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E-ISSN 3050-9939
P-ISSN: 0974-1291

HJUM

Hippocratic Journal of Unani Medicine

Volume 19 • Issue 4 • October-December 2024

https://journals.lww.com/HJUM

Central Council for Research in Unani Medicine
Ministry of Ayush, Government of India

Wolters Kluwer

Medknow

Print ISSN: 0974-1291
Online ISSN: 3050-9939

Hippocratic Journal of Unani Medicine

Editorial Board

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The journal

Hippocratic Journal of Unani Medicine (HJUM) is a peer-reviewed, refereed and indexed scientific journal of the Central Council for Research in Unani Medicine (CCRUM), an apex organization for research and development in Unani Medicine under the Ministry of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH), Government of India. Came into existence as a half-yearly journal in 2006, it was made quarterly in 2008 and since then it is being published regularly as a quarterly journal.

Abstracting and indexing information

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Published by
Wolters Kluwer India Private Limited
Fourth Floor, East Wing, Marisoft III, Marisoft Premises,
Part of Software Technology Park, S. No. 15, Vadgaon Sheri,
Kalyani Nagar, Pune – 411 014, Maharashtra, India.
Website: www.medknow.com

Printed at
Nikeda Art Printers Pvt. Ltd.,
Building No. C/3 - 14,15,16, Shree Balaji Complex, Vehele Road,
Village Bhatale, Taluka Bhiwandi, District Thane - 421302, India.

Volume 19, Issue 4, October-December 2024
Hippocratic Journal of Unani Medicine

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Review Article

Gurmar booti (*Gymnema sylvestre* (Retz.) R.Br. Ex sm.): A Comprehensive Review of Its Therapeutic Benefits and Pharmacological Insights

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Abstract

Gymnema sylvestre (Retz.) R.Br. ex Sm.(*Gurmar booti*) is a well-known medicinal plant with belonging to the family *Asclepiadaceae*, grown worldwide, mainly in tropical and subtropical regions of Asia, Africa, and Australia. In the Unani literature, *Gurmar booti* is described as a shrubby climbing plant with dense branches and has been recommended for managing various disorders like urinary disorders, chronic liver diseases, ulcers, indigestion, burning sensation, and stomach pain. The drug possesses *nāfi' dhayābīṭus* (antidiabetic), *tiryāq* (antidote), *mulayyin* (demulcent), *muḥarrik-i-qalb wa dawrān-i-khūn* (stimulant to heart and blood circulation), *muḥarrik* (stimulant), and *mudirr-i-bawl* (diuretic) properties among others. Numerous studies have documented its hypoglycemic, hypolipidemic, antioxidant, and anti-inflammatory properties. Studies have also reported the hypoglycemic effect of aqueous and ethanolic extract of *Gurmar booti* in Diabetes mellitus. This paper aims to review the effect of *Gurmar booti* in reference to Unani literature and modern pharmacological research.

Keywords: *Gurmar booti, Gymnema sylvestre (Retz.) R.Br. ex Sm, hypoglycemic, review, Unani system of medicine*

Introduction

Gymnema sylvestre (Retz.) R.Br. ex Sm. is a valuable herb that has been extensively used in traditional medicine for almost two millennia.[1] The name "Gymnema" is probably derived from the Latin word meaning "naked", and sylvestre means "from the forest."[2] In the Hindi language, it is known as "*Gurmar,*" meaning "destroyer of sugar," and it is believed that it might neutralize the excess sugar present in the body.[3] A large genus of plants distributed in tropical and subtropical regions of the world belongs to the family Asclepiadaceae, or the milkweed family.[4-7] In Unani literature, *Gurmar booti* is described as a shrubby climbing plant having dense branches. Its leaves resemble the leaves of *Aegle marmelos*. When it is chewed, it has a bitter flavor.[4,8-10] Its leaves are primarily utilized for medicinal purposes.[4]

Taxonomical Classification

Kingdom: Plantae; Class: Magnoliopsida; Subclass: Asteridae; Order: Gentianales.

Family: *Asclepiadaceae*; Genus: *Gymnema;* Species: *Sylvestre*.[11]

Morphology

Macroscopic examination

The leaves of *Gymnema sylvestre* (Retz.) R.Br. ex Sm. are green, and the stem is hairy and light brown. The leaf is 1.25–2.0 inches long and 0.5–1.25 inches wide and has a 1–2 cm long petiole. The leaves are simple, rounded to cordate base, margin entire, opposite, with acute apex, and pubescent on both surfaces. Venation is transverse and reticulate with a marginal vein.[12-14]

Microscopic examination

Microscopically, *Gymnema sylvestre* (Retz.) R.Br. ex Sm. hair is observed to be non-glandular and profusely present all over the surface. Leaves contain five vascular bundles, fan-shaped in the center and flanked on either side by two small bundles. The midrib has a ventral bulge that becomes less prominent toward the apical region.[15] The rosette crystals of calcium oxalate are present more towards the center. The cross-section of the lamina shows a dorsiventral structure with mesophyll differentiated into palisade and spongy tissues. The upper epidermal cells are square-shaped and covered by prominent cuticles. The lower epidermal

How to cite this article: Mudassir M, Naseer M, Mohsin M, Rahman Z. *Gurmar booti* (*Gymnema sylvestre* (Retz.) R.Br. Ex sm.): A comprehensive review of its therapeutic benefits and pharmacological insights. Hippocratic J Unani Med 2024;19:121-8.

Received: 28-04-2025
Revised: 28-05-2025
Accepted: 13-06-2025
Published: 10-10-2025

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Access this article online

Website: https://journals.lww.com/HJUM

DOI: 10.4103/hjum.hjum_72_25

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cells are small and covered with thin cuticles.[4] When viewed transversally, the epidermal cell surface is interrupted with trichomes, which are uniseriate, multicellular, with 2–5 celled, present in abundance on both surfaces. Vascular bundles are amphicribal, and the mesophyll is 35-celled thick.[16] Stomata are present only on the lower surface. Rosette crystals of calcium oxalate are present in the idioblasts of the spongy parenchyma.[4] The Flower and leaf of *Gymnema sylvestre* (Retz.) R.Br. ex Sm.[17] and Fruit pods showing elongated, cylindrical follicles characteristic of the species[18] is shown in Figures 1 and 2.

Geographical Distribution

Gymnema sylvestre (Retz.) R.Br. ex Sm. plants grow abundantly worldwide, mainly in tropical and subtropical regions of Asia, Africa, and Australia.[6] It has a natural occurrence in the tropical forests of Central and Southern India, Banda, Konkan, Western Ghats, and in the Goa territory.[11] In Central India, the plant is most frequent in Satpura Valley, Pachmari, Amarkantak, and Chhindwara; in the Mandala Forest and Hoshangabad division of Madhya Pradesh; and the Bundelkhand region of Uttar Pradesh.[7]

Parts Used

Leaves,[19-22] Roots,[11,23,24] Whole Plants.[25-27]

Adverse Effects (*Muḍirr*)

Taking it on an empty stomach may lead to mild gastrointestinal upset. Extremely high doses may induce hypoglycemia in susceptible individuals.[28]

Correctives (*Muṣliḥ*)

Oils.[4]

Temperament (*Mizāj*)

Hot 2° and dry 2°.[9,29,30]

Figure 1: Flowers and leaves of *Gymnema sylvestre* (Retz.) R.Br. ex Sm.[17]

Dose

Leaves: 2–4 g,[8,24] 4–6 g.[4,29]

Compound formulations (*Murakkabāt*)

Qurs-e-Ziabetes khas,[31] Qurs-e-Ziabetes[4]

Cultivation

The plant is not found under cultivation but is common in forests in tropical and subtropical humid climates. It is an evergreen climber that generally requires support for growth; the best season for its plantation is June and July. The root-cutting method is used for the propagation of plants instead of the seeds germination method due to the poor viability of seeds.[32] Terminal cuttings with three or four nodes have also been used as an alternative method for vegetative propagation, usually planted in February-March.[30]

Harvesting and yield

The crop is ready for harvest 2 years after planting. Leaves begin to harvest when plants flower at the end of June and the 1st week of July. The harvested leaves were dried in the shade for about 7–8 days. About 5–6 kg of dried leaves per plant can be obtained from 4-year-old plants. About 4800–5000 kg of dried leaves can be obtained per acre per year.[33]

Phytochemical constituents

The phytochemical constituents present in *Gurmar booti* are hentriacontane, pentatriacontane, phytin resins, albumin, chlorophyll, carbohydrates, tartaric acid, gurmarin, formic acid, butyric acid, anthraquinone derivatives, amino acid derivatives betaine, choline and trimethylamine and inositol, d-quercitol, alkaloids, organic acid (5.5%), paraben, calcium oxalate (7.3%), lignin (4.8%), and cellulose (22%).[34-37]

The main component of *Gurmar booti* is gymnemic acid, a complex mixture of at least 17 different saponins, mostly oleanane, and dammarene classes.[38-40] It also contains

Figure 2: Fruit pods of *Gymnema sylvestre* (Retz.) R.Br. ex Sm showing elongated, cylindrical follicles characteristic of the species[18]

several acylated (tigloyl, methylbutyroyl) derivatives of deacylgymnemic acid.[41] The individual gymnemic acids include gymnemic acids I-VII, gymnemosides A-F, and gymnemasaponins 1–3.[42] The four new triterpenoid saponins, gymnemasins A, B, C, and D, isolated from the leaves of *Gurmar booti*.[43] A few new compounds isolated from leaves are gymnemanol, kaempferol, gymnestrogenin, and seven new dammarane-type saponins, named gymnemasides I–VII.[44,45] Tannins, cinnamic acid, ascorbic acid, flavonoids,[46-48] chromium, iron, potassium, magnesium, sodium, lupeol, amyrin, and stigmasterol were also present.[19,35]

Pharmacological action (Af'al)

The leaves of *Gymnema sylvestre* (Retz.) R.Br. ex Sm. has various pharmacological actions. These are listed in Table 1.

Therapeutic uses (Maḥal-i-Ista'māl)

The leaves of *Gymnema sylvestre* (Retz.) R.Br. ex Sm. are used for the treatment of *Dhayābīṭus Shakri* (diabetes mellitus)[4,8,22] and various other ailments as outlined in Table 2.

Pharmacological Studies

Antidiabetic activity

Kumar *et al*. 2017, Ahmed *et al*. 2017, Aralelimath *et al*. 2012, Shafey *et al*. 2013, and Sugihara *et al*. 2000 observed that the treatment using *Gurmar booti* significantly improved the altered blood glucose level and increased the level of insulin in Streptozotocin-induced diabetic rats.[65-69]

Kumar *et al*. 2015 evaluated that the aqueous extract of *Gurmar booti* decreased the elevated blood glucose in dexamethasone-induced insulin resistance in albino rats.[70]

Tiwari *et al*. 2014 observed that aqueous extract of *Gurmar booti* (400 mg/day) leaves in the treatment of 27 patients with type I Diabetes mellitus for 12 months decreased blood glucose level (up to 35%) as a direct effect of increasing exogenous insulin level (up to 50%). Therefore, this study concluded that the decrease in

Table 1: Pharmacological actions of *Gymnema sylvestre* (Retz.) R.Br. ex Sm. mentioned in the literature of the Unani system of medicine as well as modern pharmacology, with their English equivalent and description

Pharmacological action	English equivalent	Description	Reference
Qaṭi'-i-Munashshiyat	Anti-narcotic	The drug, which helps reduce or counteract the effects of narcotic substances, potentially aiding in addiction treatment	[4,47]
Nāfi' Dhayābīṭus	Hypoglycemic	The drug, which lowers blood sugar levels, and is beneficial for managing diabetes and improving insulin function	[9,10]
Tiryāq	Antidote	Electuary, which eliminates toxicity and preserves life	[9,29]
Mulayyin	Demulcent	The drug that relieves constipation smoothly; a substance that acts to loosen stool and prevents or treats constipation	[49]
Muḥarrik-i-Qalb wa Dawrān-i-Khūn	Cardiovascular stimulant	The drug, which stimulates heart function and promotes better blood circulation, supporting cardiovascular health	[10,29]
Muḥarrik	Stimulant	The drug which stimulates	[50]
Mudirr-i-Bawl	Diuretic	The drug that increases the excretion of urine	[8]
Mukhrij-i-Balgham	Expectorant	The drug that expels phlegm	[8,11]
Muqawwī	Tonic	The drug that strengthens the organs of the body for their optimal functions	[11]
Muḥallil-i-Waram	Anti-inflammatory	The drug that reduces the swelling	[50,51]
Hāḍim	Digestive	The drug that aids in the digestion of food items	[51,52]
Muqawwī-i-Kabid	Liver tonic	The drug that tones up liver cells and improves liver function	[51]
Qātil-i-Dīdān-i-Am'ā'	Anthelmintic	Vermicide, a drug that kills intestinal worms	[8]
Dāfi'-i-Ḥummā	Antipyretic	The drug that reduces increased body temperature	[51]
Muqawwī-i-Raḥim	Uterine tonic	The drug used for toning up the uterus; strengthens the uterus and improves its function	[51,52]
Muqawwī-i-Qalb	Cardiotonic	The drug used for toning up the heart, improving its functions	[51]
Muqawwī-i-A'ṣāb	Nervine tonic	The drug that is used for toning up nerves, improving their functions	[8]
Māni'-i-Nawbat	Antiperiodic	The drug that prevents recurrent diseases, such as malaria, by disrupting disease cycles	[11]
Dāfi'-i-Ta'affun	Antiseptic	The drug that prevents/removes putrefaction	[8]
Mukhaddirāt	Anesthetic	The drug that causes loss of sensation in the organ	[53-55]
Lipid-lowering agent		The drug that helps reduce cholesterol and lipid levels in the blood, supporting heart health	[56]
Muwallid-i-Khūn	Hematogenic	The drug that improves the production of blood	[8]
Muqawwī-i-Mi'da	Stomachic	The drug is used for toning up the stomach; strengthening the stomach, and improving its function	[4,9]

