प्रदान करता है।

कुंजीशब्द: *बनफशा*, *वायोला ओडोराटा*, कोविड-19, श्वसन, ज्वरनाशक।

Functional explanation of reproductive organs in perspective of Unani Medicine

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Abstract

Overview: In Unani Medicine, bodily functions are governed by *Asbāb Tamāmiyya* (final causes), which define the purpose of the body's existence. These functions, one of the seven components of *Umūr Ṭabī'iyya* (factors of existence), are essential activities carried out by organs, reflecting the presence of *Quwā* (faculties). The primary functions—genesis, nutrition, and growth—are necessary for survival and development and are linked to *Af'āl Tanāsuliyya* (reproductive functions) and *Af'āl Ṭabī'iyya* (natural functions).

This paper examines the unique structure, faculties, and temperament of reproductive organs and their role in species preservation. Classical Unani literature offers detailed explanations, which often align with modern medical descriptions. It highlights the need for further research and validation of Unani perspectives on reproductive functions.

Methodology: Classical Unani texts in Urdu, Arabic, Persian, and English were reviewed alongside modern research databases like PubMed, Elsevier, Scopus, and Web of Science.

Results: The analysis revealed that Unani concepts of the reproductive system closely match modern medical knowledge, emphasizing their continued relevance.

Conclusion: Reproductive organs (*A'dā' Tanāsuliyya*) exist to preserve species, driven by reproductive faculties. The body's ultimate purpose is defined by its functions.

Keywords: Functions, Faculties, Reproduction, *Ḥarārat Gharīziyya*, Innate heat, Temperament, Unani medicine

Introduction

Aristotle described the parts of the body as “instruments,” each defined by its specific functions, much like how every instrument serves a purpose. Similarly, every part of the body exists for certain activities or functions. Galen expanded on this, stating that all body parts are designed for three primary purposes: sustaining life, enhancing life, and reproduction. Self-maintenance and reproduction are the fundamental functions of human nature (Schiefsky, 2007). In line with this, Unani scholars referred to *Af'āl* (functions) as the body's driving force, categorizing them under *Umūr Ṭabī'iyya*—the essential factors for existence in Unani philosophy.

Unani physicians recognized early on that the human body perceives various actions and reactions, which they attributed to *Quwā*—the faculties responsible for bodily responses. *Quwwat* is the potential or capacity to act when needed. Since functions are an expression of *Quwā*, their existence signifies the presence of these faculties (Kabiruddin, 2015). Unani Medicine identifies three primary types of faculties: *Quwā Nafsāniyya* (psychic faculties), *Quwā Ḥaywāniyya* (vital faculties), and *Quwā Ṭabī'iyya* (physical faculties), each governing the respective psychic, vital, and physical functions of the human body (Ahmed, 1980).

Reproduction and reproductive faculty

Reproduction is crucial for the survival of species, though not necessary for individual survival. While an individual can live without reproducing, a species cannot persist

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without it. Reproductive functions are tied to the genital organs and involve the production of offspring (Taber's, 2006). In humans, fetal development during pregnancy involves three stages: genesis, nutrition, and growth.

Genesis

The *Quwwat Tanāsuliyya* (reproductive faculty) governs genesis. This physical faculty ensures the propagation and preservation of species by replacing individuals lost through death (Ahmed, 1980). Unani physicians describe the formation of the fetus through *Manī* (semen) and *Khūn-i-Ṭamth* (menstrual blood stopped during pregnancy and used for fetal formation) (Majusi, 2010). Figure 1 summarizes the classification of the reproductive faculty and its various functions.

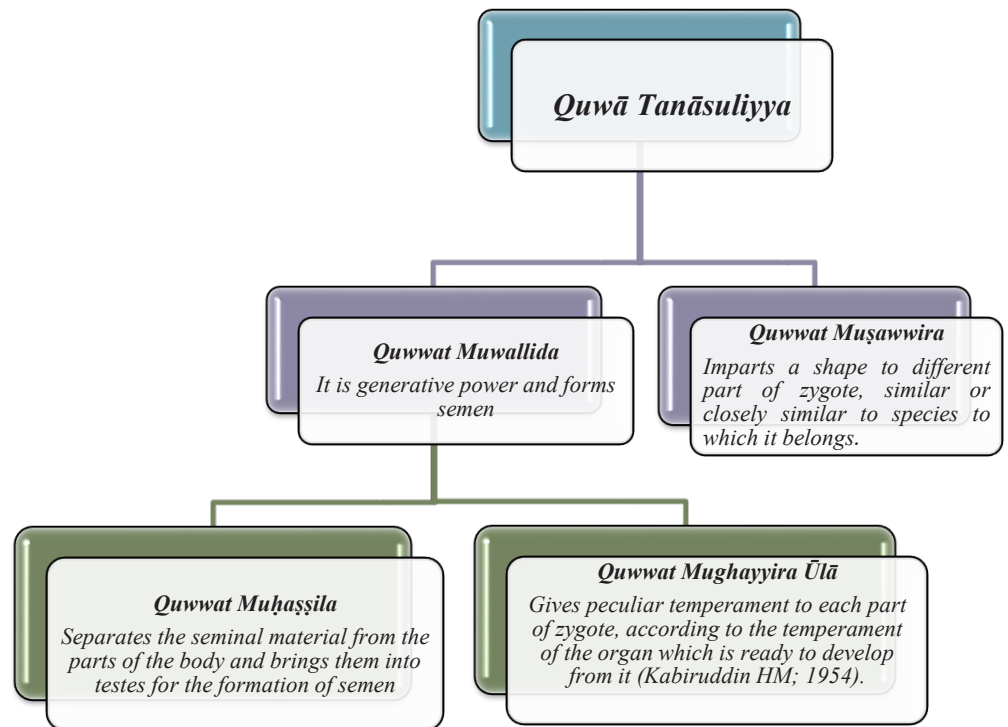


Fig. 1: Types of *Quwā Tanāsuliyya* and their functions

Every faculty including reproductive faculty works according to the temperament and structure of organs. Every organ has its specific structure and possesses its temperament; thus, it works, distinctly. Here we can say constitution (temperament), structure and functions are related to each other.

Nutrition and growth

Reproductive functions begin with semen formation and continue through organogenesis. The *Quwwat Nāmiya* (faculty of growth) and *Quwwat Ghādhiya* (nutritive faculty), both part of the physical faculty, are involved. According to Unani Medicine, organs initially form from semen and then receive nourishment from maternal blood for development. The faculty of growth enlarges embryonic organs by integrating nutrients, facilitated by the nutritive faculty (Kabiruddin, 1954). These faculties remain active until the end of growth.

Reproductive organs

The male reproductive organs aim to impregnate, while the female organs develop the embryo, facilitate birth, and care for the newborn.

Male organs

Ibn Rushd (2017) noted that the *Khuṣyatayn* (testes) and *Qaḍib* (penis) are key male reproductive organs. The testes are vital for species preservation and house the *Quwwat Tanāsuliyya* (Baghdadi, 2005). The scrotum covers the testes to maintain the right environment for semen maturation, supported by *Harārat Gharīziyya* (Masihi, 2008). If the testes become cold and lose elasticity, semen discharge would be hindered (Aristotle, YNM). Additionally, seminal vesicles are connected to the testes, where *Manī* is emptied into the *Qaḍib* via ducts (Razi, 1991). The vas deferens carries sperm from the epididymis to the urethra, joining the ejaculatory duct (Chaurasia, 2004).

The *Qaḍib* ejects semen into the uterus. The urethra runs from the bladder to the *Qaḍib*, providing a shared pathway for urine and semen (Majusi, 2010; Ansari, 2018).

Table 1: Structural importance of male reproductive organs

Organs	Structure	Importance
<i>Khuṣyatayn</i> (testes)	White, glandular (<i>Laḥm-i-Ghudūdi</i>) structure (Masihi, 2008)	Converts blood into semen through concoction
Testes vessels	Tortuous structure	Prolongs time for blood concoction
Linked to seminal vesicles	Allows further maturation of semen	Thickens and enhances viscosity (Majusi, 2010)
<i>Qaḍib</i> (penis)	Formed of “ <i>Ribāṭī Ajsām</i> ”	Expands during copulation
Two pairs of muscles (<i>Aḍalāt</i>)	Aids erection (Quf, 1986)	Helps in sexual function

Female organs

A woman’s *Raḥim* (uterus), together with her ovaries, defines her as a woman and enables her ability to procreate. The *Raḥim* carries the fetus and acts as a conduit for the discharge of menstrual blood (Ibn Rushd, 2017). The *Raḥim* is positioned in the abdomen to protect the *Manī* from *Burūdat* (coldness) and to provide space and shelter for fetal development. This positioning is intended to protect female reproductive matter from coldness and to offer shelter to the developing fetus (Quf, 1986). The *Raḥim* is attached to the vertebral column through *Ribātāt* (ligaments), which support and maintain its position. These ligaments are stretchable, allowing the uterus to expand during pregnancy.

According to Majusi, *Ṭabī‘at* (the natural power for self-preservation) instills a desire in the uterus towards the *Manī* for the preservation of species. The *Quwwat Jādhiba* of the *Raḥim* absorbs the male *Manī* during copulation (Majusi, 2010). As a result, many ancient philosophers considered the uterus as an internal entity with a desire to bear children. The *Raḥim* has two cavities conjoined at their insertion point, known as ‘*Unuq-al-Raḥim*, which is made up of cartilage and muscles. Ibn Hubal noted that in front of the uterine orifice, there is a duct that absorbs the *Manī* and expels menstrual blood and the fetus. During pregnancy, this duct narrows and dilates during labor

(Baghdadi, 2005). These structures, *'Unuq-al-Raḥim* and the duct, may be considered equivalent to the cervix and vagina, as described by Baghdadi, and they act as the birth canal.

The *Khuṣya al-Raḥim* (ovaries) is positioned just above the cervix and posterior to the fallopian tubes on either side. Female *Manī* (ovum) forms in the ovaries and reaches the *Raḥim* (Masihi, 2008). Majusi elaborated on the concept of ovulation, stating that “a body is formed by *Mabyaq* from which the semen drops and reaches the *Raḥim* through the fallopian tube” (Majusi, 2010).

Thadyayn (breasts): According to Unani Medicine, there is *Ishtirāk* (association) between the breasts and the uterus, which is why the breast is considered a reproductive organ. The utility of the breast is its ability to produce milk (a concocted form of blood) during lactation, nourishing the infant. Since the heart is regarded as the source of *Ḥarārat Gharīziyya* (innate heat), the *Thadyayn* are positioned close to the heart (Majusi; 2010), as they require the optimal amount of innate heat to process milk. A summarized elaboration of the female reproductive organs is provided in Table 2.