Table 2: Therapeutic uses of *Gymnema sylvestre* (Retz.) R.Br. ex Sm. mentioned in the literature of the Unani system of medicine as well as modern pharmacology, with their English equivalent

Therapeutic use	English equivalent	Reference
Bawl shakri	Glycosuria	[4,9]
Margazeedah	Snakebite	[29,57]
Ḥummā	Fever	[49]
Su'āl	Cough	[4,11]
Waram Ghudud	Swollen glands	[9,10]
Azm-i-Kabid	Hepatomegaly	[29,49]
Azm-i-Ṭiḥāl	Splenomegaly	[4]
Iltihāb Ṭabaqa al-'Inabiyya	Iritis	[26]
Amrāḍ-i-Qalb	Cardiac disorders	[29,50]
Bawāsīr	Hemorrhoid	[4,9,11]
Baraṣ	Vitiligo/leukoderma	[4]
Iltihāb	Inflammation	[29,49]
Iltihāb al-Shu'ab	Bronchitis	[9,11]
Ḍīq al-Nafas	Asthma	[50]
Qurūḥ	Ulcers	[4,11]
Salas al-Bawl	Urinary incontinence	[4]
Dard-Mi'da	Stomach pain	[22]
Amrāḍ-i-Bawl	Urinary disorders	[58]
Amrāḍ-i-Asnan	Disorders of teeth	[8,58]
Siman Mufriṭ	Obesity	[58]
Dasumat-i-Dam	Dyslipidemia	[58]
-	Parkinsonism	[26,59,60]
Sū' al-Haḍm	Dyspepsia	[25,50]
Qābḍ	Constipation	[25]
Dīdān al-Am'ā'	Helminthiasis	[25,51]
Iḥtibās al-Ṭamth	Amenorrhea	[51]
Iltihāb Ṭabaqa al-Multaḥima	Conjunctivitis	[25,51]
Ḍu'f al-Bāh	Anaphrodisia	[50]
Qulā'-i-Dahan	Mouth ulcer	[61,62]
Waram-i-Kabid	Hepatitis	[51]
Faqr al-Dam	Anemia	[63]
Amrāḍ-i-Balghamiyya	Diseases of phlegm	[64]

plasma glucose levels might be due to increased insulin levels.[63]

In a preclinical study, Paliwal *et al*., 2009 found that Gurmar leaf powder had optimistic and hopeful effects on blood glucose levels. It can be concluded that *Gurmar booti* powder effectively decreases fasting and postprandial blood glucose levels.[71]

Shanrnugasundaram *et al*. 1983 evaluated that the activity of insulin-dependent enzymes decreases in the diabetic tissues in rabbits, whereas in the case of insulin-independent enzymes, the activity was augmented in untreated diabetic tissues and reversed during the administration of *Gurmar booti*.[72]

Antidote activity

Walter *et al*., 2000 observed that *Gurmar booti* has antidote property against snake venom, proving to be effective. This activity of the *Gurmar booti* was believed to be due to gymnemgenin.[73]

Hypolipidemic activity

Singh *et al*., 2017 investigated the hypolipidemic activity of *Gurmar booti* in hyperlipidemia-induced Wistar female rats with a high-fat diet. After that, leaf extract was administered, and it was found that this extract significantly lowered the level of cholesterol, low-density lipoprotein (LDL), and triglycerides and increased the level of high-density lipoprotein (HDL) effectively.[74]

Rachh *et al*., 2010 evaluated that the administration of leaf extract of *Gurmar booti* was found to be effective in hyperlipidemic rats for about 2 weeks by reducing the elevated serum triglyceride, total cholesterol, very LDL (VLDL), and LDL in a dose-dependent manner. The results were comparable to those of the standard drug clofibrate.[67]

Bishayee *et al*. 1994 and Kumar *et al*. 2013 reported that it reduces triglyceride, cholesterol, VLDL, and LDL in diabetic rats.[75,76]

Antioxidant activity

Rahman *et al*., 2014 investigated the antioxidant activity of ethanol extracts of *Gurmar booti* by using 1,1-diphenyl-2-picrylhydrazyl (DPPH), and the radical scavenging assay showed better antioxidant potential than *Averrhoa bilimbi* and *Capsicum frutescens*.[77]

Ohmori *et al*., 2005 and Rupanar *et al*., 2012 assessed the antioxidant activity better in DPPH radical scavenging than butylated hydroxytoluene. Further, it was found to reduce LDL oxidation.[78,79]

Anti-inflammatory activity

Malik *et al*., 2008 investigated the anti-inflammatory effects of aqueous extract on experimental inflammatory conditions. *Gurmar booti* significantly decreased the carrageenan-induced paw edema and tumor necrosis factor-alpha levels, indicating the potent anti-inflammatory effect and therapeutic efficacy of *Gurmar booti* extract against all phases of inflammation. It was also found that the anti-inflammatory effect was very similar to the standard drug phenylbutazone.[80]

Diwan *et al*., 1995 and Kumar *et al*., 2012 investigated the anti-inflammatory effects of aqueous and methanolic extracts of *Gurmar booti*, and they displayed inhibitory potential against carrageenan-induced rat paw edema and peritoneal ascites in mice, respectively.[81,82]

Antiarthritic activity

David *et al*. 2013 conducted a study using *Gurmar booti* aqueous and petroleum ether extract against Freund's adjuvant-induced arthritis in rats. The study showed that the extract was found to be effective. This activity of *Gurmar booti* was believed to be due to the rich source of triterpenoids, saponins, and steroids.[83]

Malik *et al*., 2010 investigated the aqueous and petroleum extracts of *Gurmar booti*, which revealed significant antiarthritic activity. This activity was due to the release of inflammatory mediators necessary to reduce bone destruction in arthritic conditions.[84]

Antimicrobial activity

Pasha *et al*. 2009 evaluated that the antimicrobial activity and phytochemical screening of aqueous and methanolic extracts of *Gurmar booti* leaves was moderately effective against *Salmonella typhi, Salmonella typhimurium*, and *Salmonella paratyphi*.[85]

David *et al*. 2013 and Tahir *et al*. 2017 assessed the antimicrobial activity of the methanolic extract of the leaves of *Gurmar booti* and tested against *Escherichia coli, B. cereus, Candida albicans,* and *Candida kefyr*. Its aqueous extract reported moderate antimicrobial activity against *Staphylococcus aureus, Candida krusei, Clostridium perfringens type-A,* and *Candida kefyr*.[83,86]

Anticarcinogenic activity

Srikanth *et al*., 2010 investigated that *Gurmar booti* extract (ethanolic, ethyl, and chloroform) shows an inhibitory effect on human breast cancer cells (MCF7) and human lung adenocarcinoma (A549). These extracts show anticancer activity with a similar IC50 value against human breast cancer cells.[87]

Agrawal *et al*. 2016 investigated the protective efficacy of methanolic extract on the papillomagenesis in the carcinogen 7,12-dimethylbenz(a)anthracene-induced Swiss albino mice. Methanolic extract-treated mice showed decreased tumor incidence, tumor burden, and a cumulative number of papillomas.[88]

Antiobesity activity

Fatani *et al*. 2015 and Shigematsu *et al*. 2001 observed bodyweight reduction in *Wistar rats* and streptozotocin-induced diabetic Albino rats after administering the ethanolic extract of *Gurmar booti*.[89,90]

Anticaries activity

Parimala *et al*. 2010 assessed that the methanolic leaf extract of *Gurmar booti* was significantly effective against dental caries and microbial dental infections.[91]

Hepatoprotective activity

Srividya *et al*., 2010 investigated the hepatoprotective efficacy of the hydroalcoholic extract of *Gurmar booti* in D-galactosamine-induced hepatotoxicity in isolated hepatocytes of rats.[92]

Immunostimulatory activity

Marsh and Brand-Miller., 2005 in the *in vitro* condition, observed that the aqueous leaf extract of *Gurmar booti* showed significant immunostimulatory activity on human neutrophils.[93]

Wound-healing activity

Kiranmai *et al*., 2011 evaluated that herbal formulations consisting of hydroalcoholic extracts of *Gurmar booti* and *Tagetes erecta* Linn. showed wound healing properties in excision wounds and burn wounds models in albino mice.[94]

Discussion

Gymnema sylvestre (Retz.) R.Br. ex Sm., also known as *Gurmar booti* in Unani medicine, is considered a valuable plant because of its diverse range of pharmacological properties. Traditionally known in the Unani system for its treatment of diabetes mellitus, *Gymnema sylvestre* (Retz.) R.Br. ex Sm. has been thoroughly researched in modern medicine for its ability to lower blood sugar levels. The main active components of the plant, particularly gymnemic acids and related saponins, have been shown to have a notable hypoglycemic effect by inhibiting the perception of sweetness and decreasing the absorption of glucose in the intestines.[28]

Numerous experimental and clinical studies have validated the hypoglycemic effects of *Gymnema sylvestre* (Retz.) R.Br. ex Sm. Kumar *et al*., 2017 and Tiwari *et al*., 2014 showed that it can lower blood glucose levels and enhance insulin secretion in diabetic models and human subjects, respectively. This aligns with its traditional Unani pharmacological action as *nāfi'dhayābīṭus* (hypoglycemic) and *muqawwī-i-kabid* (liver tonic), reflecting both glucose-regulating and hepatoprotective properties.[63,65]

Besides its antidiabetic effects, it also has antidote properties,[73] helps lower lipid levels,[74] and exhibits antioxidant activity,[77] suggesting a wider range of therapeutic benefits. The lipid-lowering benefits of *Gymnema sylvestre* (Retz.) R.Br. ex Sm. involve lowering serum cholesterol, LDL, and triglycerides, while also increasing HDL levels, making it useful for treating dyslipidemia and cardiovascular conditions. These activities are aligned with Unani descriptions such as *muḥarrik-i-qalb wa dawrān-i-khūn* (cardiovascular stimulant) and *muwallid-i-khūn* (hematogenic).

Moreover, research on the anti-inflammatory,[80] antiarthritic,[83] antimicrobial,[86] and anticarcinogenic properties (Srikanth *et al*., 2010) of *Gymnema sylvestre* (Retz.) R.Br. ex Sm. has broadened its potential applications beyond just glycemic control. These findings are supported by its application in Unani medicine for conditions such as *iltihāb* (inflammation), *amrāḍ-i-bālghamiyya* (phlegmatic diseases), and *baraṣ* (vitiligo).

The morphology and botanical descriptions, with the illustrations of the flowering and fruiting stages [Figures 1 and 2], are essential visual aids for accurately identifying and authenticating the plant in research and clinical applications.

While *Gymnema sylvestre* (Retz.) R.Br. ex Sm. shows potential pharmacological benefits, additional clinical studies and standardization of dosage, extract type, and administration route are necessary to confirm its effectiveness as a widely-used therapeutic treatment. The traditional Unani perspectives offer a valuable foundation for integrative medicine strategies, blending historical knowledge with contemporary modern scientific understanding.

Conclusion

The comprehensive review aimed to explore *Gymnema sylvestre* (Retz.) R.Br. ex Sm. in classical Unani literature, as well as other traditional literature, and scientific reports. It can be concluded from the review that *Gymnema sylvestre* (Retz.) R.Br. ex Sm. is a drug that has been effectively used in the Unani system of medicine for many years to address various health conditions. In most literature, its primary effect is as a hypoglycemic agent. Various preliminary investigations and scientific studies showed promising results in hyperglycemic states. It is hypoglycemic, and numerous other properties have been validated through *in vitro* and *in vivo* pharmacological studies. Although preliminary results are promising, large-scale, multicentric clinical trials are necessary to comprehensively evaluate and confirm the efficacy, safety, and overall therapeutic value of the drug in the diverse patient population. Furthermore, research should prioritize and focus more on the bioactive components of the drug to elucidate their therapeutic potential and to establish it as a standard drug in hyperglycemic state.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Review Article

Comparative Analysis of the Concept and Management of Alcohol Intoxication in the Unani and Conventional Systems of Medicine

Abstract

Alcohol is a legally available and widely used substance, often employed for medicinal purposes. However, its misuse and toxic effects are a frequent concern in clinical practice. Alcohol intoxication is a medically hazardous condition resulting from the consumption of excessive amounts of alcohol. It presents with a wide range of clinical manifestations involving multiple organ systems, including behavioral, cardiac, gastrointestinal, pulmonary, neurological, and metabolic effects. Given its high prevalence and association with serious complications such as trauma and chronic alcohol use disorders, alcohol intoxication remains a critical clinical issue. This review aims to highlight the primary clinical features of alcohol intoxication and its pharmacological management. It also draws insights from classical Unani literature, wherein alcohol is recognized as a substance with therapeutic potential when used in appropriate doses. However, its consumption must be guided by individual tolerance, and the fine line between its medicinal use and abuse should be approached with caution.

Keywords: *Alcohol de-addiction, Alcohol intoxication, Alcohol-induced disorders, Unani medicine*

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Introduction

The Unani system originated in Greece and is based on the humoral theory of diseases. It considers the temperament of both the disease and the individual, embracing a holistic approach to treatment. Alcohol has long been one of the most widely used psychoactive substances across various cultures, owing to its relative availability and legal status in many regions, although it remains banned or heavily regulated in others.[1] Unani classical text also has an extensive mention of alcohol as a drug. Originally, alcohol was in powder form, and its name is also derived from its form through Medieval Latin from Arabic. Arabic chemists used the term *Al-Kuḥul*, which means powder for the eyes and later came to mean "finely divided spirit."[2] In chemistry, an alcohol is any organic molecule that has a carbon atom linked to the functional hydroxyl group (-OH). The primary alcohol found in alcoholic beverages and the substance originally referred to by the term "alcohol" is ethanol (also known as ethyl alcohol). It is a volatile, flammable, colorless liquid with a slight characteristic odour made by three different but related processes, i.e., fermentation (*Takhmīr*), brewing (*Sharāb Sāzī*/*Kashīdkari*), and distillation (*Amal-i Taqtīr*).[3] In Unani medicine, the term *Nabīḍ* or *Sharāb* is used for alcohol. Unani scholar *Allama Kabiruddin* has mentioned the qualities of good alcohol as having a good taste, a pleasant smell, being clear in color, and being thin in consistency.[4] This article aims to explore the clinical features of alcohol intoxication as recognized in contemporary medicine, while also drawing parallels with Unani perspectives on alcohol use. It further seeks to highlight the therapeutic boundaries and risks associated with alcohol consumption, emphasizing a cautious and individualized approach.

Methodology

The information related to alcohol, its classification, metabolism, absorption, and alcohol intoxication was collected from ancient Unani texts, namely *Al-Qanoon Fil-Tib*, *Kamilus Sana*, *Zakhira Khawarzam Shahi*, and *Kulliyāt-i-Nafisi*. In addition, the recent updated literature was gathered after surfing through information databases such as PubMed, Medline, Science Direct, and Web of Science using the keywords alcohol intoxication, alcohol-induced disorders, and adverse effects of alcohol consumption.

How to cite this article: Fatima N, Shahid A, Riyazuddin M. Comparative analysis of the concept and management of alcohol intoxication in the Unani and conventional systems of medicine. Hippocratic J Unani Med 2024;19:129-34.

Received: 03-01-2024
Revised: 31-07-2025
Accepted: 05-08-2025
Published: 10-10-2025

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Access this article online

Website: https://journals.lww.com/HJUM

DOI: 10.4103/hjum.hjum_1_24

Quick Response Code:

Observation

Classification of alcohol in Unani medicine

On the basis of the ingredients used

- *Khamr* is made from fresh grapes[5]
- *Zabīb* is made from dried grapes[5]
- *Nabīḍ Asli* is made from honey[5]
- *Tamri* is made from dates[5]
- *Fuqqā'* is made from barley.[5]

On the basis of color

Sharāb-i Surkh

It is red-colored, has a high degree of hotness (*Ḥarārat*) and dryness (*Yābusat*), and readily passes from the stomach. It enhances Innate heat (*Ḥarārat-i-Gharīzī*) if taken in limited quantities.[6]

Sharāb-i Ahmar Qani

It is dark red in color and rich in nutrients. It also possesses a high degree of hotness (*Ḥarārat*) and readily passes from the stomach.[5]

Sharāb-i Zard

It is yellow-colored and most potent in hotness (*Ḥarārat*). It causes headaches and increases bilious substances.[4,5]

Sharāb-i Siyah

It is rich in nutrients with a lesser degree of hotness (*Ḥarārat*) and takes time to excrete out of the body.[5]

Sharāb-i Safaid

It is white in color with the least hotness (*Ḥarārat*) and nutrients but easily passes from the body.[4,5]

On the basis of viscosity

Raqīq Sharāb (Nonviscous alcohol)

It is rich in volatile substances, so it easily evaporates towards the brain and occupies the space of pneuma (*Rūh*) by displacing it.[5] But due to its volatile property, it easily dissolves, and pneuma comes back to its original place to fill the empty spaces. This process takes place throughout the brain, causing continuous disturbance to *Rūh*, which ultimately results in intoxication.[5-7]

Ghalīẓ Sharāb (Viscous alcohol)

It is rich in heavy nonvolatile substances, so it cannot be easily absorbed and evaporated and remains in the stomach and intestines for a long duration, later getting absorbed by the liver. Its fumes are also thick in consistency, so they take more time to dissolve, rendering its action as late in action but long-lasting.[4-7]

The National Institute on Alcohol Abuse and Alcoholism recommends that both males and females should not drink more than 28 g (2 standard drinks) and 14 g (1 standard drink) per day, respectively. Low doses of alcohol possess some beneficial effects, whereas excessive use of alcohol has so many harmful effects on different organ systems. Legal intoxication with alcohol requires a blood alcohol concentration (BAC) of 0.08 g/dL (BAC is the percentage of blood that is concentrated with alcohol). At this level, there will be a definite impairment of muscle coordination and driving skills, which will increase the risk of an accident.[8-16] No specific minimum or maximum dose of alcohol is mentioned in Unani literature, but the physicians have said that one should consume alcohol according to their own tolerance. They have also described the type of alcohol to be used according to age. The temperament (*Mizāj*) of adults is hot and dry (*Hārr Yābis*), so white colored alcohol (*Sharāb-i Safed*) mixed with water should be used, as the addition of water will reduce the heat (*Ḥarārat*) of alcohol. The temperament of the elderly is cold and dry (*Bārid Yābis*), so yellow colored alcohol (*Sharāb-i Zard*) mixed with water should be used. *Sharāb-i Zard* has an extremely hot temperament (*Harārat*), so it eliminates phlegmatic or viscous wastes from the body and improves the natural heat (*Ḥarārat-i Gharizī*), and the addition of water will help to reduce the dryness (*Yabūsat*). In children, alcohol is forbidden as it has no beneficial effect in this age group.[4]

Metabolism and absorption of alcohol

A major portion (80%) of alcohol is metabolized in the cytosol of hepatocytes, where it is converted into acetaldehyde by alcohol dehydrogenase, while some portion (10%–20%) is metabolized via the microsomal ethanol oxidizing system in smooth endoplasmic reticulum of hepatocytes and peroxisomes, where it is converted into acetaldehyde by CYPE2E1 and catalase.[3,8] This acetaldehyde is highly toxic, carcinogenic, and mutagenic, and is chiefly responsible for tissue damage. Further, this acetaldehyde is converted into acetate by acetaldehyde dehydrogenase in the mitochondria. This acetate breaks down into CO_2 and H_2O via the Krebs' cycle and is eliminated from the body.[9-17]

A small amount of alcohol is absorbed by the mucous membranes of the mouth and esophagus, modest amount by the stomach and large bowel, and major amount by the proximal portion of the small intestine. A small amount of ethanol (2%–10%) is excreted directly through the lungs, urine, or sweat, but the greater part is first metabolized and then excreted.[8-11]

Beneficial effects of alcohol

Low doses of alcohol i.e. 1 or 2 (standard drink contains 14 g of alcohol) have some health benefits as they provide energy (1 g of alcohol provides 7 cal. of energy), decrease the risk of occlusive coronary disease (by increasing levels of high-density lipoprotein cholesterol), embolic stroke

(as it decreases platelet aggregation),[18] type 2 diabetes (by increasing insulin sensitivity),[19] and gallstones.[20]

Unani physicians have also described some beneficial effects of alcohol, such as euphoria, excitement, prevention of depression, melancholy, and obstruction in organs, as well as an antidote to some poisons. It also promotes skin glow and stimulates the digestion and excretion of excess humors. Unani scholars state that pneuma (*Rūh*) becomes light due to the heat of alcohol and moves towards the periphery, making the person happy and the skin glow. It acts as a cardio-tonic and improves natural heat, increasing excitation. Hopelessness or depression is a symbol of weakness of the heart, and alcohol acts as a cardio-tonic and makes it strong.[4] Alcohol eliminates black bile, thus preventing melancholy. Poisons such as opium (*Afyūn*) and hemlock (*Shukrān*) cause excessive clotting of blood, and alcohol prevents clotting with its hot temperament, thus acting as an antidote.[5] Since alcohol possesses the deobstruent property, it cures obstructions. However, it acts as a carrier for food particles and circulates the end products in different organs if taken after a meal, but if it is taken during or before a meal, then it carries undigested food and causes obstruction. Because alcohol possesses the properties of expectorant, bile diuretic, and blood purifier, it acts as a stimulant for the evacuation of bad humors.[4,5]

Harmful effects of alcohol

Alcohol affects almost all systems of the body.

Nervous system

Alcohol is a central nervous system (CNS) depressant. Normally, there are neurotransmitters in the brain that transmit information from neuron to neuron so that the brain can perform its functions smoothly. Excessive use of alcohol increases the number of neurotransmitters, so it takes more time to transmit the information, and the brain's activity slows down.[21]

It causes impaired judgment and coordination (thus increasing the risk of accidents), delays reaction time, slurs speech, impairs hearing, euphoria and excitation, double vision, disturbed sleep, disturbing dreams, snoring and sleep apnea (because alcohol relaxes the muscles of pharynx), blackouts (it is temporary amnesia in which patient forgets everything or a part of ii after drinking episode), cerebellar degeneration or atrophy (it causes unsteady stance and gait, and nystagmus may also present), hangover syndrome (headache, nausea, vomiting, thirst, fatigue and loss of work following the day of drinking), peripheral neuropathy (chronic use of alcohol will cause nerve damage so patient will feel pain and numbness in bilateral extremities), Wernicke–Korsakoff syndrome etc.[1,8]

Unani physicians state that the vapors of alcohol with high heat (*Harārat*) ascend towards the brain, and hinder the normal functioning of the brain, causing Paresis and tremors by weakening the nerves. It leads to syncope and apoplexy because of obstruction of pneuma of brain (*Rūh-i Dimāgh*) by excessive vapors of alcohol and altered temperament of brain (*Sū'-i-Mizāj Dimāgh*),[4] ultimately causing psychiatric conditions. Excessive use of alcohol causes moderate to severe anxiety, depression, intense sadness, auditory hallucinations, antisocial personality disorder, and suicidal tendencies.[8,14]

Cardiovascular system

Alcohol acutely stimulates the sympathetic nervous system, which constricts the blood vessels and increases the contractile force of the heart, leading to hypertension.[22] Alcohol also stimulates the renin-angiotensin-aldosterone mechanism and has a direct toxic effect on cardiac muscle, leading to cardiomyopathy. The heart cannot pump a sufficient amount of blood and may cause heart failure. It also leads to Holiday heart syndrome, i.e., acute disturbance of a heart rhythm without other clinical evidence of heart disease in a person who has consumed a large amount of alcohol, such as during a holiday party.[23-25]

Musculoskeletal system

Alcohol causes muscle weakness due to malnutrition, decreases growth on epiphyses, alters calcium metabolism, blocks calcium absorption from the diet,[8] and lowers bone density. It increases the level of cortisol, hence decreasing bone density, and alcohol increases the level of parathyroid hormone, which decreases osteoblast formation and increases the risk for fracture and osteoporosis.[8,14]

Reproductive system

Oxidative stress due to intoxication causes tissue injury to testes and ovary, as well as increases secretion of estrogen in female and decreases level of testosterone in male, hence alcohol causes irreversible testicular atrophy with shrinkage of seminiferous tubules, decrease ejaculatory volume, increase sexual desire but decrease erectile capacity, lower sperm counts in male and causes amenorrhea, infertility, decreased ovarian size and increased risk of spontaneous abortion in female.[26]

Effect on fetal development

Excessive use of alcohol causes fetal alcohol spectrum disorder (FASD) among pregnant women, caused by a wide range of physical, behavioral, and learning problems in children born to heavy drinking mothers.[26] Some features of FASD are: Facial changes with epicanthal eye folds, poorly formed ear concha, small teeth with faulty enamel, atrial septal defect or ventricular septal defect, microcephaly with mental retardation, limitation in joint movement, low birth weight, lower IQ, hyperactive behavior, cognitive deficits, and seizure disorder.[26,27]

Cancer

Alcohol decreases the production of glutathione and increases loss of it from the liver, also decreases other antioxidants that leads to increased risk of esophageal carcinoma, oropharyngeal carcinoma, hepatocellular

carcinoma, breast and cervical carcinoma, prostate carcinoma, lung carcinoma, and carcinoma of the pancreas.[8]

Esophagus and stomach

Alcohol causes irritation of the gastrointestinal lining, hence causing esophagitis and gastritis. Whenever there is an increase in the level of toxic material present in blood circulation, the vomiting center present in the brain tries to get rid of it by expelling it out resulting in violent vomiting.[8] It also causes portal hypertension, leading to esophageal varices and Mallory–Weiss syndrome.[8,14]

Liver and pancreas

During alcohol metabolism, the reduced form of nicotinamide adenine dinucleotide (NAD) generates which promotes the synthesis of fatty acids and opposes their oxidation, so fat gets accumulated in hepatocytes and causes fatty liver.[14] Reduced form of NAD causes oxidative stress and lipid peroxidation which releases free radicals and causes liver injury as well as excess use of alcohol changes the gut permeability leading to increased absorption of endotoxins released by bacteria present in the gut and in response of these endotoxins, Kuffer cells of liver release free radicals which causes hepatocytes injury resulting in alcohol hepatitis.[8,14] Continuous liver injury causes fibrosis and may develop into cirrhosis.[8,14,23]

It causes an altered temperament of the liver and its weakness (*Sū'-i-Mizāj wa Ḍu'f-i-Jigar*) due to excess and abnormal heat (*Sū'-i-i Mizāj Hārr*), flatulence because of being rich in waste fluids which suppresses the heat. When this suppressed heat acts in the presence of excessive moisture, it causes flatulence. Major portion of alcohol remains in the intestine because it cannot pass through the mesentery due to its viscosity and causes diarrhea.[4,5] Due to loose stools, the quantity of end products toward the liver decreases, and it becomes weak and unable to absorb the nutrients. Moreover, alcohol creates tension in the liver by producing pneuma in it that leads to hepatic cell injury.[4-6]

Alcohol intoxication

Alcohol is an intoxicant that affects a range of functions and structures of the CNS. When combined with personality traits, associated behaviors, and sociocultural expectations, alcohol can cause both deliberate and inadvertent harm to both the drinker and others.[28] The World Health Organization (WHO) has estimated that there are 140 million people with alcoholism worldwide.[29] According to the WHO's 2014 report on noncommunicable diseases, hazardous alcohol use results in 5.9% of all deaths, i.e., approximately 3.3 million deaths annually. Furthermore, 139 million disability-adjusted life years (a measure of overall disease burden that reflects the years of healthy life lost owing to both premature mortality and prolonged poor health), or 5.1% of the worldwide load of disease and injury, were attributable to alcohol use. Alcohol use causes varying percentages of deaths worldwide, depending on gender, with 7.6% of deaths among men and 4.0% of deaths among women.[30-34] Asian countries such as India and Japan, which have low per capita alcohol consumption owing to their traditions, are now discovering that alcoholic cirrhosis, once a rarity, has become a significant cause of morbidity and mortality.[35] In southern India, the prevalence of current alcohol use varies between 33% and 50%, with a higher prevalence among the less educated and the poor. Alcohol intoxication is a physiological condition caused by a high blood ethanol concentration. It occurs when a person consumes more alcohol than their body can tolerate and exhibits abnormal behavior or physical characteristics. It may be acute or chronic and is also known as drunkenness.[8]

Diagnosis

Patients with alcohol intoxication can be diagnosed by taking proper history of current and past use of alcohol various questionnaires such as Cut, Annoyed, Guilty, and Eye and Alcohol Use Disorders Identification Test, assessing the presence of behavioral or psychological changes, undergoing a physical examination including analysis of vitals, nutritional status etc. and performing laboratory tests such as Liver Function Test (LFT), carbohydrate deficient transferring, gamma glutamyl transferase, mean corpuscular volume.[8,14,36] Differences are presented in Table 1.