Table 2: Structural importance of female reproductive organs

Organs	Structure	Importance
Raḥim (uterus)	Small pits are found in <i>Tajāwīf-i-Raḥim</i> , called “ <i>Nuqr</i> ”. Different areas around the <i>Nuqr</i> are rough.	These pits are the mouths of uterine vessels, and the roughness helps retain the <i>Manī</i> and improves placental attachment.
	It is formed by <i>'Aṣbī Jawhar</i> .	This structure allows the uterus to distend easily during pregnancy and contract after delivery.
	Its opening (cervical os) is <i>Mu'tadil</i> in <i>Ṣalābat</i> .	The cervical os stretches easily, allowing <i>Manī</i> to enter during coitus (Majusi, 2010).
	Two processes, known as <i>Zawā'id</i> (fallopian tubes), are located on both sides of the uterus.	Through these tubes, <i>Manī</i> (ovum) and <i>Rūḥ</i> reach the uterus, where fertilization occurs.
	<i>'Unuq al-Raḥim</i> (cervix) is made of cartilage and muscles, with a duct (likely the vagina) in front of the uterine orifice.	The duct absorbs <i>Manī</i> and expels menstrual blood and the fetus. The cervix and vagina form the birth canal during delivery.
	The uterus contains three types of fibers: longitudinal, oblique, and circular.	Longitudinal fibers help absorb <i>Manī</i> , oblique fibers assist <i>Quwwat Māsika</i> in retaining the <i>Manī</i> , and circular fibers expel the fetus (Ibn Rushd, 2017).
Khuṣya al-Raḥim (ovaries)	Ovaries are harder and smaller than testes, made of glandular tissue.	The female <i>Manī</i> (ovum) forms in the ovaries and reaches the uterus.
Thadyayn (breasts)	Made of <i>Laḥm Ghudūdi</i> , containing <i>'Urūq</i> , <i>Sharā'in</i> , and many <i>A'ṣāb</i> . The breast vessels have a complex structure.	The structure of the breast is homologous to the testes, as blood undergoes a similar concoction in both organs for the formation of milk and <i>Manī</i> , respectively.

Temperamental importance of reproductive organs

The *Mizāj* (temperament) has a direct impact on the functions of the body, which are carried out by different *Quwā* (faculties) (Beg, 2019). Highlighting this concept, Abu Sahl Masihi explained that the *Quwā Ṭabī‘iyya* (physical faculties) require certain tools to perform their functions within the body; these tools are the structure, temperament, and constitution of the organ itself (Masihi, 2008). *Mizāj* originates from the interaction of four qualities: *Ḥarārat* (hotness), *Ruṭūbat* (moistness), *Burūdat* (coldness), and *Yubūsat* (dryness) (Majusi, 2010). Majusi (2010) also described that all body organs are equipped with *Quwā Ṭabī‘iyya Khādima* (secondary physical faculties), which include *Quwwat Jādhiba* (absorptive faculty), *Quwwat Māsika* (retentive faculty), *Quwwat Hāḍima* or *Quwwat Mughayyira* (digestive faculty), and *Quwwat-i-Dāfi‘a* (expulsive faculty). These secondary physical faculties are regulated by the *Kayfiyāt Arba‘a* (four qualities) (Kabiruddin, 1954).

Only when an optimal degree of body heat—known in Unani Medicine as *Ḥarārat Gharīziyya* (innate or vital heat)—is available to the body, can bodily processes function properly (Tipo, 2018). Since this innate heat serves as a common tool for all faculties, all *Quwā* require *Ḥarārat* (Masihi, 2008). *Burūdat* is indirectly necessary for some of the *Quwā Arba‘a* because its direct function opposes the activities of the other *Quwā*. The three faculties—*Quwwat Jādhiba*, *Quwwat Dāfi‘a*, and *Quwwat Māsika*—depend on *Yubūsat* to function, as muscle fiber contraction, which aids retention of nutriment, relies on this dryness.

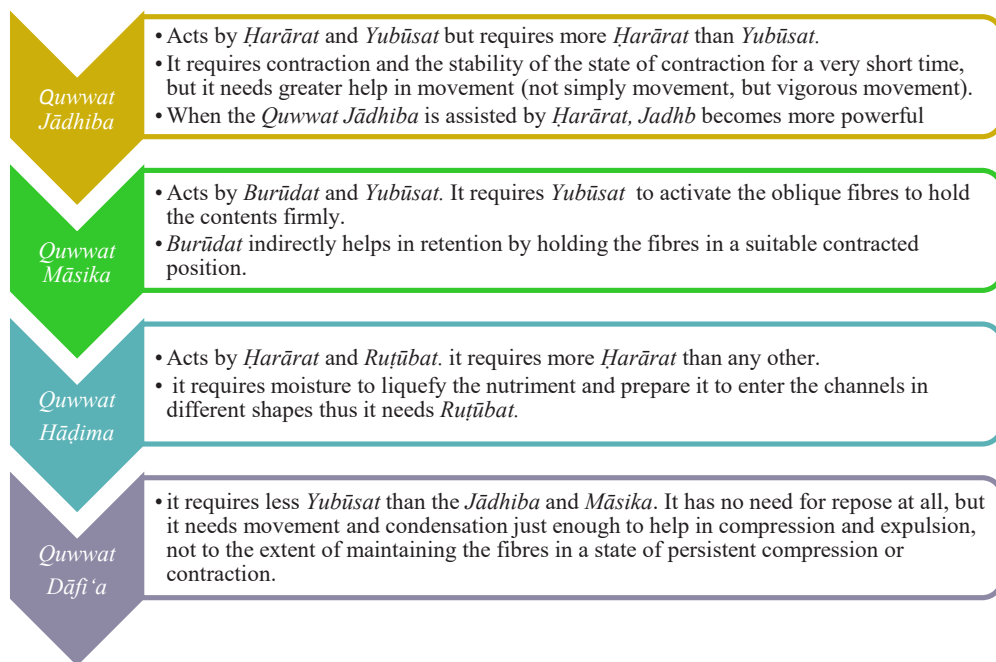


Fig. 2: Relation between *Quwā Arba‘a* and *Kayfiyāt Arba‘a*

Quwā Tanāsuliyya (reproductive faculties) and their subordinate faculties also function through these four qualities. *Quwwat Muwallida* relies on *Quwwat Jādhiba*, *Quwwat Māsika*, and *Quwwat Hāḍima/Mughayyira Thānī* of the *Khuṣyatayn* (testicles) for the preparation of *Manī*. *Quwwat Jādhiba* requires *Ḥarārat* for absorbing nutrients, while *Quwwat Māsika* relies on *Yubūsat* to contract muscle fibers and retain the nutriment

until *Manī* is formed. *Quwwat Hāḍima/Mughayyira Thānī* depends on *Ḥarārat* and *Ruṭūbat* for the formation of *Manī* since *Manī* is a concocted form of blood (Tabari, 2017). Figure 2 illustrates the relationship between *Quwā Arba ‘a* and *Kayfiyāt Arba ‘a*.

The innate temperament of the *Raḥim* (uterus) is *Hārr Raṭb* (hot and moist), but *Ruṭūbat* increases during pregnancy. The workload of the *Raḥim* rises as it supplies blood to the developing embryo, which causes an increase in blood flow, thereby raising *Ḥarārat* in the *Raḥim*. *Ṭabī‘at* (nature) directs moist matter toward the *Raḥim* to prevent the dominance of *Yubūsat* (dryness) and to offset excess *Ḥarārat*. Consequently, the *Raḥim* increases in both *Ruṭūbat* and *Ḥarārat*, ensuring its proper functioning throughout pregnancy. Table 3 highlights the importance of temperament in reproductive organs.

Table 3: Importance of temperament in reproductive functions

S. No.	Functions	Importance
1	Formation of <i>Manī</i>	<i>Quwwat Hāḍima/Mughayyira Thānī</i> depends on <i>Ḥarārat</i> and <i>Ruṭūbat</i> for the formation of <i>Manī</i> .
2	Absorption of <i>Manī</i>	The longitudinal fibers of the uterus depend on <i>Ḥarārat</i> for the absorption (<i>Injidhāb-i-Manī</i>) at the time of copulation.
3	Fertilization and implantation	After fertilization, the species-specific <i>Mizāj</i> in the zygote is established, creating harmony between uterine and zygotic <i>Mizāj</i> . If harmony is maintained, successful conception occurs; otherwise, abortion may result (Zulkifl et al., 2005). <i>Quwwat Māsika</i> of the uterus assists in the better attachment of the placenta through <i>Yubūsat</i> .
4	Organogenesis	<i>Quwwat Mughayyira Ūlā</i> forms organs through the action of <i>Kayfiyāt Arba ‘a</i> . It produces flesh via the effect of <i>Ḥarārat</i> and <i>Ruṭūbat</i> in specific parts of the zygote (Majusi, 2010). The organs of the body are produced through varying proportions of <i>Kayfiyāt Arba ‘a</i> .
5	Formation of milk	<i>Quwwat Mughayyira Thānī</i> of the breasts depends on <i>Ḥarārat</i> and <i>Ruṭūbat</i> for milk formation.

Conclusion

After reviewing the classical Unani literature on the reproductive system, it is reasonable to conclude that Unani Medicine provides thorough and comprehensive information comparable to that of conventional medicine. The descriptions of *A ‘dā’ Tanāsuliyya* (reproductive organs) by Unani scholars are detailed and precise, despite the limited resources available to them by contemporary standards. This documentation of reproductive systems offers an opportunity to bridge the gap between classical and conventional medical knowledge and serves as a platform for further scholarly discourse.

The current need is to collect classical data from existing Unani literature, organize and synthesize it, evaluate its relevance, and address emerging diseases from both preventive and curative perspectives. This can be achieved by utilizing Unani Medicine’s close-to-nature understanding of disease causation and intervention, offering a holistic approach to modern healthcare challenges.

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प्रजनन अंगों की कार्यात्मक व्याख्या: यूनानी चिकित्सा के दृष्टिकोण से

नज़मा खान, मोहम्मद जुलकिफल, वसीम अहमद, मलिक इतरत, नीलोफ़र

सारांश

समीक्षा: यूनानी चिकित्सा में शारीरिक क्रियाओं को *अस्बाब तमामिया* (अंतिम कारण) द्वारा नियंत्रित किया जाता है, जो शरीर के अस्तित्व का उद्देश्य निर्धारित करते हैं। ये क्रियाएं *उमूर तबीय्या* (अस्तित्व के कारक) के सात घटकों में से एक हैं और अंगों द्वारा की जाने वाली आवश्यक गतिविधियों को प्रदर्शित करती हैं, जो *कुवा* (शक्तियों) की उपस्थिति को दर्शाती हैं। प्रमुख कार्य-उत्पत्ति, पोषण, और वृद्धि-जीवित रहने और विकास के लिए आवश्यक हैं और इन्हें *अफ़आल तानासुलिया* (प्रजनन क्रियाओं) और *अफ़आल तबीय्या* (स्वाभाविक क्रियाओं) से जोड़ा जाता है। यह शोध पत्र प्रजनन अंगों की विशिष्ट संरचना, शक्तियों, और मिज़ाज का अध्ययन करता है और इनका प्रजाति संरक्षण में क्या योगदान है, इसे स्पष्ट करता है। क्लासिकल यूनानी साहित्य में इनकी विस्तृत व्याख्या मिलती है, जो अक्सर आधुनिक चिकित्सा के विवरणों से मेल खाती है। यह प्रजनन क्रियाओं पर यूनानी चिकित्सा के दृष्टिकोण पर शोध और वैधीकरण की आवश्यकता पर प्रकाश डालता है।

कार्यप्रणाली: उर्दू, अरबी, फ़ारसी, और अंग्रेज़ी में यूनानी चिकित्सा के शास्त्रीय ग्रंथों की समीक्षा की गई, साथ ही आधुनिक शोध डेटाबेस जैसे कि PubMed, Elsevier, Scopus, और Web of Science का अध्ययन किया गया।

परिणाम: विश्लेषण से पता चला कि यूनानी चिकित्सा के प्रजनन तंत्र की अवधारणाएं आधुनिक चिकित्सा ज्ञान से काफ़ी मेल खाती हैं, जिससे उनकी प्रासंगिकता का पता चलता है।

निष्कर्ष: प्रजनन अंग (*आज़ा तनासुलिया*) प्रजाति के संरक्षण के लिए होते हैं, और इन्हें प्रजनन शक्तियों द्वारा संचालित किया जाता है। शरीर का अंतिम उद्देश्य इसकी क्रियाओं द्वारा परिभाषित होता है।

कुंजीशब्द: क्रियाएं, शक्तियां, प्रजनन, हरात गरीज़िया, जन्मजात गर्मी, मिज़ाज, यूनानी चिकित्सा

Safety and efficacy evaluation of Unani pharmacopoeial formulation *La'ūq Bādām* in patients with *Khushūna al-Ḥalq* (sore throat) (NUMC: C-119): An open-label single-arm study

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Abstract

Background: Sore throat, known as *Khushūna al-Ḥalq*, is a prevalent medical condition primarily caused by viruses, with bacteria contributing to 5-15% of cases. The over prescription of antibiotics leads to adverse effects, unnecessary costs, and antibiotic resistance, posing a significant healthcare challenge. NSAIDs such as paracetamol are the standard pain management therapy, but their efficacy is limited and they may occasionally cause severe side effects. This study assesses the safety and efficacy of *La'ūq Bādām*, a commonly prescribed Unani pharmacopoeial formulation, in patients with sore throat.

Methods: A single-arm, open-label trial was conducted with 113 clinically diagnosed sore throat patients of either gender aged 18-60 years. The study adhered to GCP guidelines and obtained approval from the Institutional Ethics Committee. Patients received 7 grams of *La'ūq Bādām* orally twice daily with lukewarm water for 14 days. Relevant pathological and biochemical investigations were conducted, and adverse events were monitored to assess the safety of the formulation. Efficacy was evaluated by improvements in the Visual Analogue Scale (VAS) for sore throat.

Results: Of the 113 patients enrolled, 11 were lost to follow-up, leaving 102 patients who completed the trial with a mean age of 37 ± 9.9 years. The overall treatment response rate was 98%. A significant ($P < 0.05$) decrease in the mean VAS score for sore throat and associated symptoms was observed after 14 days of treatment compared to baseline. No adverse events were documented during the trial, and there were no significant changes in pathological and biochemical parameters before and after treatment. These findings indicate that *La'ūq Bādām* is a safe and effective remedy for the treatment of sore throat and its associated symptoms.

Keywords: Sore throat, *Khushūna al-Ḥalq*, *La'ūq Bādām*, Pharyngitis, *Waram-i-Ḥalq*.

Introduction

Sore throat is a common reason for seeking medical intervention. It is the main symptoms of the upper respiratory tract infection (URTI) and pharyngitis. It may be accompanied by fever, pain in throat, difficulty in swallowing, pain in swallowing and cough, etc. The most common cause includes infection by viruses, bacteria, and fungus. Gastro-esophageal reflux may also cause throat irritation (McNally *et al.*, 2012). *Khushūna al-Ḥalq* (sore throat), also termed as *Hurqa al Ḥalq* and *Ḥalq kī Sozish* (burning sensation and roughness in throat), is the main and earliest symptom of *Waram-i-Ḥalq* (pharyngitis) and *Waram-i-Ḥanjara* (laryngitis) (Kabiruddin, 1925; Kabiruddin, 1956; Khan, 2003). It is also present in different diseases and conditions such as *Nazla-o-Zukām* (common cold), *Waram al-Lawzatayn* (tonsillitis), *Hummā-i-Surkh* (scarlet fever), *Jism Gharīb* (foreign body) in the throat, and *Tasammum Dam* (toxaemia) (Arzani, 1903; Khan, 1987). On the basis of humoral involvement, sore throat can be classified into *Damawī* (sanguineous), *Balghamī* (phlegmatic), *Ṣafrāwī* (bilious) and *Sawdāwī* (melancholic). *Khushūna al-Ḥalq* can be caused by several external and internal factors. Astringent and citrus fruits/vegetables may cause sore throat (Arzani, 1903; Kabiruddin, 1956; Khan, 2003). Recurrent episodes of cold, gout, measles, presence of wound or boil in the throat, exposures to cold or hot air, accidental inhalation/swallowing of corrosive/irritant materials, prolonged and persistent mouth breathing, constant use of spicy food, tobacco chewing, smoking,

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alcohol, shouting and the people who use the throat beyond the limits like singing, among others are closely associated with sore throat (Kabiruddin, 1956; Khan, 1987; Khan, 2003; Addey & Shephard, 2012; CDC, 1992; Middleton, 1996; Murthy & Laing, 1995).

Sore throat may have an infectious or non-infectious aetiology, although these sometimes overlap. Most cases are infectious, with a large proportion up to 40% (Renner *et al.*, 2012). Most pharyngitis is due to viruses (up to 80%) and does not require treatment with antibiotics (Sykes *et al.*, 2020), while bacteria causing 20-30% of pharyngitis (Stillerman & Burnstein, 1961). Rhinovirus is most common cause of viral infection followed by adenovirus, coxsackievirus, coronavirus, parainfluenza, Epstein-Barr virus, and orthomyxoviridae (Sykes *et al.*, 2020). A wide variety of physico-chemical factors have been implicated in causing non-infectious sore throat, like cigarette, smoke inhalation, snoring, tracheal intubation, shouting, and concomitant illness or drug effects. Smoking is a risk factor for sore throat, in both active and passive smokers (Renner *et al.*, 2012). Significant association between cigarette smoking and sore throat has been reported in college students (An *et al.*, 2009). Further, a close relationship between children's sore throats and maternal smoking has been reported (Willatt, 1986). Snoring is also known to be associated with sore throat (Ekici *et al.*, 2008). A high frequency of sore throat is a risk factor for habitual snoring in children (Urschitz *et al.*, 2004), and sore throat was reported by over half of those snoring children who were subsequently diagnosed with obstructive sleep apnoea (Richards & Ferdman, 2000). Sore throat may also be associated with obstructive sleep apnoea in adults (Casale *et al.*, 2008). Tracheal intubation and laryngeal mask airways are common causes of sore throat in people undergoing general anaesthesia (Farazmehr *et al.*, 2021). The reported incidence of postoperative sore throat varies widely, but is generally higher for tracheal intubation than for laryngeal mask airway (Joshi *et al.*, 1997). Shouting and voice loading may also cause sore throat. An increasing incidence of sore throat has been reported in aerobics instructors (Long *et al.*, 1998) and school teachers (Van Lierde *et al.*, 2010). Drug-induced sore throat is a notable adverse effect of some medications, including angiotensin-converting enzyme (ACE) inhibitors and chemotherapy agents (Fletcher *et al.*, 1994). Sore throat is also a common problem in asthmatics taking inhaled corticosteroids (Bhalla *et al.*, 2008).

Patients suffering from sore throat may present associated symptoms such as irritation, dryness in the throat, and tightness around the throat which leads to difficulty in speaking, swallowing. Low pitch voice or absence of voice may occur in severe cases. Dry cough occurs in the forms of episodes. *Raqiq Balgham* (watery phlegm) may be present in the initial stage which may become thick and sticky after some time if not treated properly. Fever may be present upto 103°C. This condition usually occurs in young adults (Kabiruddin, 1956).

Unani Medicine offers an engrossing approach for treating sore throat and associated symptoms based on the aetiology of the disease. Principles advocated by Unani scholars for treating sore throat include voice rest, avoidance of visiting polluted areas, use of *Mulayyināt Khafīfa* (mild laxative), *Mugharriyāt* (mucilaginous/lubricants), *Musakkināt* (soothing agents), *Dāfi '-i-Hummā* (antipyretic), *Munaffithāt-i-Balgham* (expectorant), *Dāfi '-i-Su'āl* (cough suppressant), *Mu'arriqāt* (diaphoretics), and *Muqawwiyāt* (tonics) and immune boosters (Kabiruddin, 1956; Khan, 2003). A number

of single drugs and compound formulations are used in Unani Medicine since ages for the successful treatment of sore throat and other associated symptoms. *La'ūq Bādām* is one such formulation recommended frequently for such conditions. However, no scientific data is available with regard to its safety and efficacy, therefore, proposed for the present clinical trial in patients with sore throat.

Materials & Methods

An open-label, single-arm clinical trial was conducted at Regional Research Institute of Unani Medicine (RRIUM), Chennai to evaluate the safety and efficacy of Unani pharmacopoeial formulation *La'ūq Bādām* in patients suffering from sore throat. The study was conducted in accordance with GCP guidelines and was approved by the Institutional Ethics Committee (IEC), RRIUM, Chennai prior to the study initiation. A total number of 113 patients were enrolled in this study, however only 102 patients were included in the analysis as 11 patients were lost to follow-up due to varied reasons. Patients of either gender in the age group of 18-60 years with sore throat as chief complaint and willing to participate in the study were subjected to thorough clinical examination and laboratory investigations for the diagnosis confirmation and to ensure that the patient meets the inclusion and exclusion criteria. Patients with confirmed diagnosis of sore throat with or without associated symptoms such as hoarseness of voice, dysphagia, cough, pharyngeal erythema, pain in throat, post nasal drip and/or fever were included in the study after obtaining duly signed voluntary informed consent form.

Patients below 18 and above 60 years of age, patients with all the four classical symptoms of group A streptococcal pharyngitis, tonsillar swelling or exudates, swollen and/or tender anterior cervical nodes, and absence of cough were excluded from the study. Patients with uncontrolled diabetes mellitus (blood sugar fasting >250mg/dL), poorly controlled hypertension ($\geq 160/100$ mm Hg), patients suffering from major systemic illnesses such as rheumatoid arthritis, tuberculosis, oral candidiasis, epiglottitis, herpes simplex, psycho-neuro-endocrinal disorders necessitating long-term drug treatment, and known cases of renal/hepatic/cardiac ailments were excluded from the study. Also, patients who were alcoholics and/or drug abusers, pregnant women and lactating mothers, and those who had participated in any other clinical trial during the past 6 months were excluded from the study. Patient temperament was assessed by the standard module developed by the CCRUM, Ministry of Ayush, Government of India.

Drug Intervention

The study formulation *La'ūq Bādām* comprising 9 ingredients (Table 1) was prepared following classical methods at the GMP certified pharmacy of NRIUMSD, Hyderabad in a single batch and supplied to the study centre. The study drug (100g/patient) was dispensed to patients for one week at a time and they were advised to intake the medication at a dose of 7 g orally twice daily with lukewarm water. As the duration of protocol therapy was 14 days, the procedure was repeated for the next week to complete the protocol therapy duration. Patients were instructed to return the unconsumed drug at the follow-up visits to monitor the medication compliance. During the trial, no concomitant therapy was permitted. The patients underwent clinical assessment at baseline and after 14 days of treatment. The clinical observations, both subjective and objective, were documented in the case record form.

Table 1: Ingredients of *La'ūq Bādām* (Anonymous, 2006)

Ingredient name	Botanical name
<i>Şamgh 'Arabī</i>	<i>Acacia arabica</i> (Lam.) Willd.
<i>Katīra</i>	<i>Astragalus strobiliferus</i> Royle.
<i>Nishāshṭa-i-Gandum</i>	<i>Triticum aestivum</i> L.
<i>Rubb al-Sūs</i>	<i>Glycyrrhiza glabra</i> L.
<i>Maghz-i-Bādām</i>	<i>Prunus amygdalus</i> Batsch.
<i>Maghz Tukhm-i-Kadū</i>	<i>Cucurbita maxima</i> Duch.
<i>Qand Safaid</i>	<i>Saccharum officinarum</i> L.
<i>Rowghan-i-Bādām</i>	<i>Prunus amygdalus</i> Batsch.
<i>'Araq-i-Gulāb</i>	<i>Rosa damascena</i> Mill.