Alcohol De-addiction

Alcohol de-addiction must be addressed initiating by removing the root cause, i.e., first of all, we have to remove the cause, i.e., alcohol abstinence. It can be achieved through thorough counseling of the patients with the support of family and friends, along with certain psychiatric interventions. In addition, some pharmacological agents can also be used to treat alcohol dependence, such as disulfiram, naltrexone, nalmefene, and acamprosate.[30,31,37,38] Ismail Jurjani suggested that the use of one *Ratal* (equivalent to 480 mL) of water of *Ruta graveolens* L. (*Aab Raz*/*Suddab*), instead of alcohol, without disclosing to the individual that it is not alcohol, and consumption of alcohol dipped bread has also been proposed as a method of quitting drinking.[6] Furthermore, *Quercus infectoria* G. Olivier (*Mazu*.) has also been explored for its potential in alcohol de-addiction.[39] Physicians have outlined various tips to mitigate the risk of alcohol intoxication. It includes instant vomiting induction if someone has ingested an excessive amount of alcohol, use of small glasses for drinking, maintaining an appropriate interval between drinks, and use of vinegar water mixture to expedite recovery from alcohol intoxication. Some Unani physicians have suggested the use of almonds before drinking to reduce the risk of alcohol intoxication.[4] Habitual

Table 1: Comparison of factors between the Conventional and Unani Systems

Factor	Conventional medicine	Unani medicine
Dose of alcohol intoxication	0.08 g/dL BAC	No definite dose is mentioned
Beneficial effects	Provides instant energy, decreases the risk of CAD, stroke, T2DM, and gallstones	Stimulant, cardiotonic, deobstruent, expectorant, blood purifier, and antidote to opium and hemlock
Harmful effects	CNS depression, anxiety, hallucinations, hypertension, muscle weakness, gastritis, esophagitis, carcinoma, alcoholic liver disease, alcoholic hepatitis, and liver cirrhosis	*Sū'-i-Mizāj Haar*, flatulence, intestinal diarrhea, hepatic diarrhea, and hepatic cell injury
Diagnosis	History, presence of behavioral changes, deranged LFT, CDT, GGT, and MCV	History, Changes in behavior, appetite, and stool

BAC: Blood alcohol concentration, CDT: Carbohydrate-deficient transferring, GGT: Gamma-glutamyl transferase, MCV: Mean corpuscular volume, CNS: Central nervous system, LFT: Liver Function Test

drinkers should be given nutritious diet and appropriate drugs according to involvement of the system, namely Brain tonics such as *Prunus amygdalus* Batch (*Maghz-e-Badam Sherin*), *Lagenaria siceraria* (Molina) Standl. (*Maghz-i-Tukhm-i-Kadu Sherin*), *Terminalia chebula* Retz. (*Halaila Siyāh*), *Lavandula stoechas* L. (*Usṭukhudus*), *Papaver somniferum* L. (*Tukhm-i-Khashkhash*), semi-liquid preparation with *P. amygdalus* Batch (*Ḥarīra Maghz-i-Badam*), and pills of *Bacopa monnieri* (L.) Wettst. (*Ḥubūb Brahmi*) should also be administered Nervine tonics (*Muqawwī-i-Aʻṣāb*) in case of nervous system involvement, such as *Semecarpus anacardium* L.f. (*Biladur*), *Strychnos nux-vomica* L. (*Kuchla*), *Delphinium denudatum* Wall. ex Hook. f. and Thomson (*Jadwar*), *Moschus moschiferus* (*Mushk*), *T. chebula* Retz. (*Halaila*), and *Terminalia bellirica* (Geartn.) Roxb. (*Balaila*); Cardiotonic (*Muqawwī-i-Qalb*) drugs in cardiovascular involvement such as *Bombyx mori* (*Abresham*), Silverfoil (*Warq-i-Nuqra*), *M. moschiferus* (*Mushq*), *Ambra greasa* (*Ambar*), and *Crocus sativus* L. (*Zafran*); Carminatives (*Kāsir-i-Riyāḥ*) such as *Ferula assa-foetida* L. (*Hing*), *Mentha x piperita* L. (*Podina*), *Zingiber officinale* Roscoe (*Zanjabeel*), Black salt (*Namak Siyah*), and *Commiphora mukul* Baill (*Muqil*). May also be used as anastaltic and astringent drugs (*Ḥābis wa Qābiḍ Advia*) such as *Dracaena cinnabari* Balf.f. (*Dammul Akhwain*), *Armenian bole* (*Gile Armani*), and *Aesculus hippocastanum* L. (*Baloot*). Furthermore, stomachic (*Muqawwī-i-Miʻda*) such as Iron (*Faulad*) and *Foeniculum vulgare* Mill. (*Badiyan*), *Nigella sativa* L. (*Kalaunji*). Hepato-refrigerants (*Mubarridā Jigar*) such as Water of *Cichorium intybus* L. (*Aabe Kasni*), Water of *Solanum nigrum* L. (*Āb-i-Mako*), oxymel (*Sikanjabeen*), and refrigerant poultice (*Mubarrid Ḍimād*) such as *Santalum accuminatum* (R. Br.) A. DC. (*Sandal*), and *Rosa damascena* Mill (*Gule Surkh*) are suggested. In case of hot morbid temperament of liver (*Sū'-i-Mizāj-i-Jigar Ḥārr*), Deobstruent drugs (*Mufattiḥ-i-Sudad*) such as Decoction of *C. intybus* L. seeds (*Joshānda Tukhm-i-Kāsnī*), Decoction of *Solanum nigrum* L. seeds (*Joshānda Tukhm-i-Mako*), Decoction of *Cucumis sativus* L. seeds (*Joshānda Tukhm-i-Khayar*), and Decoction of *Adiantum capillus-veneris* L. (*Joshānda Parsiyaoshan*) are recommended. In addition, concoctives and purgatives of yellow bile (*Mundij wa Mushil Ṣafrā*) in case of bilious inflammation of liver (*Waram-i-Jigar Ṣafrāwi*) should be administered.[4-7]

Conclusion

Over time, alcohol has been extensively utilized as a drug and is even referenced in classical Unani texts. While small amounts of alcohol may offer certain health advantages, such as providing energy and some cardiovascular benefits, excessive consumption poses significant risks to nearly every bodily system. Alcohol's adverse effects span from neurological impairments to cardiovascular ailments, musculoskeletal issues, reproductive challenges, fetal developmental disorders, cancer, and gastrointestinal complications. Furthermore, alcohol intoxication can result in substantial societal and personal harm, evident from the substantial global burden of alcohol-related diseases and fatalities.

Addressing alcohol addiction necessitates a multifaceted strategy, encompassing counseling, social support, psychiatric interventions, and possibly pharmacological treatments. The Unani system provides insights into minimizing the risks associated with alcohol intoxication, stressing the importance of dietary adjustments, herbal remedies, and lifestyle changes to support recovery and alleviate the negative impacts of alcohol on health.

Recognizing the nuances of alcohol consumption and addiction through the lens of traditional medicine systems like Unani can inform more holistic approaches to prevention, intervention, and rehabilitation, fostering overall health and well-being for individuals and communities alike.

Acknowledgment

The authors are thankful to all faculty members for their encouragement and the library staff of their respective institutions for providing all literature related to this manuscript at the time of writing.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Original Article

Unani Concept of *Maḍarrat* and *Tadbīr-i-Advia* (Adverse Drug Effect and Detoxification): A Scientific Appraisal

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Abstract

Background: Unani medicine, such drugs are used after processing (detoxification), a procedure by which harmful elements are downgraded. The Unani concept of adverse drug effects and their downgrading before use is somehow vague for the present-day addressees because of subjective scales to enumerate the idea. **Methodology:** This study was designed to revisit the concept of scientific parameters. Pre- and post-processed samples of an Unani drug, *Māzū Sabz*, which is thought to be harmful as it is, were taken as an example and evaluated using physicochemical and analytical methods, such as spectrophotometry and high-performance liquid chromatography, to determine whether there are any differences between pre- and post-processed samples. **Result:** The study did not reveal clear results. The study revealed that the conventional concept of adverse drug effects and the Unani concept of Maḍarrat (adverse drug effect) are not the same. This study also explained that the processing of a drug (*Tadbīr-i-Advia*) does not always mean a major difference; rather, the purpose may also be, sometimes, otherwise. **Conclusion:** These findings underscore that the traditional Unani notion of Maḍarrat (adverse drug effect) differs from the modern concept of toxicity, and that the purpose of drug processing (Tadbīr-i-Advia) may extend beyond merely reducing harm—it is not always aimed at creating significant chemical alterations.

Keywords: *Adverse drug effects, Maḍarrat, Māzū Sabz, processing, Unani medicine*

Introduction

The Unani concept of adverse effect entails a bit of ambiguity. The related aspects, such as the nature of the adverse effect, harmful dose and duration of use of harmful drugs, need added elaboration. Differences between adverse effects and toxicity of drugs are changes that occurred in the postprocessing drug, etc., require reinvestigation. Furthermore, standardization of various processes used for *Tadbīr-i-Advia* has also not been done. Although most classical Unani books have mentioned the harmful effects of drugs, their correctives and methods of purification, but left the core concept indistinct to appraise.

According to Unani Medicine, drugs belonging to the 3rd and 4th degree temperament may be harmful even at their therapeutic dose levels, and some drugs of lower temperament may do so if used for a long period or without correctives or processing. The Unani scholars have placed each drug in its respective temperaments based on observation, uses, and adverse effects, along with the corrective measures.[1]

Some Unani scholars contemplate that all drugs are potentially harmful.[1,2] According to them, all harmful drugs are of three types. First, drugs which are harmful in the state of health but useful in the diseased condition, are used without any processing or correctives in diseased condition; second, drugs which are harmful in diseased conditions but safe in the state of health, are used with correctives in diseased condition; third, drugs which are harmful in both conditions, are used after processing and with correctives in both conditions. The harmful effects of drugs either cause the functions of an organ to weaken or change the function, or make the function devastated. The above concerns are indicative of disturbance in function only, but are silent about structural changes because of the nonavailability of biochemical and histopathological tests centuries ago; therefore, the physicians could not explain adverse effects on the present-day scientific parameters.

How to cite this article: Chand K, Wadud A, Uddin H, Kalam MA. Unani concept of *Maḍarrat* and *Tadbīr-i-Advia* (Adverse drug effect and detoxification): A scientific appraisal. Hippocratic J Unani Med 2024;19:135-9.

Received: 29-05-2025
Revised: 07-07-2025
Accepted: 05-08-2025
Published: 10-10-2025

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Access this article online

Website: https://journals.lww.com/HJUM

DOI: 10.4103/hjum.hjum_5_24

Quick Response Code:

In conventional medicine, adverse drug effects and toxicity are two different notions. The former discusses about all unwanted drug effects, ranging from trivial side effects to fatality. However, toxicity is viewed differently where both structural and functional disturbance occur at the cellular, tissue or organ level.[3,4] Conventional medicine has no concept of processing harmful drugs. The toxic effects of drugs are usually dose-related and are predictable. They may damage the organs, for example, Liver cirrhosis due to overdose or prolonged use of paracetamol. Toxicity may also be the extended therapeutic effect, for example, coma due to barbiturates.[5] No harmful conventional drug is subjected to any detoxification process before use.

The various processing methods of Unani medicine aim to minimize the adverse effects of *Tadbīr wa Iṣlāḥ* (processing), including *Biryān* (roasting), *Tashwiya*, *Taṣfiya* (cleaning), etc., Use of *Muslīḥāt* (corrective drugs) and change of route of drug administration.[6,7] The drugs that undergo certain procedures to minimize adverse effects retain therapeutic effects or even maximize the therapeutic potential. In this study, it was made to observe whether there is any difference between the drug as it is and the same after processing, so as to appraise the Unani concept scientifically. In this study, *Māzū Sabz* (*Quercus infectoria* Olive.) was taken as an example.

Materials and Methods

Drugs

Q. infectoria was procured from the local market of Bengaluru.

Identification of the raw drugs

Both drugs were authenticated by Dr. S. Nurunnisa, Senior Research Associate, FRLHT, Bengaluru vide. FRLHT 3888.

Chemicals and solvents

Petroleum Ether, Benzene, Chloroform, Acetone, Ethanol, Sodium hydroxide, Hydrochloric acid, Sulfuric Acid, Ammonia, Fehling A and B solution, Nitric acid, Benedict's reagent, Ethyl acetate, Molish's reagent, Mayer's solution, etc., were of analytical grade.

Methods of processing

Māzū Sabz was taken in a pan, and 25 mL of *Ravghan-i-Kunjad* (Sesame oil) was added to it until the whole of *Māzū Sabz* was soaked in the oil. It was stirred for 5–8 min on the electric stove on a low flame till the oil was completely absorbed. Special care was taken to avoid the burning of the drug.[1,8]

Powdering of drugs

The pre- and post-processed samples of drugs were crushed into small pieces with the help of an Iron mortar and pestle, and powdered finely in a mixer. These powders were stored separately in an air-tight glass jar for the study.