Efficacy and safety assessment

All the patients were assessed at baseline and at the end of treatment for clinical progress and improvement. The efficacy of the test formulation was determined based on the improvement observed in sore throat and associated symptoms, for which the Visual Analogue Scale (VAS) was employed. The result of the study was recorded in terms of percentage efficacy as calculated from the reduction in VAS score. The safety of the test formulation was evaluated by documenting adverse effects (AEs), serious adverse events (SAEs), and pertinent pathological and biochemical investigations such as haemoglobin (Hb), erythrocyte sedimentation rate (ESR), serum bilirubin (S. Bil), serum glutamic-oxaloacetic transaminase (SGOT/AST), serum glutamic-pyruvic transaminase (SGPT/ALT), alkaline phosphatase (ALP), blood urea, serum creatinine and serum uric acid. These laboratory investigations were performed and recorded at baseline and after 14 days of treatment and the outcomes were compared.

Statistical analysis

The discrete variables were expressed as percentage and continuous variable were expressed as mean with standard deviation. To find the association between categorical variable and the outcome variable Chi-square test was used. The pathological and biochemical parameters were analyzed using Paired t-test. The P-value <0.05 was considered as significant.

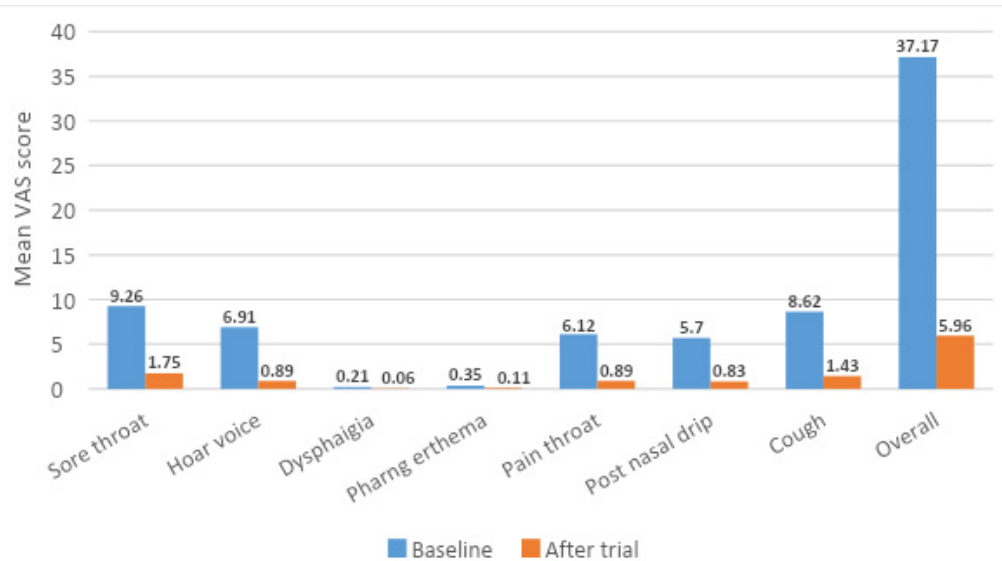
Results

A total of 113 patients meeting the inclusion criteria were enrolled in the study, with 11 participants lost to follow-up for various reasons, leaving 102 patients who completed the trial. The mean Visual Analog Scale (VAS) scores for sore throat and associated signs and symptoms were recorded individually and collectively at baseline and at the end of the trial. Figure 1 illustrates the improvement in sore throat and associated signs and symptoms.

A significant ($P < 0.05$) decrease in the Mean \pm SD values of VAS scores was observed after 14 days of treatment compared to baseline scores. The VAS scores for sore throat,

hoarseness of voice, dysphagia, pharyngeal erythema, throat pain, postnasal drip, and cough were initially recorded as 9.26 ± 1.08 , 6.91 ± 3.08 , 0.21 ± 1.20 , 0.35 ± 1.77 , 6.12 ± 3.56 , 5.70 ± 3.52 , and 8.62 ± 2.14 respectively. After 14 days of treatment with *La'ūq Bādām*, these scores were significantly reduced to 1.75 ± 1.77 , 0.89 ± 1.35 , 0.06 ± 0.44 , 0.11 ± 0.49 , 0.89 ± 1.55 , 0.83 ± 1.46 , and 1.43 ± 1.70 respectively.

The overall Mean \pm SD VAS score for all signs and symptoms at baseline and after treatment was recorded as 37.17 ± 7.20 and 5.96 ± 5.78 respectively (Figure 1).



*Significant at 5% level

Figure 1: The mean Visual Analogue Scale (VAS) score at baseline and after treatment in *Khushūna al-Ḥalq* (sore throat) patients treated with *La'ūq Bādām* ($n = 102$).

The percentage efficacy of the test formulation was calculated on the basis of reduction in the VAS score. Figure 2 depicts the overall response of the study participants to the treatment. The findings showed that among research participants who completed the trial, 43.1% reported feeling completely relieved, 45.1% relieved, 9.8% partially relieved, and 2.0% reported feeling no relief at all (Figure 2).

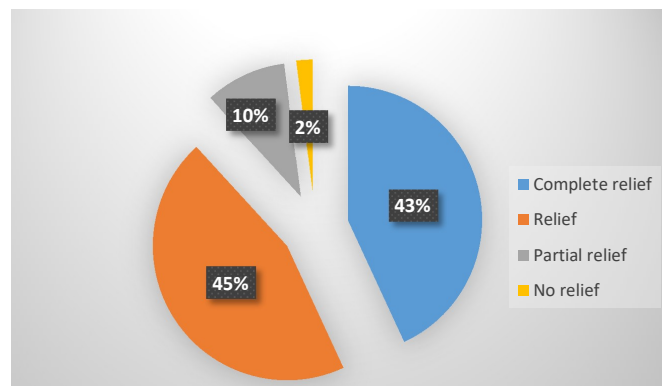


Figure 2. Response of treatment in *Khushūna al-Ḥalq* (sore throat) patients treated with *La'ūq Bādām* ($n = 102$)

Table 2 represents the overall response to the treatment in different age groups and chronicity of the disease in the study population treated with *La'ūq Bādām*. The result revealed significant differences ($P < 0.05$) in response to treatment between different age groups and chronicity of the disease. In age groups <30 and $31-40$, the percentage of completely relieved patients was recorded to be 32% and 49% respectively. Whereas, the percentage of relieved patients was noted as 54% and 38% respectively. Among patients with less than one month of chronicity of disease, 36% were completely relieved and 51% patients were relieved. In contrast, among patients with more than one month of chronicity of disease, the percentage of completely relieved and relieved patients was found to be 51% and 38% respectively (Table 2).

Table 2: Response to treatment in different age groups and chronicity of the disease in patients with sore throat treated with *La'ūq Bādām* (n=102)

Characteristics	Response			
Age Group (Years)	Complete relief No. (%)	Relief No. (%)	Partial relief No. (%)	No relief No. (%)
<30	9 (32.1)	15 (53.6)	4 (14.3)	0 (0)
31-40	18 (48.6)	14 (37.80)	3 (8.1)	2 (5.4)
41-50	14 (48.3)	13 (44.8)	2 (6.9)	0 (0)
>50	3 (37.5)	4 (50.0)	1 (12.5)	0 (0)
Chronicity (Months)				
<1	20 (36.4)	28 (50.9)	6 (10.9)	1 (1.8)
>1	24 (51.1)	18 (38.3)	4 (8.5)	1 (2.1)

In order to assess the safety of *La'ūq Bādām*, certain important laboratory parameters were performed at baseline and at the end of the trial. The data of laboratory indices collected at the baseline and at the end of trial are illustrated in Table 3. The findings revealed that there was no significant ($P > 0.05$) difference in the mean values between the baseline and after the treatment in all parameters except haemoglobin, serum bilirubin and serum alkaline phosphate, where statistically significant (<0.05) difference was observed. The course of the study was uneventful as no adverse effects, serious adverse events or drug intolerance was reported during the study period.

Table 3: Pathological and biochemical investigations at baseline and after treatment in patients with *Khushuna al-Halq* treated with *La'ūq Bādām* (n=102)

Safety parameters	Baseline Mean \pm SD	After treatment Mean \pm SD	P value
Hb (g/dl)	12.8 \pm 1.84	12.6 \pm 1.75	<0.05
ESR 1 hr (mm)	26.6 \pm 17.97	24.6 \pm 17.47	>0.05
S.Bil (mg/dl)	0.6 \pm 0.27	0.5 \pm 0.22	<0.05
SGOT (U/L)	17.7 \pm 5.82	17.7 \pm 5.83	>0.05
SGPT (U/L)	19.5 \pm 7.58	19.5 \pm 7.30	>0.05
ALP (U/L)	68.0 \pm 21.18	64.8 \pm 15.08	<0.05
B.Urea (mg/dl)	16.5 \pm 5.59	16.1 \pm 4.45	>0.05
S. Creatinine (mg/dl)	0.7 \pm 0.19	0.7 \pm 0.16	>0.05
S. Uric Acid (mg/dl)	4.8 \pm 1.85	4.8 \pm 2.25	>0.05

All values are expressed as Mean \pm SD, n = 102, (p-value<0.05 significant). Hb represents haemoglobin; ESR, erythrocyte sedimentation rate; S. Bil, serum bilirubin; SGOT, serum glutamicoxal oacetic transaminase; SGPT, serum glutamic-pyruvic transaminase; ALP, alkaline phosphatase.

Discussion

Since ancient time, nature has been the excellent source of medicinal materials, and because of their biological properties, natural products have been instrumental in treating a wide range of illnesses (Anwar *et al.*, 2021). According to World Health Organization (WHO), 80% world population is relying on traditional medicine and it is considered to be the major provider of health care around the globe, especially in rural and remote areas (Nyeko *et al.*, 2016).

One of the most prevalent medical conditions that primary care doctors treat especially in children is sore throat. According to reports, viruses are the most common cause of sore throats. Although antibiotic prescriptions are frequently prescribed in cases of sore throat, only 5–15% of cases of sore throat are caused by bacteria (Parthasarathi *et al.*, 2020). This overprescription of antibiotics results in side effects, additional costs, and the emergence of antibiotic resistance in microorganisms which has become a major challenge to healthcare sector of the nation (Kumar *et al.*, 2013; Anwar *et al.*, 2021). Acetaminophen or non-steroidal anti-inflammatory medications (NSAIDs) are therefore the central component of care for pain control. However, these medications can result in major harm in addition to their limited ability to relieve pain (Sadeghirad *et al.*, 2017).

The management of sore throat in Unani Medicine is based on *Ta'dīl-i-Mizāj* (normalization of altered temperament), *Tanqīya-i-Mawād* (cleansing of morbid humours), *Taskīn-i-Alam* (pain alleviation), *Tahlīl-i-Waram* (resolving swelling and inflammation), *Tarīb-i-Halq* (producing moistness in throat), *Izlāq* (lubrication) and *Tanfīth* (expectoration) (Arzani, 1903; Kabiruddin, 1956; Khan, 2003). *La'ūq Bādām* is a Unani pharmacopoeial formulation which is highly recommended in cases of sore throat (Anonymous, 2006). The formulation contains ingredients that are known to have *Musakkin* (analgesic and soothing), *Muḥallil* (anti-inflammatory), *Munaffīth* (expectorant), *Muzliq* (lubricating) and *Mumallis* (emollient) properties (Ghani, 2011). Hence, it is thought to be beneficial in relieving sore throat and other associated symptoms including throat pain, hoarseness of voice, dysphagia, cough, pharyngeal erythema, and post nasal drip.