Physicochemical studies

Organoleptic properties

Appearance, color, taste, smell, and texture of both pre- and detoxified forms of drug samples were evaluated.[8]

Ash value

Two grams of dried powdered drug were placed in an accurately weighed and dried silica crucible and were incinerated at a temperature not exceeding 450°C in the muffle furnace until free from carbon. The crucibles were cooled and kept in the desiccators, and the crucibles were weighed with ash, and the weight of ash was subtracted from the total weight. The percentage of total ash was calculated concerning the air-dried *Māzū Sabz* in both crude and detoxified form. The process was repeated for triplicate.[9]

Determination of acid insoluble ash

The ash was boiled with 25 mL of dilute hydrochloric acid for 5 min, filtered through an ashless filter paper and washed with hot water. The insoluble matter collected on the ashless filter paper was ignited at a temperature not exceeding 450°C in the muffle furnace. After cooling, the weight of the insoluble ash was calculated concerning the air-dried *Māzū Sabz* samples in both crude and detoxified form. The process was repeated for triplicate.[9]

Determination of water-soluble ash

The ash was boiled with 25 mL of distilled water for 5 min and filtered through an ashless filter paper (Whatman 41). The insoluble matter collected on the ashless filter paper was ignited at a temperature not exceeding 450°C in the muffle furnace. After cooling, the weight of the insoluble ash was calculated concerning the air-dried *Māzū Sabz* samples in both crude and detoxified form. The process was repeated in triplicate.[10]

Loss of weight on drying at 105°C

Two gram of drug was taken in previously weighed crucibles and was kept in a hot air oven for drying at 105°C for 5 h. The drug was allowed to cool in desiccators and weighed. The procedure was continued by drying the drug in the oven for 1 h each time after weighing until the difference between two successive weighing corresponds to not more than 0.25%. Loss of weight on the drying method was calculated regarding the original weight of *Māzū Sabz*, in crude and detoxified form, in terms of percentage. The mean value and standard deviation were calculated. The process was repeated in triplicate.[11]

pH value of 1% aqueous solution

An accurately weighed 1 g of powdered drug was dissolved in 100 mL of distilled water to form a 1% solution. This

solution was filtered, and the filtrate was subjected to pH tutor. Readings shown after immersing the standard glass electrode into the solution were noted.

The pH value of a 10% aqueous solution

An accurately weighed 1 g of powdered drug was dissolved in 90 ml of distilled water to form a 10% solution. This solution was filtered, and the filtrate was subjected to pH tutor. Readings shown after immersing the standard glass electrode into the solution were noted.[10,12]

Spectrophotometry

Spectrophotometry was performed with the help of an Ultraviolet-visible (UV-Vis) Spectrophotometer, model Lab India 3000, at the room temperature. Sample extracts were analyzed by spectrophotometer against a blank sample for the visible wavelength range (360–190 nm). After a preheating time, the UV-Vis spectrophotometer was set to spectrum scanning mode. The parameter setting was done, and dark current correction was performed to ensure the accuracy of the measurement results. Baseline correction was performed with the sample control cell, and then, the sample of the drug was analyzed. Peak picking was done by threshold value. The observations were saved in graphical as well as table form to note maximum absorbance against particular wavelengths and the number of peaks with peak widths for the whole spectrum.

Chromatographic studies

Chromatographic system CAMAG TLC Scanner 3 Mobile Phase: Chloroform (90): Methanol (10): Acetic acid (2) Detection: 254 nm, 366 nm, and visible light after derivatization.

Sample Preparation: 25 mg/mL of Methanol Plate size (X × Y) 10.0 cm × 10.0 cm Material HPTLC plates silica gel 60 F 254 Calibration mode: Single level Statistics mode: CV Evaluation mode; Peak height Spray gas: Inert gas Sample solvent type: Methanol Dosage speed: 150 nL/s Predose volume: 0.2 µL Syringe size: 100 µL Number of tracks: 2 Application position Y: 12.0 mm Band length: 10.0 mm Sample volume; 10.0 µL.

Results

Organoleptic properties

The organoleptic properties of *Māzū Sabz* and *Māzū Sabz Mudabbar* are shown in Table 1.

Physicochemical studies

Ash value: The mean percentage values of the total ash, acid-insoluble ash, and water-soluble ash of *Māzū Sabz* and *Māzū Sabz Mudabbar* are shown in Table 2, respectively. Loss of weight on drying at 105°C: Results are shown in Table 2. The mean values of pH of a 1% aqueous solution and a 10% solution are shown in Table 2, respectively.

Preliminary phytochemical screening

The preliminary phytochemical screenings of the different solvent extracts of various samples were done systematically, and for different phytochemical constituents present in the samples of *Māzū Sabz* and *Māzū Sabz Mudabbar* are shown in Table 3.

Spectrophotometry

Findings are shown in Table 4.

Chromatographic studies

Detailed results of *Māzū Sabz* and *Māzū Sabz Mudabbar* are shown in Figures 1 and 2. Since no marker was used in this test; therefore, no information about phytoconstituents can be drawn from the chromatogram.

Discussion

The active ingredients of plant extracts are the chemicals that are similar to those of purified medicine, and they have the same potential to cause serious adverse effects as isolated phytomolecules.[10] Different processes and corrective measures have been adopted for different drugs

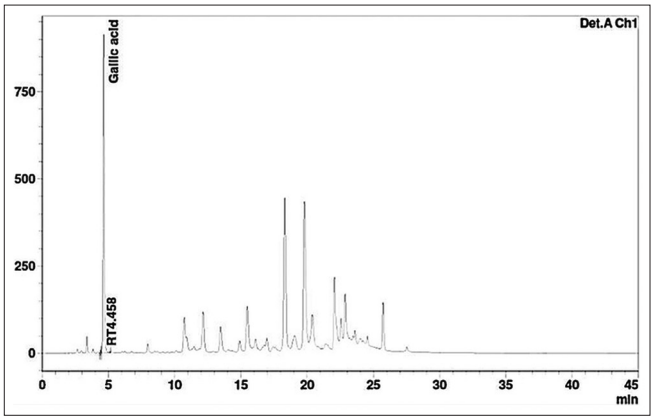

Figure 1: High performance liquid chromatography of *Māzū Sabz*. HPLC: High performance liquid chromatography

Table 1: Organoleptic characters

Drug	Organoleptic properties
Māzū Sabz	Smooth, yellow, agreeable; bitter, smooth texture
Māzū Sabz Mudabbar	Blackish, oily, agreeable, bitter, rough, oily texture

Table 2: Physicochemical values

Parameters	*Māzū Sabz*	*Māzū Sabz Mudabbar*
Total ash values	3.72±0.33	3.88±0.44
Total ash values	0.46±0.05	0.56±0.11
Acid insoluble ash values	1.8±0.56	2.73±0.39
Loss of weight on drying	10.36±0.05	3.275±0.06
Solubility	50.28±0.249	46.90±0.44
pH of 1% solution	3.17±0.003	3.29±0.003
pH of 10% solution	3.07±0.003	3.18±0.005

Table 3: Preliminary phytochemical test of ethanol extract of *Māzū Sabz* and *Māzū Sabz Mudabbar*

Phytochemical tests	Ethanol	
	Māzū Sabz	*Māzū Sabz Mudabbar*
Alkaloids		
Dragendroff's test	−	−
Mayer's test	−	−
Heger's test	−	−
Wager's test	−	−
Carbohydrates test		
Fehling's test	+	+
Benedict's test	+	+
Molish's test	+	+
Cardiac glycosides		
Deoxysugars (kellar killiani test)	+	+
Bufadenoloid's (liebermann test)	−	−
Borntrager's test	−	−
Terpenes/phytosterols		
Salkowski's test	−	−
Hosse's test	−	−
Leibermann burchard' test	−	−
Moleschott's test	−	−
Test for phenols		
Ferric chloride test	+	+
Lead acetate	−	+
Fixed oils		
Filter paper test/spot test	−	−
Tincture alkana test	−	−
Flavonoids		
Ammonia test	+	+
Alkaline reagents test	+	+
Lead acetate test	+	+
Tannins		
Ferric chloride test	+	+
Lead acetate test	−	+
Diterpenes		
Copper acetate test	−	−
Saponin		
Froth test	−	−
Foam test	+	+
Protein and amino acids		
Ninhydrin test	−	−
Biurett's test	+	+
Millions test	+	+
Xanthoprotein test	+	+
Test for protein contains sulphur	+	+
Coumarins	+	−
Quinones	−	−
Anthraquinones	−	−

+: Positive, −: Negative

depending on the nature of the drug. These procedures are used for varied purposes, i.e. to remove toxic constituents, to decrease the concentration of toxic constituents, to convert them into chemically modified compounds, to remove some harmful substances which are not chemically defined, or even to change the drug physically.

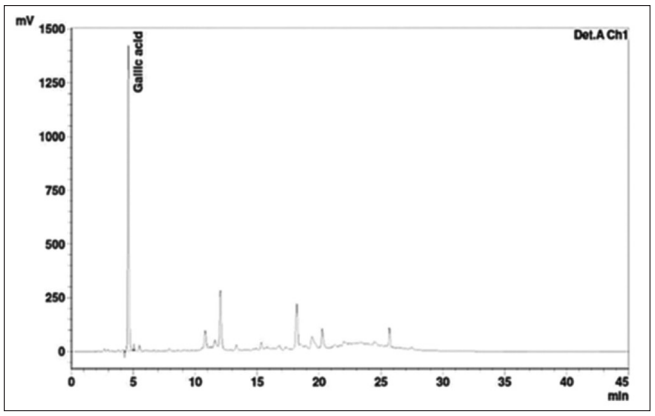

Figure 2: High performance liquid chromatography of *Māzū Sabz* Mudabbar

Physicochemical studies, such as extractive values and ash values, are the good indicators of drug standardization. These parameters can be utilized to observe the physicochemical changes that may happen in crude and the drug after it is processed.

Classical methods and conventional methods are often inconclusive in many cases. Preliminary phytochemical studies revealed no major change in crude and detoxified forms of the drugs in qualitative tests. It is possible that by detoxification is not meant to remove a particular chemical constituent. However, the purpose may be to reduce the particular constituents that can be seen only in quantitative estimation. For this purpose, the drug was subjected to high-performance liquid chromatography (HPLC). Since no marker was used in it; therefore, it was difficult to infer results as to which form and chemical, change has occurred in detoxified forms but, it is clear that the chromatogram of both forms differed from each other; therefore, it can be said that change occurred in detoxified forms and probably Unani physicians intended to induce change in the processed form of the harmful drug. It might be possible that the Unani physicians meant to reduce other chemicals, which are clear from the reduced number of peaks in detoxified forms. A detailed study is required to quantify the increase are decrease of various constituents using the markers for individual constituents.

In the case of *Māzū Sabz Mudabbar,* heat increased, thereby active constituents in the form of Gallic acid were estimated with reference/mass. As Gallic acid belongs to total tannin, the increase in HPLC is justified by an increase in the total tannin constituent of the *Mudabbar* batch. Increased gallic acid was noted in the HPLC of *Māzū Sabz Mudabbar.* No changes were found in phytoconstituents in the two forms. Similarly, no apparent changes occurred in the physicochemical study. By comparing all the findings, it may be said that the Unani scholars meant to increase the tannin content in the drug, as well as some changes in

Table 4: Quantitative analysis of total tannin content in *Māzū Sabz* and *Māzū Sabz Mudabbar* was estimated by spectrophotometry

Parameters	*Māzū Sabz*	*Māzū Sabz Mudabbar*	Method/protocol
Description	Dark brown paste	Dark brown paste	Visual
Total tannins as tannic acid (% w/w)	81.8	87.95	UV Spectrophotometer

the physical appearance. Many studies are required, in this regard, to establish a scientific basis for this Unani concept.

Conclusion

From the above findings, it is suggestive of the fact that Unani physicians do not always mean by the *Tadbīr-i-Advia* that is not a major change in the drug after detoxification rather certain other facts mentioned in Unani classical books which occur after processing of the drug such as change in the physicochemical properties, correction of bad test, removal of toxic elements, etc., in this study spectrophotometry and HPLC studies indicate toward physicochemical change that is tannin quantity was increased after *Tadbīr* in *Mazu Sabz* Mudabbar. Since the drug is of plant origin, it would be more likely to undergo metabolic profiling/liquid chromatography-mass spectrometry (MS)/MS as well as test for fixed oil and phytosterols of the drug, both in pre- and post-detoxification samples, in the next study carried out on the same drug.

Acknowledgment

The authors are thankful to the Director National Institute of Unani Medicine (NIUM) for providing research facilities.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Original Article

A Study on Obesity and Its Risk Factors Associated with *Mizāj* (Temperament) of the Person in Maharu Village, Trincomalee, Sri Lanka

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Abstract

Obesity is an increasing health issue globally, causing significant adverse health effects among adults. An imbalance between energy intake and energy expenditure leads to obesity, a major contributor to several life-threatening noncommunicable diseases. This study aimed to examine obesity and its associated risk factors in relation to *Mizāj* (temperament) in Maharu village, Trincomalee. A community-based cross-sectional study was conducted among males and females with a body mass index of more than 30 in the village. A random sampling technique was used to select 206 participants. Data were collected through questionnaires, and ethical approval was obtained from the relevant Ethics Review Committee (Reference: ERC UG 24/303) before data collection. The age of participants ranged from 25 to 76 years, with a majority (72%) being female adults and 28% being male adults. Based on Unani medicine principles, 54.4% of the participants had *Balghamī Mizāj* (Phlegmatic temperament), 44.7% had *Damawī Mizāj* (Sanguinous temperament), and the remaining participants belonged to *Safravi* (bilious temperament) and *Sawdāwī Mizāj* (melancholic temperament). The study revealed that most participants exhibited poor food habits and a lack of physical exercise. This study suggests that unhealthy lifestyles and poor dietary habits play a significant role in obesity within this population. The findings show that individuals with *Balghamī Mizāj* were susceptible to be affected more by obesity than the other three *Mizāj* individuals. This warrants further investigation into the potential association between temperament and obesity risk factors.

Keywords: *Mizāj, obesity, risk factors, Sri Lanka, temperament, unani medicine*

Introduction

The term "obesity" originates from Latin "obedere," meaning to devor. In Unani medicine, obesity is termed *Siman Mufrit,* associated with the *Balghamī Mizāj* (Phlegmatic temperament), characterized by excess fat accumulation. Each *Mizāj* influences physical and psychological traits, with *Balghamī* individuals displaying soft, flabby muscles prone to obesity.[1,2] Pathophysiologically, *Balghamī Mizāj* (Phlegmatic temperament) involves cold and moist qualities leading to increased bodily humors and fat deposition, exacerbated by dietary habits and sedentary lifestyles.[3,4] Historical texts by Ali Bin Rabban Tabri emphasize overeating and inactivity as critical factors in obesity development. In Unani medicine, it is believed that all the diseases are caused by derangement of *Akhlāṭ* (humors) which is mainly caused by improper maintenance of *Asbāb e sitta Ḍarūriya* (six essential factors) such as fresh air (*Hawae Muheet*), fresh air (*Hawae Muheet)*, food and drink (*Makool Mashroob*), body movement and repose (*Harkat wa Sukoone Badania*), mental movement and repose (*Harkat wa Sukoone Nafsania*), sleep and wakefulness (*Naum wa Yaqzah*), and retention and evacuation (*Ihtibas wa istifragh*).

Modern studies corroborate that obesity prevalence is higher in women and is influenced by genetic, behavioral, and environmental factors, including poor diet, physical inactivity, stress, and socioeconomic status.[5-7] Obesity has reached pandemic proportions globally and is recognized as a major public health challenge of the 21st century.[8] It is characterized by excessive fat accumulation that may impair health and significantly increase the risk of various noncommunicable diseases such as cardiovascular diseases, type 2 diabetes, certain types of cancer, and musculoskeletal disorders.[9] The fundamental cause of

How to cite this article: Zeenath AL, Shiffa M, Fahamiya N. A study on obesity and its risk factors associated with *Mizāj* (Temperament) of the person in Maharu village, Trincomalee, Sri Lanka. Hippocratic J Unani Med 2024;19:140-4.

Received: 04-05-2025
Revised: 26-05-2025
Accepted: 27-05-2025
Published: 10-10-2025

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Access this article online

Website: https://journals.lww.com/HJUM

DOI: 10.4103/hjum.hjum_73_25

Quick Response Code:

obesity is an energy imbalance between calories consumed and calories expended over time. However, various genetic, behavioral, and environmental factors also contribute to its development.[10] In Sri Lanka, the prevalence of overweight and obesity is a growing concern, particularly in urban areas.[11] Understanding the specific risk factors within different communities is crucial for developing targeted intervention strategies.

Traditional medicine systems, such as Unani medicine, offer unique perspectives on health and disease. Unani medicine emphasizes the concept of *Mizāj* (temperament), which is believed to be a unique blend of four humors (blood, phlegm, yellow bile, and black bile) that influences an individual's physiological and psychological characteristics, including susceptibility to certain diseases.[2,12,13]

This study aimed to investigate the obesity prevalence according to lifestyle, dietary habits, and individual temperament and its associated risk.

Methodology

The research was conducted in Maharu Village, Trincomalee, Eastern Province, Sri Lanka as a community-based cross-sectional study among adults with body mass index (BMI) >30. The study was conducted from April 8, 2024, to December 15, 2024. Participants were adults aged 25–76 years, both genders, meeting inclusion criteria.

The sample size was 206 participants, calculated using standard formulas, considering a 16% expected prevalence, and random sampling was employed to minimize bias. Data were collected using a questionnaire.[14] The consent was taken from each participant. The details regarding the "withdrawing right" are included in the information sheet. Description of the purpose of the study, statements about voluntary participation, and anonymity of their information were included in the information sheet and explained to the participants before commencing the study.

After obtaining the consent, the name, age, and gender of each person were recorded. Then, weight and height were measured according to standard procedures using standard equipment. The measuring tape was used for measuring height to the nearest centimeter. Weight was measured using an electronic digital weighing scale. Ethical approval was obtained before conduct the research from the Ethical Review Committee of Faculty of Indigenous Medicine, University of Colombo, Sri Lanka (Reference: ERC UG 24/303). All participants involved in the study were informed about the study at the beginning and consent was obtained before the study.

Results

Figure 1 shows the distribution of the study population according to age and sex. More than half of the study population, i.e.,168 were females (82%) and only 37 (18%) were males.

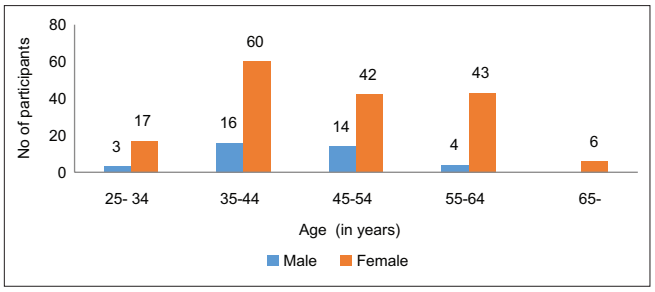

Figure 1: Distribution of participants according to the age and sex

The study population was categorized according to the BMI classification. Table 1 shows the classification of obesity and the number of participants under each category.

The dietary habits of the study population are depicted in Figures 2-4.

Figures 5 and 6 show the physical activities of the study population that influence in the obesity. This is a good index as when physical inactivity is increased means that obesity is also increased.

Figures 7 and 8 show the physiological and psychological factors of the study population that influence obesity such as stress and sleep.

Figure 9 shows that the comorbidities are found in the study population along with obesity.

Discussion

The study's numerical data highlighted several key findings regarding obesity prevalence in Maharu village. As depicted in Figure 1, a total number of participants who participated in this study was 206, among them 72% was female and 28% male, revealing a significant gender disparity with a female-to-male ratio of 2.57:1. This aligns with global trends, where women are more affected by obesity due to hormonal and sociocultural factors. The age distribution showed the highest prevalence among middle-aged individuals (35–60 years), representing 68% of the study population, with lesser prevalence in the 25–34 years (15%) and 61–76 years (17%) age groups. A study which conducted in the Colombo district in Sri Lanka revealed the highest prevalence of obesity 58.3% was seen in 41–60-year group and the minimum prevalence of 43.1% among subjects older than 60 years.[11] Middle-aged individuals (35–60 years) represent the largest proportion (68%) of the study population, aligning with previous research on obesity prevalence by age.

As shown in Table 1, the WHO categorizes the obesity into 3 types class 1, class 2, and class 3. According to the data analysis among 206 participants, 27 male and 138 female participants are under the Class 1 category same time 10 male and 25 female participants are under Class 2 and only 5 female participants are under Class 3. Obesity Class 1 is the most prevalent category, affecting 165 participants, with females largely outnumbering males in all obesity classes.

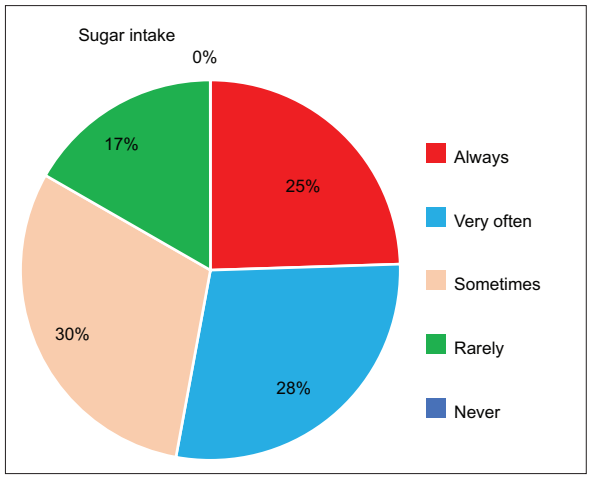

Figure 2: Frequency of sugar consumption by the participants

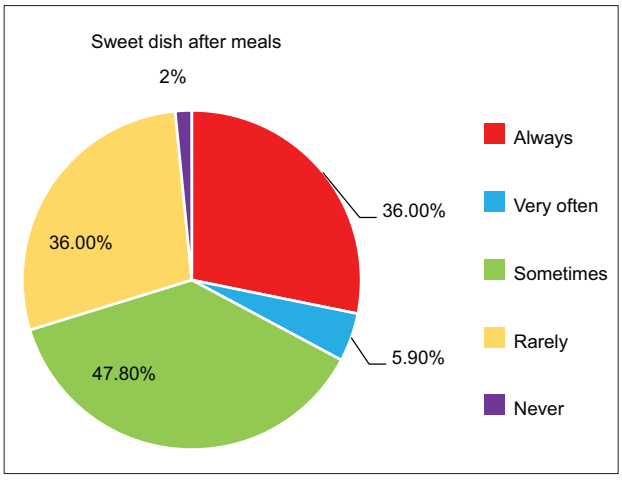

Figure 3: Frequency of consumption of sweet dessert by the participants

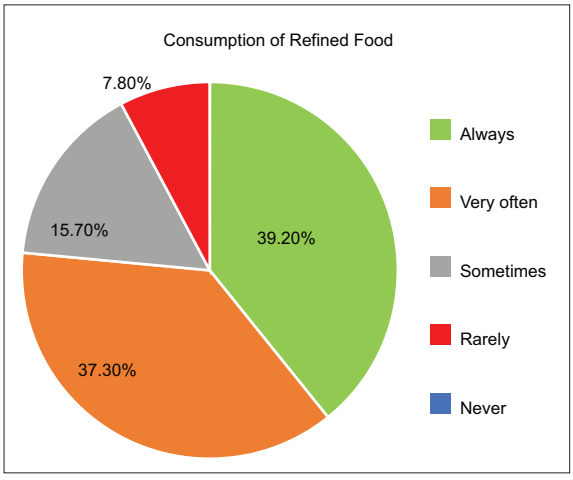

Figure 4: Frequency of consumption of refined food by the participants

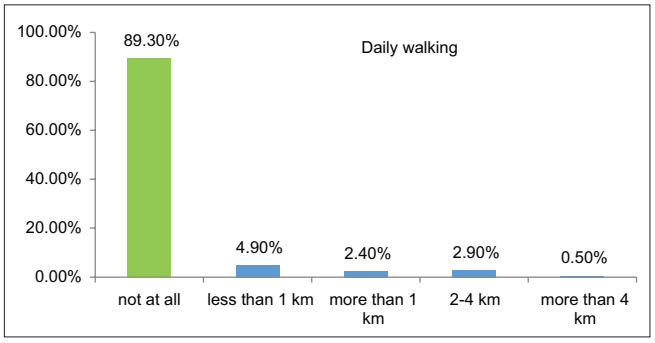

Figure 5: Distance of daily walking by the participants

Table 1: Body mass index classification and the number of participants in each category

Category	BMI	Male	Female
Obese - Class I	30.0–34.9	27	138
Obese - Class II	35.0–39.9	10	25
Obese - Class III	≥40	00	05
Total		37	168

BMI: Body mass index

In terms of *Mizāj* (temperament) distribution [Figure 10], 112 (54.4%) participants exhibited *Balghamī* (Phlegmatic) temperament, 92 (44.7%) participants were *Damawī* (sanguinous), and only 0.9% were *Safravi* (bilious) or *Sawdāwī* (melancholic), reinforcing the Unani perspective that *Balghamī* individuals (more than 50%) are more predisposed to obesity which is a significant value when compared to other *Mizāj* individuals and second is *Damawī*, one of the study showed *Damawī* has highest BMI means because *Damawī* individual (hot and moist *Mizāj*) have large and strong bones.[15]

As shown in Figures 2-4 and 11, dietary habits played a significant role, with 85% consuming refined foods, 78% using sugar regularly, and 68% frequently consuming sweet dishes after meals, reflecting a shift toward calorie-dense, processed diets, which could be the main reason for the obesity of this study population. This study was similar to the previous study.[16]

Physical inactivity was a prominent factor, with only <4% of participants engaging in regular exercise and around 10% only walking daily, while most of them are remained sedentary for over 6 h [Figures 5 and 6]. Psychological and physiological factors such as stress and irregular sleep patterns further exacerbated obesity risks; 60% of participants reported frequent stress, and 70% reported daytime sleeping for more than 2 h, disrupting their metabolic balance as depicted in Figures 7 and 8.

The study also highlighted the consequences of obesity, with 70.2% of participants suffering from hypertension, 28.8% from diabetes, 51.7% from hyperlipidemia, and 29% from musculoskeletal issues [Figure 9]. One of the recent studies shows that 11.20% were found with risk of hypertension, 6.22% with diabetes, 2.90% with thyroid dysfunction.[17] These findings underscore the urgent need for culturally sensitive interventions, addressing poor dietary habits, physical inactivity, and psychological stressors to mitigate the obesity epidemic in the community.