In the present study, *La'ūq Bādām* was evaluated for its safety and efficacy in adult patients aged between 18-60 years suffering from sore throat with or without associated symptoms. The mean age of the study participants was found to be 37 ± 9.9 years. This finding is consistent with the previous reports that suggest high prevalence of sore throat in adults. According to reports, sore throat accounts for 2% of adult outpatient visits and 5% of paediatric medical consultations (Sadeghirad *et al.*, 2017).

Pain relief is the major concern in patients visiting clinics with sore throat (Sadeghirad *et al.*, 2017). A valid, dependable, and widely used tool in clinical settings to assess pain intensity and changes both before and after treatment is the VAS scale (Anwar *et al.*, 2023). It is equally effective tool for assessing cough, throat discomfort and related symptoms (Hull *et al.*, 2020). The VAS score was utilized in this study to assess

the changing trend in sore throat, pain and other associated signs and symptoms in order to analyze the outcome of the study. In patients treated with *La'ūq Bādām*, the results showed an overall 98% therapeutic response; in contrast, 2% of patients showed improvement in throat pain and related symptoms of less than 30%, which was deemed to be no relief at all. Most patients who were registered in this study had moderate to severe sore throat, hoarseness of voice, throat pain, post nasal drip, and cough, whereas few patients reported mild dysphagia and pharyngeal erythema at baseline which were significantly improved after treatment. A highly significant decrease in VAS score of sore throat and all associated symptoms was observed after 14 days of treatment with *La'ūq Bādām*.

The study also analyzed the overall treatment response across different age groups and chronicity of the disease in the study population to explore any potential association. Although the response to treatment varied significantly across age groups, there was no significant association found between age and treatment response. It was observed that the proportion of completely relieved patients was relatively lower in the age group below 30 years (32%) compared to the age group 31-40 years (49%). However, the proportion of relieved patients was comparatively higher in the age group below 30 years (54%) than in the age group 31-40 years (38%). Similarly, it was also noted that the proportion of completely relieved patients was relatively higher (51.1%) among patients with a chronicity of disease of more than one month compared to patients (36.4%) with less than one month of chronicity. However, the proportion of relieved patients was higher (50.9%) in patients with chronicity less than one month compared to patients (38.3%) with more than one month of chronicity.

Although the response to treatment varied between the duration of illness, no significant association was noted between the chronicity of illness and response to treatment. These variations may be attributed to small sample size of the study, as there is always a risk of random variability and lack of precision with a small sample size (Faber & Fonseca, 2014). Confounding factors such as diet, smoking, or other variables may also have contributed to these variations.

The beneficial effect of the formulation in sore throat is attributed to the inherent properties of the ingredients contained in the formulation and their ability to address the underlying causes and pathology of sore throat. Unlike conventional therapy which mainly focusses on pain alleviation through anti-inflammatory medications and infection control through antibiotics (Sadeghirad *et al.*, 2017), the formulation tested in this study possesses analgesic, soothing, anti-inflammatory, expectorant, emollient, and lubricating properties. The ingredients of the formulation have been reported to have anti-inflammatory, antimicrobial, antispasmodic, immunomodulatory, antioxidant, anticancer activities among many others (Kumar *et al.*, 2024; Taghavizadeh Yazdi *et al.*, 2021; Wahab *et al.*, 2021; Barreca *et al.*, 2020). *Glycyrrhiza glabra*, an important component of the formulation, has extensively been utilized in traditional and modern preparations for treating a wide range of afflictions including upper respiratory tract infections, bronchitis, cold, cough, sore throat, dry mouth, and fever (Wahab *et al.*, 2021). The observation suggests that the combinatorial impact of the formulation ingredients may have had a substantial role in resolving the underlying pathology and reducing sore throat and other related symptoms.

The safety of *La'ūq Badam* was assessed by reporting medication intolerance, AEs, and SAEs in this study, as well as by utilizing relevant clinical and laboratory

investigations. With the exception of Hb%, S. bilirubin, and ALP levels, the findings of laboratory studies showed no significant changes in clinical and laboratory indices between the baseline and after the treatment. After treatment, there was a statistically significant drop in Hb%, S. bilirubin, and ALP levels compared to the baseline levels, which was found clinically insignificant. During the whole trial period, no reports of medication intolerance, AEs, or SAEs were made regarding the oral administration of *La'ūq Badam*. The study findings suggest that the oral administration of *La'ūq Badam* may be utilized for the effective treatment of sore throat and associated symptoms with no / least safety concern.

Conclusion

The beneficial effects of the Unani pharmacopoeial formulation *La'ūq Bādām* in patients suffering from *Khushūna al-Ḥalq* (sore throat) were successfully revealed by this study. The study findings showed a statistically significant improvement in the mean VAS score of sore throat and associated signs and symptoms after 14 days of treatment with the test formulation. *La'ūq Bādām* was found to be well-tolerated in patients with sore throat, and the trial proceeded without any incident or untoward effects. Nevertheless, human intervention trials in a bigger sample size with standard control and for a longer duration are required to confirm the study findings and demonstrate the long-term sustainability of the drug potential in treating sore throat and its associated symptoms.

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खुशुनतुल हलक (गले में खराश) (NUMC: C-119) के रोगियों में यूनानी फार्माकोपियल फॉर्मूलेशन लऊक बादाम की सुरक्षा और प्रभावकारिता का मूल्यांकन: एक ओपन-लेबल सिंगल-आर्म अध्ययन

कबीरुद्दीन अहमद, ज़हीर अहमद, वसीम अहमद, अतहर परवेज़, नोमान अनवर

सारांश

पृष्ठभूमि: गले में खराश, जिसे *खुशुनतुल हलक* के नाम से जाना जाता है, एक आम चिकित्सा स्थिति है, जो मुख्य रूप से वायरस के कारण होती है, जबकि 5-15% मामलों में बैक्टीरिया कारण होते हैं। एंटीबायोटिक दवाओं के अत्यधिक नुस्खे से प्रतिकूल प्रभाव, अनावश्यक लागत और एंटीबायोटिक प्रतिरोध होता है, जो स्वास्थ्य देखभाल के लिए एक महत्वपूर्ण चुनौती है। पैरासिटामोल जैसे एनएसएआईडी सामान्य रूप से दर्द के उपचार के लिए उपयोग किए जाते हैं, लेकिन इनकी प्रभावकारिता सीमित होती है और कभी-कभी यह गंभीर दुष्प्रभाव भी पैदा कर सकते हैं। यह अध्ययन गले में खराश के रोगियों में सामान्य रूप से निर्धारित यूनानी फार्माकोपियल फॉर्मूलेशन *लऊक बादाम* की सुरक्षा और प्रभावकारिता का मूल्यांकन करता है।

विधि: 18 से 60 वर्ष की आयु के 113 चिकित्सकीय रूप से निदान किए गए गले में खराश के रोगियों पर एक सिंगल-आर्म, ओपन-लेबल परीक्षण किया गया। अध्ययन ने GCP दिशानिर्देशों का पालन किया और संस्थागत नैतिकता समिति से अनुमोदन प्राप्त किया। रोगियों को 14 दिनों तक गुनगुने पानी के साथ मौखिक रूप से 7 ग्राम *लऊक बादाम* दिन में दो बार दिया गया। प्रासंगिक रोग संबंधी और जैव रासायनिक जांच की गई और प्रतिकूल घटनाओं की निगरानी करके फॉर्मूलेशन की सुरक्षा का आकलन किया गया। प्रभावकारिता का मूल्यांकन विज़ुअल एनालॉग स्केल (VAS) में सुधार द्वारा किया गया।

परिणाम: नामांकित 113 रोगियों में से 11 का अनुवर्ती परीक्षण नहीं हुआ, जिससे 102 रोगी बचे जिन्होंने परीक्षण पूरा किया। इनकी औसत आयु 37 ± 9.9 वर्ष थी। समग्र उपचार प्रतिक्रिया दर 98% रही। 14 दिनों के उपचार के बाद गले में खराश और संबंधित लक्षणों के लिए औसत VAS स्कोर में एक महत्वपूर्ण ($P < 0.05$) कमी दर्ज की गई। परीक्षण के दौरान कोई प्रतिकूल घटना नहीं देखी गई, और उपचार से पहले और बाद में रोग संबंधी और जैव रासायनिक मापदंडों में कोई महत्वपूर्ण परिवर्तन नहीं हुआ। इन निष्कर्षों से पता चलता है कि *लऊक बादाम* गले में खराश और इससे संबंधित लक्षणों के उपचार के लिए एक सुरक्षित और प्रभावी उपाय है।

कुंजीशब्द: गले में खराश, *खुशुनतुल हलक*, *लऊक बादाम*, ग्रसनीशोथ, *वरम-ए-हलक*।

Identification of the vulnerable section among the service class and the modes adopted for resilience

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Abstract

Background: The nationwide lockdown in India subsequent to the Covid-19 pandemic exposed the vulnerable section among the service class. The psychosocial impact of these remains untold and needs to be studied.

Setting: The study was conducted through an online questionnaire with 14 questions administered to educated professionals aged 20-45 from Delhi, Bangalore, Mumbai, and Kolkata, excluding daily wagers and housewives. Data were analyzed using Chi-Square or Fisher exact tests, with results expressed as mean \pm SD and frequency.

Results: Among 370 participants, 53.51% were migrants, mostly males under 30. High pull factors were observed in Bangalore and Kolkata, with migrants employed in desk or field jobs in the private sector. Many young migrant males faced job loss (61.25%), lack of family support (87.9%), and had to venture out for essentials (78.89%).

Conclusion: Young migrant men were the most vulnerable, coping through exercise, meditation, and creative activities. The study underscores the complex interplay between socio-demographic, social, professional, and psychological factors, highlighting the need for multifaceted approaches in addressing such impacts. Limitations include lack of control data and unequal state representation.

Keywords: Lockdown, Migrant, Family support, Social, Psychology, Resilience

Abbreviations: BMI - Basal Metabolic Index; IT - Information Technology; MNC - Multinational Company; SPSS - Statistical Package for Social Sciences; WHO - World Health Organization

1. Introduction

In an era characterized by increasing globalization and the pursuit of career, opportunities are available beyond borders, a distinct subgroup of the workforce has emerged as a focal point of study and concern: professionals who embark on migration for work. The desire for career advancement, coupled with economic incentives, compels these individuals to traverse geographical and cultural boundaries, seeking new opportunities in foreign lands (Arifa *et al.*, 2021). Yet, in their pursuit of professional growth, these professionals often find themselves facing a unique set of challenges and vulnerabilities that set them apart within the broader working population. The susceptibility of this group is most exposed during natural disasters, national crisis, conflicts, etc.; the pandemic of Covid-19 was one of them.

To contain the Covid-19 pandemic, the most noteworthy measure taken by the Indian government was to impose the largest national lockdown in the world in March 2020 culminating in four phases finally ending in May 2020. This quick and immediate lockdown, praised by WHO as “tough and timely” did had its consequences. It severely affected movement disrupting daily life and normalcy. For a population beyond 1.3 billion, immediate lockdown meant far-reaching consequences beyond the spread of the disease itself (The Lancet, 2020; Iyengar & Jain, 2020).