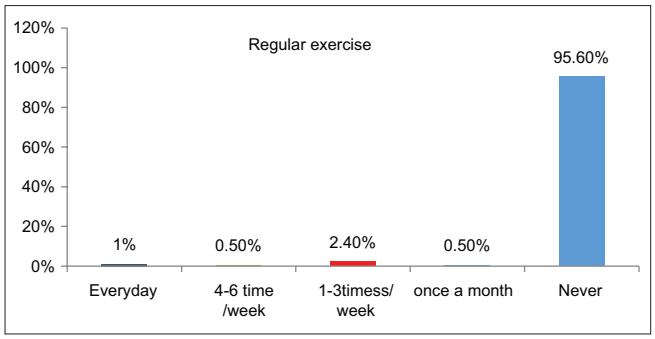

Figure 6: Frequency of regular exercise by the participants

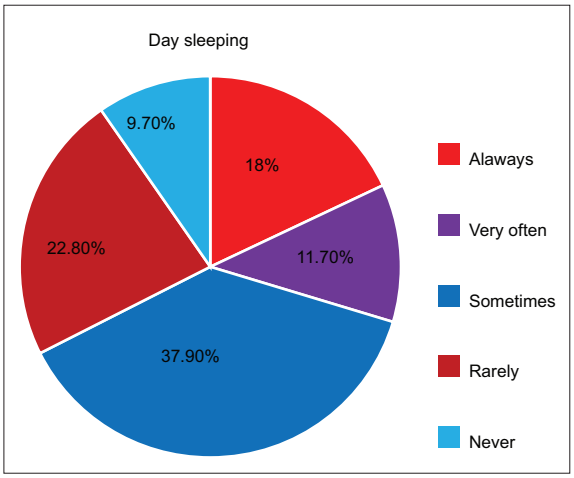

Figure 8: Frequency of sleeping during day time by the participants

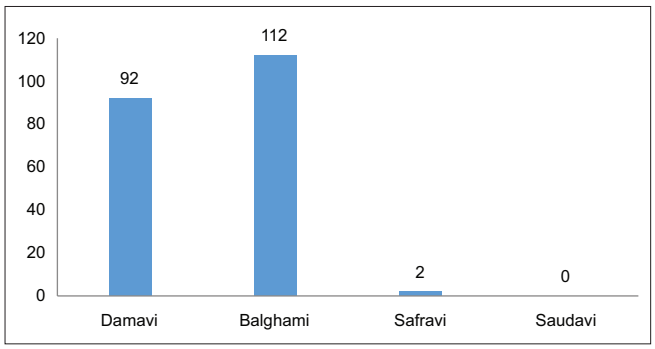

Figure 10: Mizāj of the participants

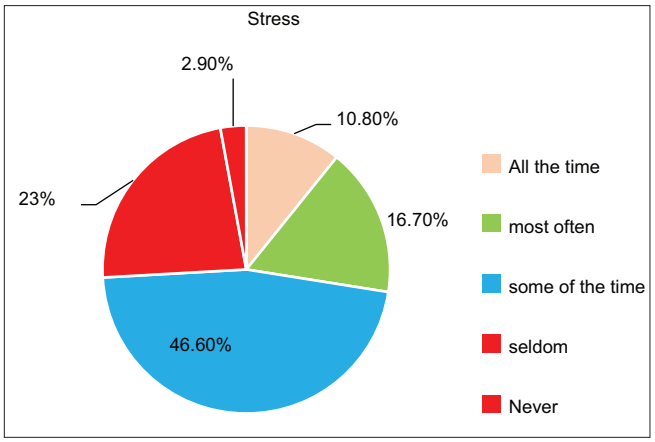

Figure 7: Frequency of stress experienced by the participants

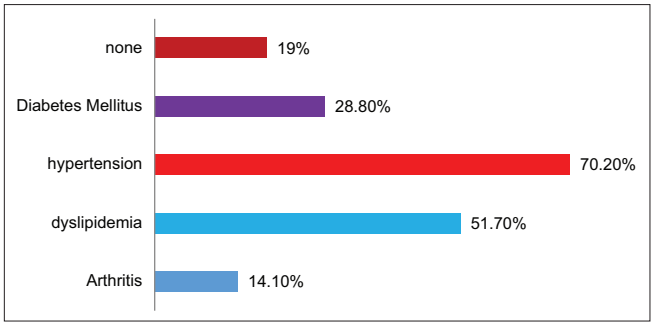

Figure 9: Other concurrent comorbidities are found in the participants

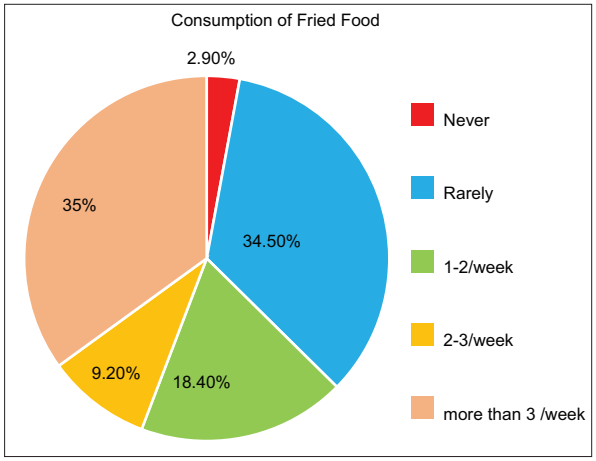

Figure 11: Frequency of consumption of fried food by the participants

The results of the study provide significant insights into the interplay between obesity, lifestyle factors, and *Mizāj* (temperament) in the population of Maharu village. The findings indicate that obesity prevalence is higher among females, aligning with global patterns where women are at greater risk due to biological and social factors.

The study highlights that individuals with *Balghamī Mizāj* (Phlegmatic temperament) are more prone to obesity compared to others. This aligns with Unani principles that associate this temperament with cold and moist qualities, which contribute to fat accumulation. The predominance of *Balghamī Mizāj* (Phlegmatic temperament) underscores the importance of personalized interventions targeting individuals with this temperament.

Poor dietary habits are highly prevalent, with a vast majority consuming refined foods (85%), sugar regularly (78%), and frequent sweet dishes (68%). Physical inactivity is a major concern, with very few participants engaging in regular exercise (<4%) or daily walking (~10%), and most being sedentary for prolonged periods. Psychological (stress – 60%) and physiological (daytime sleeping – 70%) factors are significantly present, potentially contributing

to obesity risks. A high percentage of participants suffer from comorbidities associated with obesity, particularly hypertension (70.2%) and hyperlipidemia (51.7%).

Poor dietary choices, such as the consumption of refined foods, sugary beverages, and a lack of balanced meals, emerged as critical contributors to obesity. The study emphasizes that sedentary lifestyles and inadequate physical activity exacerbate these risks. These findings align with global literature, which identifies diet and inactivity as primary drivers of obesity. The study reveals that stress and irregular sleep patterns significantly impact obesity prevalence. Daytime sleeping and prolonged sedentary hours were notable factors, suggesting a need for holistic health interventions addressing mental and physical well-being.

Conclusion

This study explored the risk factors and *Mizāj* associated with obesity in Maharu Village, Trincomalee. The study cohort showed a notable gender disparity, with females comprising the majority. *Balghamī* (Phlegmatic) temperament was the most common, supporting the Unani perspective on predisposition to obesity. These findings underscore the multifaceted nature of obesity in Maharu Village, driven by a combination of demographic, lifestyle, psychological, and physiological factors, leading to a significant burden of associated health issues.

The findings confirm that obesity is a multifactorial issue, deeply influenced by lifestyle, dietary habits, and physiological and psychological factors. *Balghamī Mizāj* individuals showed a higher predisposition to obesity, which was compounded by poor dietary habits and sedentary lifestyles. The findings underscore the necessity of culturally sensitive, community-specific strategies to combat obesity. Traditional approaches integrating Unani principles and modern health practices could prove effective in addressing the obesity population.

Acknowledgment

The authors acknowledged the village officer of the Maharu Village, Trincomalee, and others who helped to complete this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Case Report

Clinically Significant Improvement in a Case of Chronic Diarrhea with Unani Medicines: A Pediatric Case Study

Abstract

Diarrhea (also known as *Is'haal* in Unani system of medicine) remains a leading cause of mortality and morbidity worldwide, particularly affecting children in the resource-limited settings. Conventional treatments often involve antibiotics, which may not always yield long-term relief and can contribute to antimicrobial resistance. This study explores the potential of Unani medicine as an alternative treatment for diarrhea in pediatric patients. To evaluate the efficacy of Unani formulations in the treatment of recurrent diarrhea in a pediatric patient. We report the case of a 4-year-old male with a 2-year history of recurrent loose stools, who was treated unsuccessfully with conventional antibiotics. He was evaluated as per the Unani principles based on *Arqaan, Akhlaat, Quwa,* and *Mizaaj*. He was prescribed a combination of Unani formulations *Dafay Ishaal* (anti-diarrheal), *Habis and Qabiz* (styptic and astringent), *Muqawwi-e-Jigar* (hepatoprotectives), and *Muqawwiya* (general tonic). Within 5 days of commencing Unani treatment, the frequency of loose stools reduced from 7–8 times per day to two times per day. By the end of the 15-day treatment course, the patient exhibited only 1 loose stool per day, with significant improvement in general health and appetite. The patient did not require any conventional treatments during this period. This case highlights the effectiveness of Unani medicine in managing recurrent diarrhea in pediatric patients. The observed clinical improvements suggest that Unani formulations can serve as a viable alternative or complementary approach to conventional treatments. Further research and clinical trials are warranted to validate these findings and to integrate Unani medicine into broader diarrhea management protocols.

Keywords: *Diarrhoea, Ishaal, pediatric, recurrent diarrhea, traditional medicine, Unani medicines*

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Received: 25-12-2024
Revised: 29-01-2025
Accepted: 22-04-2025
Published: 10-10-2025

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Access this article online

Website: https://journals.lww.com/HJUM

DOI: 10.4103/hjum.hjum_70_25

Quick Response Code:

Introduction

As per the WHO, diarrhea is the condition when three or more loose or liquid stools pass per day (or more frequent passage than is normal for the individual).[1] Diarrhea is usually a symptom of an infection in the intestinal tract, which can be caused by a variety of bacterial, viral, and parasitic organisms. Infection spreads as a result of poor hygiene through drinking water, contaminated food, or from individual-to-individual.[2] Globally, diarrhea making up 4% of the world's mortality rate and kills about two million people annually. In addition, 1.3 million children annually killed due to diarrhea.[3] Children from minority families, the poor, people living in rural areas, people living in areas without sanitary facilities, and people living in homes with concrete roofs, walls, or floors are more likely to have diarrhea cases. The eastern and western regions of India exhibit the highest prevalence.[4]

Malnutrition and death are the two major risks factors of diarrhea. Dehydration is the primary cause of death due to diarrhea.[5] Young age (<23 months) has been considered as the predominant risk factor mainly associated with all types of diarrhea,[6-8] anemia,[8,9] severe malnutrition, and low household income (below 2000 INR per month).[10] Water supply from noncommunity sources,[10] not using solar disinfected water, kutcha house, any family member having diarrhea, use of common toilets,[10] and no hand washing after defecation are significantly associated risk factors.[10] While child with mild or moderate malnutrition,[9] uneducated mothers,[8,11] recurrent episodes of acute respiratory infection, and Vitamin A deficiency[9] are considered as nonassociated risk factors.[12]

Diarrhea is divided into different types based on their pathology and duration. Osmotic type, when there is a significant amount of fluid passively enters the bowel lumen along

How to cite this article: Parveen U, Ahmed U, Ahmed A, Bano U. Clinically significant improvement in a case of chronic diarrhea with Unani medicines: A pediatric case study. Hippocratic J Unani Med 2024;19:145-8.

the osmotic gradient, and the lumen contains a large number of osmotically active particles. This causes the solute load to exceed the gut's absorptive capacity, which leads to diarrhea. Keeping the patient nil per oral (NPO) is the best treatment for this type of diarrhea. Secretory type is due to any specific reason like any innate defects in the enterocytes, irritation caused a toxin (like cholera toxin), or any inflammatory process inside the wall. The bowel mucosa secretes fluid excessively resulting in diarrhea. Keeping the patient NPO is not essential in such type. Other classification is acute and chronic diarrhea. Acute diarrhea could be a valuable physiological response against the hazardous substances in the colon, thus removing the toxic substances and harmful bacteria from the body. It is managed by oral rehydration therapy, refeeding, antibiotics, and probiotics, etc. There may be some noninfectious causes of acute diarrhea include intestinal inflammation, which damages the bowel's villi and reduces its absorptive surface. Psychogenic causes are excessive parasympathetic nervous system stimulation, which results in excessive mucus secretion and motility into the lumen. Diarrhea that lasting longer than 3 weeks is designated as chronic diarrhea. Chronic diarrhea can have either an osmotic or secretory pathophysiology, or certainly a combination of the two. Infective causes of diarrhea are *Cryptosporidium parvum* or *Giardia lamblia* infections. Noninfective causes are uncommon enterocyte or brush border membrane abnormalities, secondary mucosal damage, electrolyte transport defects, carbohydrate malabsorption, pancreatic and biliary disorders, immunosuppression, irritable bowel syndrome, and functional disorders.

Acute and chronic diarrhea in child is evaluated based on nutritional status including height and weight, hydration status, and by skin fold thickness if chronic illness is suspected. Initial investigations for chronic diarrhea are C-reactive protein, erythrocyte sedimentation rate, complete blood count, celiac disease screen with total serum IgA and anti-tissue transglutaminase antibody, and stool assessment. Other blood tests such as immunoglobulins and subclasses, radiological imaging and endoscopy.

Acute diarrhea as per the Unani system of medicine is considered as *Zalaq-ul-Medah* caused by *warm-e-haar* (acute inflammation) which may be *damvi* (bloody) or *safravi* (bilious). It may also be *Is'haal-e-Safravi* (bilious diarrhea) as a result of *Insebaab-e-Safra* (infiltration of bile) into intestine and stomach. Other causes are *Insebaab-e-khilt-e-akkaal* (infiltration of corrosive humor) into stomach and

samoom-e-harrah (hot toxins) of the stomach.[13,14] In the Unani System of Medicine, *Is'haal* (diarrhea) is treated with the drugs having *Qabiz* (astringent), *Habis* (styptic), and *Daafey Ishaal* (antidiarrheal) properties.[14,15]

Case Report

A male child aged 4 years with chief complaints of loose motions and general weakness came to the pediatric outpatient department (OPD) of Majeedia Unani Hospital, Jamia Hamdard in March 2024. On further enquiry, the patient revealed that since past 2 years, he was having recurrent loose stool (7–8 times per day) in every 2–3 months. He had undergone allopathic treatment where he was prescribed antibiotics regularly for managing his illness. On examination, the vitals (BP, pulse, and temperature) were stable and the general condition was fair. No any other acute illness was found after taking proper history from him and his mother. Per abdomen examination revealed some signs of dehydration. All hematological and biochemical parameters were within normal range. No abnormality was observed in sonography of the abdomen.