Migration has not been a feature among labourers alone but ubiquitous among the working class as well. Following the 14 hour Janta curfew, all transport (road, air and rail) was suspended. (Iyengar & Jain, 2020). This left many a worker in the lurch. Migration according to the Census of India is of two types – migration by birthplace, and migration by place of the last residence (Registrar General & Census Commissioner, 2011b;

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Registrar General & Census Commissioner, 2011c). In a country like India with a diverse geo-culture, this diaspora leaves the migrant as an alien. Migrants fall in the vulnerable category because they are less familiar with their environment, their movement to earn their livelihood can expose them to the disease, their living and working conditions, makes them relatively vulnerable. They suffer from stigma both in the place of work and native for fear of being carriers of the diseases. This makes them prone to various social, psychological, and emotional trauma in such situations, emanating from fear of neglect by the local community and concerns about wellbeing (Iyengar & Jain, 2020; Ministry of Health and Family Welfare, 2020; Roberto, 2020; de Haan, 2020).

This study strives to provide a nuanced understanding of the challenges professionals face in the context of work-related migration. By examining the multifaceted dimensions of vulnerability, including economic precarity, social isolation, and psychological resilience. We aim to offer a comprehensive analysis of their experiences and identify the factors that render them particularly susceptible to adversity. Through this study we hope to inform policy development and community initiatives aimed at bolstering the resilience and well-being of this dynamic and increasingly vital segment of the workforce.

2. Methodology

Selection criteria

An online survey was conducted during the lockdown period from May 2020 to July 2020 using a structured questionnaire with both open and close-ended items having 3-sections. In the first section, there were six questions pertaining to demographic details of the respondents such as age, gender, city/state, native place/city, staying with family, length of staying in the current city, and marital status, which were covered under social life. In the second section, information related to the impact of the lockdown on the working life of the respondents such as working categories/sector, job categories/role, current working condition/situation, and problems facing in the current situations were sought. The third section had three questions to study the impact on the psychology of the respondents.

Data was collected through a pre-structured questionnaire consisting of 14-questions, circulated through a web-based link (Google forms) via messages and emails asking them to circulate it among friends. The study participants included individuals aged 18 years and above from four different states of India viz., Delhi, Bengaluru, Mumbai, and Kolkata. All the participants were employed in public or private sectors including MNCs. Daily wagers or those with a contract for less than or equal to three months and housewives were excluded from the survey.

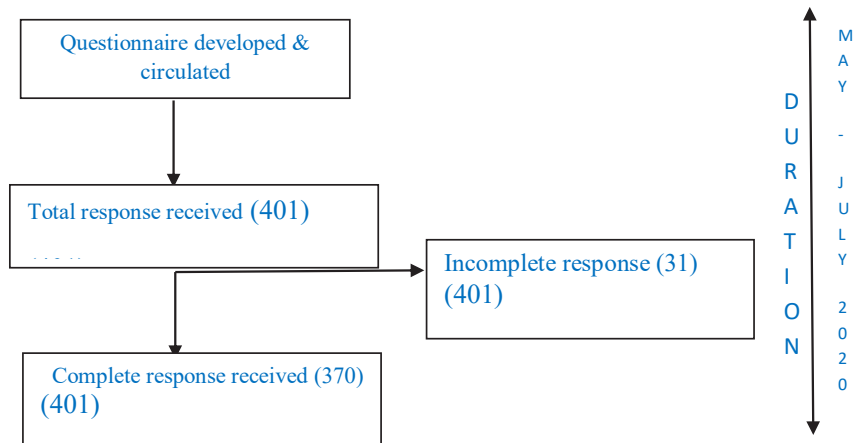


Fig.1. Work Flow-Chart

Description of professional roles

During the study, certain labels were assigned to a set of jobs which might not be inclusive of all the jobs in that category, for example desk job includes job done in the office setting on the desk in the capacity of a manager, data analyst, statistician in the field of banking and finance, insurance, tax, and human resource; similarly, field job includes going out of the office like sales executive, medical representative, product specialist in the field of marketing; whereas health workers are doctors and medical students. In this article, family refers to a nuclear family having two to five members.

Data processing and analysis

The data post-collection was entered in a Microsoft excel sheet and validated. A clean database was generated and analyzed in SPSS (version 23) & R-4.2.0. A total of 401 participant responses were received; out of which 31 responses were excluded from the survey as they were incomplete with less than 70% of the questions from the questionnaire answered missing some key answers. Descriptive statistics were used to characterize the study population. Association between categorical variables was assessed using Chi-Square test (or Fisher exact test). P-value <0.05 and <0.001 were considered as significant and highly significant.

3. Results

Social impact

Table 2: Association between social variables and native city status

- **Age:** The data suggests a social impact of age on being native to the city. Younger individuals (≤ 30) have migrated to the place of residence compared to older individuals (> 30). It reflects the interplay between age and social identity.
- **Gender:** The gender disparity in being native indicates a possible social influence. More females are native to their place of residence compared to males. This difference could be attributed to cultural norms, social roles, or the extent of their social networks within the city.
- **Staying with family:** The strong association between staying with family and being native to the place highlights the social importance of familial connections. Individuals living with their families are more likely to have deeper social ties and potentially stronger emotional connections to the city.
- **Duration of stay:** The link between longer residency (> 5 years) and nativity emphasizes the social bonds developed over time. Lengthy residence often leads to a more integrated social life.
- **Working sector/categories:** The fact that government/semi-government/autonomous sector employees are natives suggests that workplace affiliations and social circles within the profession may influence the migrants. It reflects the social dimensions of employment and the interactions among colleagues.

Table 3: Association between social variables and staying with family

- This table examines the social impact of variables on the decision to stay with family. The results indicate that age, duration of stay, and working sector significantly influence this choice.

- Younger individuals (≤ 30) are less likely to live with family. Longer-term residents (> 5 years) are more likely to stay with family, emphasizing the social support and emotional bonds that develop over time. Government/semi-government/autonomous sector employees are more likely to live with family.

Professional impact

Table 4: Association between professional variables

- Private sector employees are more likely to work from home. Job categories also influence working conditions. Desk-job workers, for example, are more likely to experience specific conditions compared to field-job workers or those in teaching or healthcare roles.

Table 5: Association between working sector variables

- Private sector employees are significantly more likely to face “no work/struggling” conditions, indicating the professional challenges in the private sector. The higher likelihood of private sector employees working from home reflects changes in work arrangements, which can impact work-life balance and job satisfaction.

Psychological impact

Table 6: Stress management strategies

- Engaging in exercise and meditation, creative activities, spending quality time with family, and searching for new jobs are common strategies used by individuals to manage stress and maintain psychological well-being. These strategies can have positive psychological effects, such as reducing stress levels, enhancing creativity, improving family bonds, or providing a sense of purpose during job searches.

Table 7: Association between family support and vulnerability

- Individuals who stay with family members are seven times less likely to go out more than once a week, indicating the protective role of family support in encouraging individuals to stay home.
- Those who are not staying with family members are over 59 times more likely to go out once a day compared to their counterparts who stay with family. This stark contrast underscores the influence of living arrangements on outdoor activities.

Implications

The data highlights the importance of family support and living arrangements in shaping individuals’ behaviors and vulnerabilities during various situations.

4. Discussion

Social impact

Age: The majority of the 370 adult population who participated in the survey were migrants or non-native 198(53.51%); whereas 172 (46.49%) participants were native (Table 1, Fig. 1). The mean age of non-native participants was 31.98 ± 6.62 years, ranging between 20-45 years. This could be because young employees are willing

to struggle and as one ages their desire to migrate decreases (Zaiceva, 2014). This resonates in our study wherein 130(75.58%) respondents above 30 years of age resided in their native place. This relation between residence and age is highly significant with $p < 0.001$ (Table 2). The results of the Census 2011 are in cognizance with our study wherein maximum migrants by place of residence belonged to the age group of 25-29 years (Registrar General & Census Commissioner, 2011a).

Gender: The male representation was slightly higher than females in our study. Of 370 participants, 245 (66.21%) were men, whereas 125 (33.79%) were women (Table 1, Fig. 1). Of them, 149 (75.25%) were migrant males (Table 2). This choice highlights the male hierarchical system in Indian society. The participation of women in migration depends on the social roles of women, their autonomy and capacity to make decisions, their access to resources, and the existing gender stratification. Women often migrate as dependent family members or to marry someone (United Nations, 2006). According to the Census of India 2011, men migrated five times more than women for work whereas twice more than women for business (Registrar General & Census Commissioner, 2011a).

Family support: The study reveals that natives lived at their place of residence for more than 5 years, resided with their family and enjoyed family support (Table 2). This forms one of the major social support systems. A social support system is crucial in managing stress and maintaining a sense of wellbeing (Brummett *et al.*, 2005; Fatih *et al.*, 2007). According to the census report, majority of men migrated with their families when they were young (15–19 years old), whereas women migrated with families when they were 25–29 years old (Registrar General & Census Commissioner, 2011a).

Migrants are prone to harsh living conditions, discrimination and low wages; this is because they lack safety nets, and suffer disproportionately in times of economic hardship (Ban Ki-moon, 2010)

Push and pull factor: The push factors are factors that cause migration, whereas the pull factors attract migrants. A study showed that young skilled migrants were high in Bengaluru with its largest proportions of migrants to total population (Sridhar *et al.*, 2012). This corroborates with our study where maximum migration is seen in Bengaluru and Kolkata. The migrants in these cities outnumber the natives (Table 2, Fig 2).

Duration of stay: The non-natives have lived at their place of work for less than five years and mostly lived alone whereas the natives have lived at their place of work for more than five years and stayed with their family (Table 3). The census report of India 2011 shows that 28.34 % of the migrants by virtue of residence have stayed at their place of posting for less than 5 years, 17.10% for 5-10 years and 54.56% for more than 10 years (Registrar General & Census Commissioner, 2011a).

Professional impact

The impact of the lockdown on the professional aspect of the service class individuals was studied on the following parameters:

Working sector: The distribution between the public and private sectors is significantly unequal, with the ratio of public sector to private sector being 0.28:1 (as shown in Table-1). A large majority, 78% of the participants were employed in the private sector, likely due to the abundant job opportunities available there. Notably, as migrant youth were distanced

from their native places, the majority, 142 (71.72%), did not reside with their families (Table-2). Conversely, seniors (>30 years old) displayed a strong preference for their hometowns, with 196 (92.01%) opting to reside there and 174 (81.7%) choosing to live with their families. Additionally, a significant portion, 141 (66.20%), of seniors worked in the private sector. This preference for hometowns among seniors could be attributed to the perceived psychological costs associated with migration, including separation from family and friends, lower anticipated earnings, and the loss of firm-specific human capital (skills tailored to a particular firm) (Zaiceva, 2014; Frank & Obloj, 2014).

Job type: In terms of job types, the majority of migrants were observed to be employed in either desk or field positions, predominantly within the private sector. Interestingly, the distribution of teaching and healthcare workers was relatively balanced between the private and public sectors. Desk job roles, characterized by low levels of physical activity, were associated with a higher Basal Metabolic Index (BMI), an indicator of obesity, compared to field job roles.

According to Amelie F. Constant, migrants contribute to job creation by stimulating demand (Constant, 2014). However, despite this contribution, job opportunities do not always favor migrants, as noted by Kiczkowiak (2020). Discrimination against migrants often results in them being relegated to more demanding positions with fewer benefits.

Moreover, individuals working in the private sector faced significant job insecurity, as evidenced by 177 (61.25%) experiencing it (Fig 3). Many among them had to contend with reduced wages, forced leave, or outright job loss, spending considerable time searching for new employment opportunities (Fig-4).

Job survivability: Job survivability during the pandemic has been particularly challenging for those in the private sector, with a staggering 96% experiencing job loss or grappling to retain employment (Table 4). This phenomenon can be attributed to the significant financial strain experienced by businesses during lockdowns, leading to extensive layoffs. Conversely, individuals employed in essential services managed to retain their jobs but faced wage reductions, exacerbating concerns about meeting everyday expenses (Jesline *et al.*, 2021).

Among those striving to maintain employment, 54% were migrants, and 52% did not reside with their families, compounding their difficulties due to the lack of a robust social support network. The loss of a primary source of income significantly impacted their ability to afford basic necessities such as housing and food, particularly affecting those living paycheck to paycheck (Hagger *et al.*, 2020). Additionally, the affordability of essential hygiene products like detergents, soaps, and sanitizers became a challenge, leading to reported cases of suicide and attempted suicide attributed to job loss and financial strain (Jesline *et al.*, 2021).

Only a mere 3.81% reported their work remaining unaffected by the pandemic (Table 5). Previous research on economic downturns has shown that job loss during crises often leads to prolonged unemployment, stagnant wages, and deteriorating health among affected individuals, consequently increasing poverty levels (Jesline *et al.*, 2021).

During the lockdown period, remote work became the norm; however, it was primarily migrants living away from their families who had access to appropriate information technology infrastructure. This digital divide further exacerbated concerns as IT infrastructure became essential for various aspects of daily life, including social interaction, shopping, education, and work.

The odds of facing job loss or employment struggles in the private sector, compared to the public sector or remote work, were notably high, with a substantial 10.025-fold difference. This disparity underscores the heightened vulnerability of private sector workers. Furthermore, within the private sector, field job workers were particularly susceptible compared to desk job or other categories of workers in the public sector.

Psychological impact

The stress experienced during the lockdown stemmed from various sources, including concerns about the well-being of family, friends, and colleagues, as well as worries about food availability and financial stability (Hagger *et al.*, 2020). However, amidst these challenges, there were some positive outcomes. The lockdown contributed to improved air quality throughout India (Mishra *et al.*, 2021), and individuals made healthier dietary choices due to the unavailability of junk food and the desire to boost immunity amid the pandemic. Moreover, many engaged in physical exercise and pursued hobbies or creative activities to maintain physical and mental well-being (Table 6).

Stress management

To mitigate the negative effects of sedentary behavior and self-quarantine, the WHO recommended regular physical activity and relaxation techniques. This included 150 minutes of moderate or 75 minutes of vigorous exercise per week, or a combination of both, along with joining online exercise programs and incorporating movement into daily routines (Chtourou *et al.*, 2020). Interestingly, individuals in the private sector often relied on meditation and exercise to manage stress, possibly due to the predominance of private sector workers among the study participants (Table 6).

Hobbies

To combat stress induced by the pandemic, engaging in cognitively stimulating activities such as reading, playing board games, and solving puzzles was recommended by the WHO (Chtourou *et al.*, 2020). Migrants, lacking the social support of family and friends, dedicated more time to creative pursuits like learning new languages, taking online courses, gardening, or painting, to occupy themselves and alleviate stress (Table 6).

Vulnerability

Migrants faced increased vulnerability due to their need to venture outside for essential provisions, medications, and other necessities, exposing them to the risk of contracting Covid-19 (Table 8). This daily exposure heightened their stress levels and susceptibility to the virus, as well as potential encounters with law enforcement. In contrast, individuals residing with their families typically ventured out less frequently, reducing their vulnerability (Hagger *et al.*, 2020).

The odds of migrants living alone going out of their homes daily or more than once a week were significantly higher, 59.52 and 7.8 times respectively, compared to those residing with their families and venturing out once a week (Table 8, Fig. 5).

This discrepancy starkly contrasts with those staying with their families, where the majority (78, 36.62%) did not venture out at all (Table 7), thereby decreasing their vulnerability. Consequently, single migrants experienced greater challenges due to the scarcity of essential goods (152, 71.36%) and hygiene concerns related to covid-19 (40, 25.47%), whereas those residing with their families faced fewer issues (48, 30.57%) (Table 7).

Resilience

Despite facing significant challenges, migrants demonstrated resilience by adopting constructive coping mechanisms and utilizing their time to enhance their health and career prospects. This underscores the importance of providing support to migrants during crises, as they possess the capacity to rebound from adversity with remarkable resilience.

Overall, the study highlights the multifaceted psychological impacts of the pandemic and underscores the importance of implementing supportive measures to aid individuals, particularly vulnerable population like migrants, in navigating these challenging times effectively.

5. Conclusion

In summary, migration is predominantly driven by employment, marriage, education, security concerns, and environmental factors, accounting for 53.51% of the participants in this study. Among these migrants, the majority were males aged 30 years or younger, with men typically migrating at a younger age than women. While migration offers financial benefits, it also entails psychosocial and professional challenges, including harsh living conditions, discrimination, and low wages, impacting both migrants and their families emotionally.

During the Covid-19 lockdown, these vulnerabilities were exacerbated, leading to financial strain, emotional distress from separation from family, and psychological stress due to daily challenges like obtaining essential supplies amid restrictions. Despite these hardships, young migrant men employed various resilience strategies, such as exercise, meditation, and engaging in creative activities like gardening and painting.

The study underscores the complex interplay of socio-demographic, social, professional, and psychological factors in shaping individuals' experiences. Family support emerged as a crucial mitigating factor against daily challenges, including access to essential goods, medical care, and hygiene maintenance, contributing to overall well-being.

Recognizing these impacts is essential for informed decision-making and the design of effective interventions. Policymakers and healthcare professionals should prioritize family support and living conditions when developing strategies to address vulnerabilities and promote public health.

In conclusion, while this study sheds light on the experiences of young educated migrants, it acknowledges limitations, including underrepresentation of the uneducated population and uneven geographical representation across Indian states. Future research should strive for broader inclusivity to capture a more comprehensive understanding of migration dynamics and their impacts on society.

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Table 1: Socio-demographic data

Variables	Frequency	Percentage (%)
Age	32.29 ± 6.6 (mean ± sd)	
Citizen type		
Non-native (mean age ± sd)	198 (31.98 ± 6.66.62)	53.51%
Native (mean age± sd)	172 (35.10 ± 6.09)	46.49%
Gender		
Male	245	66.21%
Female	125	33.79%
City		
Delhi	101	27%
Kolkata	92	25%
Mumbai	87	24%
Bengaluru	90	24%
Working sectors/categories		
Govt./Semi-Govt./Autonomous	81	22%
Private	289	78%

Table 2: Association between social variables with regard to migrants and natives

Variable	Is this your native city?		Test-statistics Chi-Square Value	p value
	No (n=198)	Yes (n= 172)		
Age (in years)				
≤30	93 (46.96%)	42 (24.42%)	20.19	<0.001
>30	105 (53.03%)	130 (75.58%)		
Gender				
Female	49 (24.75%)	76 (44.19%)	15.547	<0.001
Male	149 (75.25%)	96 (55.81%)		
City/State				
Delhi	49 (27.75%)	52 (30.23%)	6.36	0.095
Kolkata	53 (26.77%)	39 (22.67%)		
Mumbai	40 (20.20%)	47 (27.33%)		
Bengaluru	56 (28.28%)	34 (19.77%)		
Staying with family				
Yes	56 (28.28%)	157 (91.28%)	149.536	<0.001
No	142 (71.72%)	15 (8.72%)		
How many years you stayed here				
>5	43 (21.72%)	172 (100%)	231.71	<0.001
<5	155 (78.28%)	0 (0%)		
Working Sector/ Categories				
Govt./Semi-Govt./ Autonomous	22 (11.11%)	59 (34.30%)	28.95	<0.001
Private	176 (88.89%)	113 (65.70%)		

Table 3: Association between social variables with regard to staying with family

Variable	Staying with family		Chi-Square test	p value
	No (n= 157)	Yes (n= 213)		
Age (in years)				
≤ 30	96 (61.14%)	39 (18.30%)	71.56	<0.001
>30	61 (38.86%)	174 (81.7%)		
How many years you stayed here				
>5	19 (12.10%)	196 (92.01%)	237.13	<0.001
≤5	138 (87.9%)	17 (7.99%)		
Is this your Native city?				
Govt./Semi-Govt./ Autonomous	9 (5.73%)	72 (33.80%)	149.53	<0.001
Private	148 (94.27%)	141 (66.20%)		

Table 4: Association between professional variables

Variable	Working sector/categories		Chi-square test	p value
	Public/ Semi-public/ Autonomous (n=81)	Private (n=289)		
Job categories/role				
Desk-job	56 (69.14%)	144 (49.83%)	61.42	<0.001
Field-job	1 (1.23%)	123 (42.56%)		<0.001
Teaching	12 (14.81%)	12 (4.15%)		0.41
Health-worker	12 (14.81%)	10 (3.46%)		0.1454
Current working conditions/situation				
No work/ Struggling	5 (6.17%)	120 (41.52%)	39.04	<0.001
Work from home	66 (81.48%)	158 (54.67%)		<0.001
Work as usual	10 (12.35%)	11 (3.81%)		0.65
Problem you are facing in your working life				
Job survivability	0	177 (61.25%)	95.55	<0.001
Home IT- infrastructure	12 (14.81%)	20 (6.92%)		0.03
No problem at all	69 (85.19%)	92 (31.83%)		<0.001

Table 5: Association between working sector variables

Parameter estimates									
Working category/sector	B	Std. Error	Wald	df	Sig.	Exp (B) Lower bound	95% Confidence Interval for Exp (B)		
							Upper bound		
Pvt.	Current working condition/ situation	.873	.147	35.475	1	.000			
	[No work/ Struggling]	2.305	.479	23.121	1	.000	10.025	3.918	25.654
	[Work as usual]	-.778	.461	2.847	1	.092	0.459	.186	1.134
	[Work from home]	0 ^b	.	.	0

a. The reference category is: **Govt.**

b. This parameter is set to zero because it is redundant.

Table 6: Table depicting stress management strategies

Variables	Frequency	Percentage (%)
How do you spend your day?		
Exercise and meditation		
Yes	299	80.82 %
No	71	19.18%
Creative activities		
Yes	305	82.43%
No	65	17.57%
Quality time spending with family		
Yes	265	71.62%
No	105	28.38%
Searching for new jobs		
Yes	236	63.78%
No	134	36.72%

Table 7: Association between family support and vulnerability

Staying with family ^a	B	Std. Error	Wald	df	Sig.	Exp (B)	95% Confidence Interval for Exp (B)		
							Lower bound	Upper bound	
No	How often did you go out of your home?	-1.974	.276	51.326	1	.000			
	[More than once in a week]	2.054	.486	17.865	1	.000	7.800	3.009	20.219
	[Not myself till now but other family members do so]	-.773	.537	2.070	1	.150	.462	.161	1.323
	[Once in a day]	4.086	.388	110.834	1	.000	59.520	27.815	127.366
	[Once in a week]	0 ^b	.	.	0

a. The reference category is: **Yes**.

b. This parameter is set to zero because it is redundant.

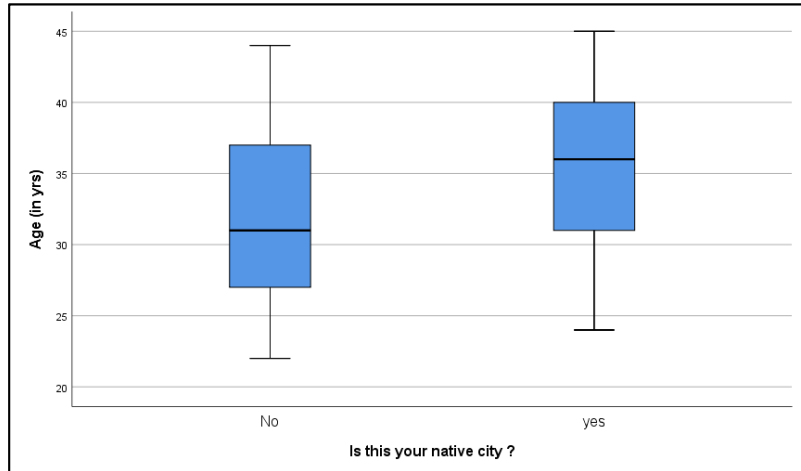


Fig. 1

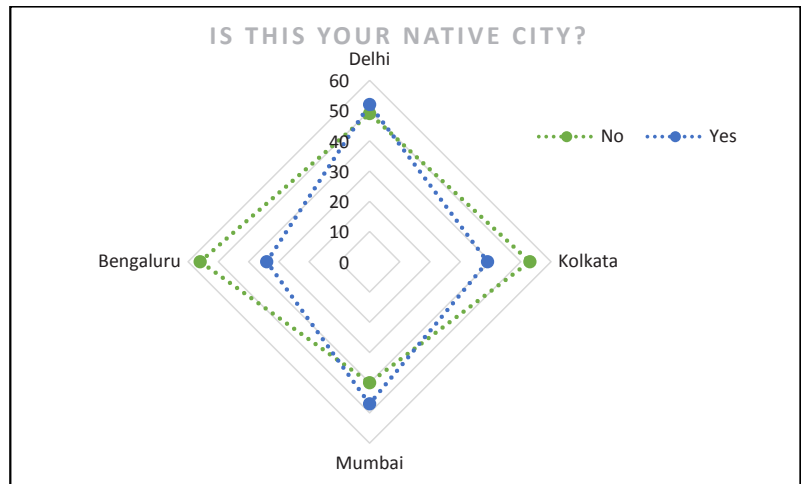


Fig. 2

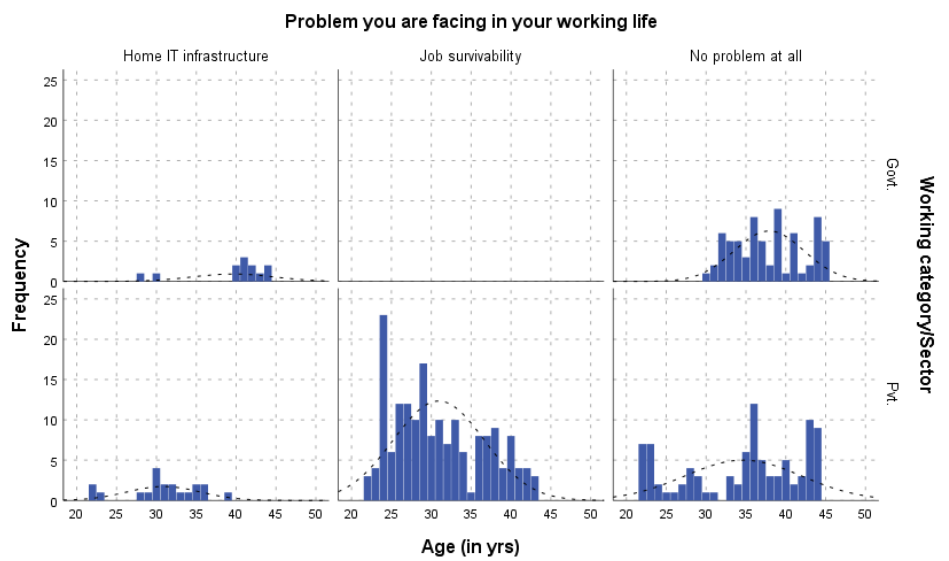


Fig. 3: Association between social variables with regard to staying with family

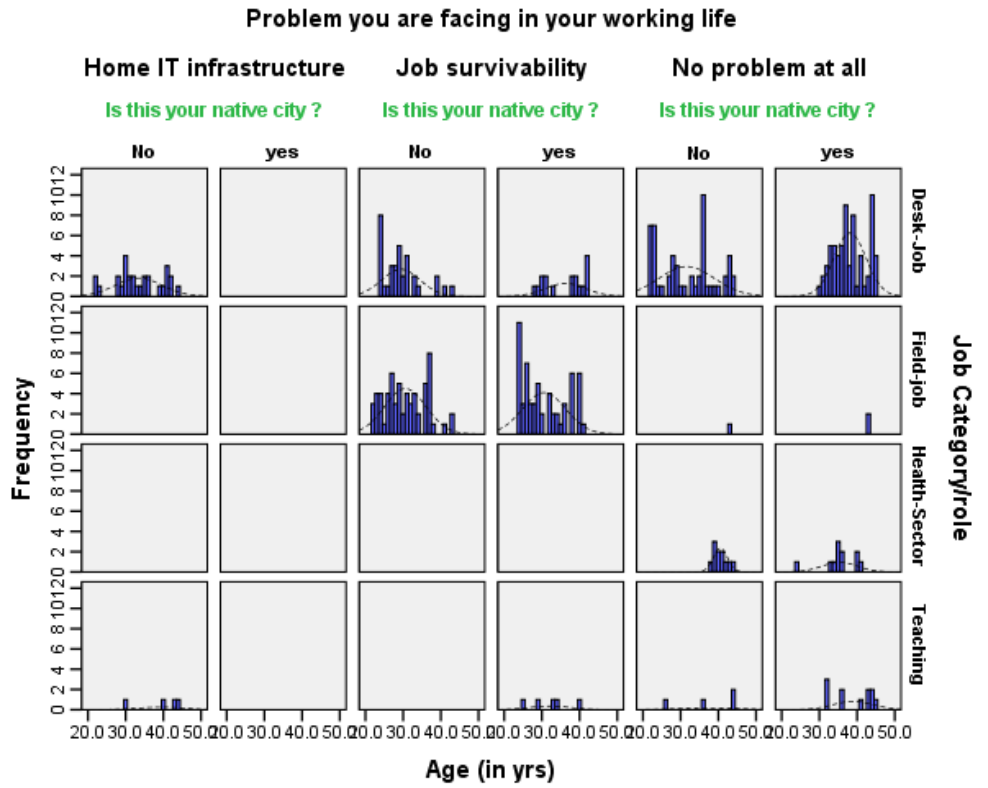


Fig. 4: Association between professional variables

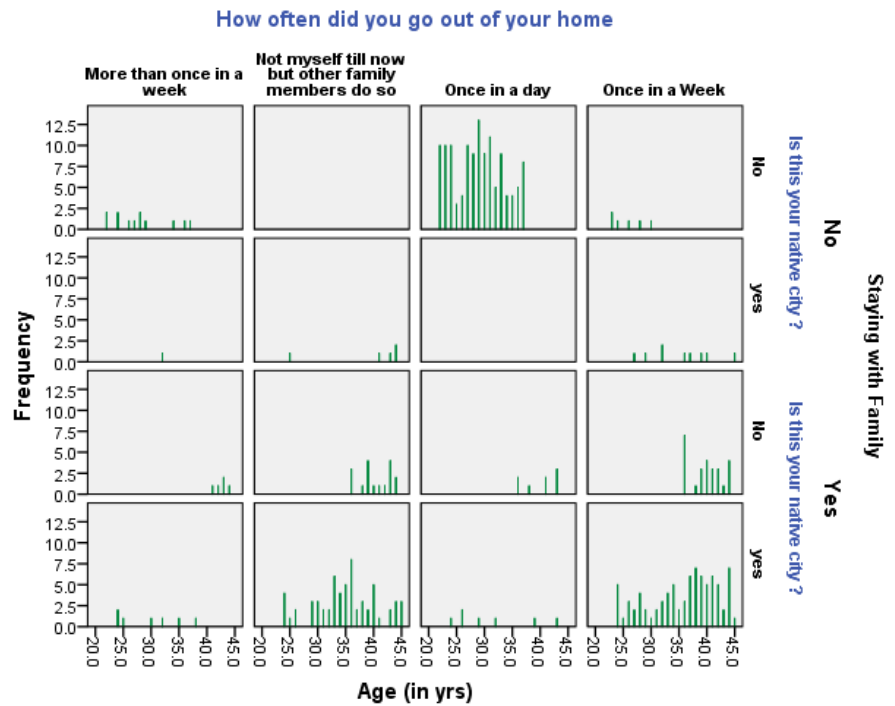


Fig. 5: Association between family support and vulnerability

सेवा वर्ग के बीच कमज़ोर वर्ग की पहचान और तन्यकता के लिए अपनाए गए तरीके

अनिर्बन रेज, शाइस्ता उरूज, अनन्या भट्टाचार्य, अरिंदम रेज, उमर जहाँगीर

सारांश

पृष्ठभूमि: कोविड-19 महामारी के बाद भारत में हुए देशव्यापी लॉकडाउन ने सेवा वर्ग में कमजोर वर्ग को उजागर किया। इनका मनोसामाजिक प्रभाव अब तक अज्ञात है और इसका अध्ययन किया जाना आवश्यक है।

सेटिंग: यह अध्ययन ऑनलाइन प्रश्नावली के माध्यम से 20-45 आयु वर्ग के शिक्षित पेशवरों के बीच दिल्ली, बंगलुरु, मुंबई और कोलकाता में किया गया, जिसमें दैनिक मजदूर और गृहिणियों को शामिल नहीं किया गया। आंकड़ों का विश्लेषण ची-स्क्वायर या फिशर सटीक परीक्षणों से किया गया और परिणाम औसत ± मानक विचलन और आवृत्ति के रूप में व्यक्त किए गए।

परिणाम: 370 प्रतिभागियों में से 53.51% प्रवासी थे जिनमें ज्यादातर पुरुष 30 साल से कम उम्र के थे। बंगलुरु और कोलकाता में उच्च आकर्षण कारक देखे गए, जहां प्रवासी निजी क्षेत्र में डेस्क या फील्ड नौकरियों में लगे थे। इन युवा प्रवासी पुरुषों को नौकरी खोने (61.25%), परिवार का समर्थन न मिलने (87.9%) और आवश्यक वस्तुओं के लिए कोविड के डर के बीच बाहर निकले (78.89%) जैसी समस्याओं का सामना करना पड़ा।

निष्कर्ष: युवा प्रवासी पुरुष सबसे अधिक असुरक्षित थे, जो व्यायाम, ध्यान और रचनात्मक गतिविधियों के माध्यम से लचीलापन बनाए रखने की कोशिश कर रहे थे। यह अध्ययन सामाजिक-जनसांख्यिकीय, सामाजिक, पेशेवर और मनोवैज्ञानिक कारकों के बीच जटिल अंतर्संबंध को रेखांकित करता है, जो ऐसे प्रभावों को संबोधित करने में बहुआयामी दृष्टिकोणों की आवश्यकता पर प्रकाश डालता है। इस अध्ययन की सीमाओं में नियंत्रण डेटा की कमी और राज्यों का असमान प्रतिनिधित्व शामिल है।

कुंजीशब्द: लॉकडाउन, प्रवासी, पारिवारिक सहायता, सामाजिक, मनोविज्ञान, लचीलापन