We decided to treat the patient only with Unani medications because he was stable and did not have any comorbidities. The patient was informed that he could be transferred to the emergency room immediately if conventional treatment needed. If needed, he was also advised to give IV fluids. For proper observations and management, he was admitted to the hospital. We prescribed capsule Raal 1 BD (an anti-diarrheal Unani formulation manufactured by Hermas Pharmaceuticals Ltd., Kerala), Jigreen (an Unani formulation used to strengthen abdominal organs and liver, manufactured by Hamdard Laboratories, India), Syrup Pechnil (an Unani polyherbal formulation specific for diarrhea), and Qurs Kushta Marwareed (calcium-containing tablets which helps in managing loose motion). After 5 days of treatment, the frequency of loose motion reduced to two times per day and patient got relieved with signs of clinical improvement. His appetite was also improved. On the 5th day, the patient was discharged and asked to continue the course of medicine for another 10 days. He was advised to review in between in the department in case of emergency. Since, the upcoming season is summer so he was also guided with some precautionary steps and proper diet protocols, which may otherwise affect the current condition of the patient. After 10 days, the patient revealed improvement in consistency and frequency of motion (1 time per day) with significant improvement in general health. Last time he reported to the OPD in May and revealed that he did not feel any need to use conventional treatment.

Discussion

Unani medicines play a significant role in the management of chronic diseases, as evidenced by this particular case. This study presents a compelling case for the use of Unani medicine in treating recurrent diarrhea in pediatric patients. The significant improvement observed in the 4-year-old male patient underscores the potential of Unani formulations as an effective alternative to conventional antibiotic treatments, which often fail to provide long-term relief and can contribute to the growing issue of antimicrobial resistance.[16]

The patient in this case had experienced recurrent episodes of loose stools over a 2-year period, with limited success from

conventional treatments. The medicines used in this case were as per the Unani protocols based on *Mizaaj,* age, need of the patient and season. As per the Unani treatment guidelines, we prescribed drugs which have pharmacological properties as *Mohallil-e-Auram* (anti-inflammatory), *Qabiz* (astringent), and *Habis* (styptic) which led to a rapid and sustained reduction in diarrhea frequency, with the patient achieving near-normal bowel movements within 15 days. This positive outcome highlights the therapeutic potential of Unani medicine in managing diarrhea, particularly in cases resistant to conventional therapies. The details of Unani formulations and some important drugs used in this study are given in Table 1.

Unani medicine, rooted in ancient Greek principles and developed through centuries of empirical knowledge, offers a holistic approach to disease management.[29] Its emphasis on natural ingredients and balancing bodily humors aligns with modern principles of integrative medicine.[30] The success in this case may be attributed to the multi-faceted pharmacological actions of the prescribed Unani formulations, which likely include anti-inflammatory, astringent, styptic, digestive, and hepatoprotective properties.

Unani medicines offer a holistic approach with fewer side effects and lower risk of antimicrobial resistance, unlike conventional treatments that rely heavily on antibiotics.[31] Unani treatments are cost-effective and can be easily administered in various clinical settings, making them accessible for low-income families.[32]

The findings from this case study suggest several implications for public health, particularly in regions with limited access to modern medical resources. The integration of Unani medicine into diarrhea management protocols could provide a cost-effective and culturally acceptable treatment option, possibly alleviating the burden on healthcare systems and enhancing patient outcomes. In addition, the use of Unani medicine could mitigate the over-reliance on antibiotics, addressing concerns about antimicrobial resistance.

However, as a single case report, the findings cannot be generalized to the broader pediatric population without further research. Larger, controlled clinical trials are essential to validate the efficacy and safety of Unani formulations in treating diarrhea in diverse pediatric populations.

Conclusion

The successful treatment of recurrent diarrhea in a pediatric patient using Unani medicine highlights its potential as an effective alternative to conventional treatments. The case report of a 4-year-old male patient with recurrent loose stools demonstrates the successful management of diarrhea using Unani formulations. The patient, who had been previously treated with antibiotics without long-term success, showed significant improvement within 5 days of starting Unani treatment. The prescribed Unani formulations, including capsule Raal, Syrup Jigreen, Syrup Pechnil, and Qurs Kushta Marwareed, led to a marked reduction in the frequency of loose motions and an overall enhancement in the patient's health. These findings suggest that Unani medicine offers a viable alternative for managing diarrhea, particularly in cases where conventional treatments have been ineffective or where patients prefer traditional remedies. The observed clinical improvements underscore the importance of further research and clinical trials to validate the efficacy and safety of Unani treatments in broader pediatric populations. Integrating Unani formulations into diarrhea management protocols can provide a complementary approach to conventional medicine, offering holistic benefits and expanding treatment options. This case emphasizes the need for a collaborative healthcare model that incorporates traditional practices,

Table 1: Ingredients and pharmacological activities of Unani formulations used in the treatment of recurrent diarrhea

Drug	Botanical name	Activity
Capsule Raal		
Raal musaffa	*Vateriaindica L.*	*Mujaffif, qawi, mundamil, qabis, and habiz*[17]
Phitkari Biryan	*Potassium aluminum sulfate*	Antibacterial activity[18]
Syrup Pechnil		
Post anar	*Punicagranatum*	*Qabis, Muqawwi meda*[17] Antidiarrheal activity[19-21]
Amlakhusk	*Phyllanthus emblica*	*Mujafif, Habisishal, muqawwi meda,*[17] antidiarrheal activity,[22,23] and antioxidant activity[24]
Qurs Kushta Marwareed		
Marwareed	*Mytilus margaritiferus*	*Muqawwieaam* (general tonic)[17,25]
Starch	*Ararot*	Antidiarrheal activity[26]
Sharbat Jigreen		
Kasani	*Cichoriumintybus*	Anti-inflammatory activity[17]
Manjishtha	*Rubiacordifolia*	Anti-inflammatory activity and antidiarrheal activity[17]
Nirgundi	*Vitex negundo*	Digestive, hepatoprotective[27]
Rhubarb	*Rheum rhabarbarum*	Antibacterial, anti-inflammatory, anti-fibrotic, and anticancer[28]

particularly in regions with limited access to modern medical resources. By doing so, we can enhance the patient outcomes and contribute to a more inclusive and effective healthcare system.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Case Report

Clinical Efficacy of a Unani Polyherbal Formulation in Chronic Insomnia: A Case Study

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Abstract

Insomnia, defined as difficulty in initiating or maintaining sleep or experiencing nonrestorative sleep, is a common condition with significant health implications. It affects nearly 10% of adults, with a higher prevalence among women, the elderly, and individuals facing socioeconomic hardships. In classical Unani medicine, insomnia is termed "*Sahar*" and is attributed to an imbalance in the brain's temperament, particularly due to excess *ḥarārat* (heat) and *yubūsat* (dryness). Although Unani physicians have historically managed insomnia effectively using various polyherbal formulations, scientific validation of these treatments remains limited. This article evaluates the safety and efficacy of a Unani polyherbal formulation (AFA), comprising *Asrūl* (*Rauvolfia serpentina* Benth ex. Kurz), *Filfil siyāh* (*Piper nigrum* L.), and *Asgandh* (*Withania somnifera* (L.) Dunal), in the management of chronic insomnia. A 35-year-old male patient with a one-year history of insomnia was treated with a 50% hydroalcoholic extract of AFA at a dose of 500 mg daily for six weeks. The Insomnia Severity Index (ISI) was used to assess therapeutic outcomes, and the score improved from 26 (severe) to 2 (no clinically significant insomnia), with no reported adverse effects and normal laboratory findings throughout the study. These findings suggest that the AFA formulation may serve as a safe and effective alternative for the management of insomnia, warranting further investigation.

Keywords: *Asgandh, Asrūl, Filfil siyāh, insomnia, insomnia severity index, Sahar*

Introduction

Insomnia, first described by Johann Heinroth in 1818, is a common psychosomatic disorder characterized by difficulty falling asleep, frequent awakenings during the night, trouble returning to sleep, early morning awakening, and/or unrefreshing sleep.[1,2] The word "insomnia" comes from the Latin insomnis, where "in" means "not" and "somnus" means "sleep," thus denoting "no sleep."[3] It is classified based on its duration into acute and chronic forms in modern medical terms. Acute insomnia, or transient insomnia, is short-term and often triggered by stress or traumatic events. Chronic insomnia is defined as difficulty initiating or maintaining sleep at least three nights a week for a minimum of 3 months. It is associated with underlying issues such as lifestyle changes, medications, or comorbidities such as depression or anxiety.[3,4] The condition can further complicate mental health, leading to symptoms such as irritability, fatigue, and impaired cognitive function. Studies indicate that around one in three adults globally experience some form of insomnia, and its prevalence increases with age, affecting up to 50% of individuals above 60 years.[5] Insomnia can also be classified as primary, when it occurs independently, or secondary when it results from other medical conditions or medications. For example, insomnia can accompany mental health issues such as anxiety, depression, and posttraumatic stress disorder, as well as chronic illnesses such as asthma, heart disease, or cancer. The pathophysiology of insomnia involves an imbalance between sleep-inducing neurotransmitters like GABA and adenosine, and arousal neurotransmitters such as serotonin, dopamine, and orexin, which regulate wakefulness. Research also suggests that insomnia may be linked to localized brain activity and dysregulation in sleep–wake regions.[6]

In Unani medicine, the Arabic term *Sahar* is used to denote Insomnia. It is believed to be caused by *Su-e-Mizāj Ḥārr Yābis*/*Mizāj Ghayr Mu'tadil Ḥārr Yābis* (Abnormal/Inequable hot and dry temperament) in the

How to cite this article: Tayyab IK, Bilal KQ, Khan NA. Clinical efficacy of a unani polyherbal formulation in chronic insomnia: A case study. Hippocratic J Unani Med 2024;19:149-55.

Received: 21-12-2024
Revised: 03-06-2025
Accepted: 09-06-2025
Published: 10-10-2025

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Access this article online

Website: https://journals.lww.com/HJUM

DOI: 10.4103/hjum.hjum_18_24

Quick Response Code:

brain, where dryness directly induces the condition and heat exacerbates it.[7] In Unani medicine, normal sleep is thought to be governed *by Ruṭūbat wa Burūdat* (wetness and coldness) in the brain. If there is a disturbance in sleep and wakefulness, it signifies an imbalance with *yubūsat wa Ḥarārat* (dryness and heat) in the brain, a condition that correlates with insomnia or *Sahar*.[8] Other contributing factors in Unani medicine include purging, diarrhea, vomiting, diuresis, menstrual regulation, and the consumption of hot spices.[9] Various Unani Scholars such as Ibn e Sina, Azam Khan, Ismail jurjani, Akbar Arzani, and Allama kabiruddin have described Insomnia (*sahar*) in their literary work. Ibn Sina described it as excessive awakening, while Hakeem Azam Khan linked it to an imbalance of hot and dry qualities in the brain, with secondary causes such as morbid phlegm and bile.[10] Another eminent scholar Ismail Jurjani says that sleeplessness and excessive awakening are called *Sahar*.[11] As per the concept of Akbar Arzani *sahar* is *Bidārī-yi mufraṭ* (prolonged awakening).[12] Allama Kabīruddin emphasized that insomnia leads to the weakening of the brain's power and impaired digestion.[13]

Based on etiology, insomnia can be classified into primary and secondary types. Primary insomnia is idiopathic, with no clear cause, while secondary insomnia is linked to medical or psychiatric conditions.[6] In Unani medicine, insomnia's causes are categorized into three groups: *Ikhtiyārī asbāb* (voluntary causes), *Āriḍī asbāb* (temporary causes), and *Marḍī asbāb* (caused by diseases).[12,14]

Symptoms of insomnia include general tiredness, concentration and memory issues, daytime sleepiness, irritability, and an inability to feel rested after sleep. These symptoms often lead to functional impairments, such as an increased risk of accidents and ongoing sleep-related worries. Addressing the underlying causes of insomnia, whether physical, psychological, or environmental, is key to effective management.[6]

In the Unani system of medicine, the *Uṣūl-i ʿilāj* (Principles of management) of insomnia is based on a holistic approach and principally includes *Taʿdīl-i Mizāj*-correction of *Suʾ-yi Mizāj* and *Tartīb-i Badan wa Dimāgh*-genesis of *ruṭūbat* or fluids in the body and brain.[15,16] Unani Physicians have been successfully treating insomnia (*Sahar*) for centuries through a combination of *Ilāj bi-l-ġidhā* (Dietothrapy), *Ilāj bi-l-dawā* (Pharmacotherapy), *and Ilāj bi-l-ṭadābīr* (Regimental therapies like *Nutūl* therapy); however, scientific documentation is not available. In *Ilāj bi-l-dawā* (Pharmacotherapy), the Unani polyherbal formulation used in this case study, though not pharmacopoeial, is composed of ingredients that have been employed for centuries by Unani physicians in the management of insomnia, either individually or in combination. The constituent drugs – *Asrūl* (*Rauvolfia serpentina* Benth. ex Kurz), *Filfil siyāh* (*Piper nigrum* L.), and *Asgandh* (*Withania somnifera* (L.) Dunal) – are well-documented in classical Unani texts and are reported to have multiple therapeutic actions, including *musakkin-i ʿAlam* (analgesic), *mukhadir* (sedative), *mubarrid* (refrigerant), *munawwim* (hypnotic), *muqawwī-yi Dimāgh* (brain tonic), *muqawwī-yi Aʿṣāb* (nervine tonic), and anxiolytic.[17-20] Modern pharmacological studies also support their efficacy in sleep disorders. *Asrūl* exhibits tranquilizing, antihypertensive, and neuro-calming effects; *Filfil siyāh* enhances bioavailability and exerts anxiolytic and antioxidant actions, whereas *Asgandh* is known for its sedative, adaptogenic, anti-stress, anti-anxiety and anti-inflammatory properties.[21-23,34] Although these ingredients have a long tradition of therapeutic use, their combined efficacy and safety have not been systematically evaluated using standardized clinical parameters. Hence, it was decided to conduct a study to confirm and evaluate the safety and efficacy of Unani polyherbal formulation containing *Asrūl* (*Rauwolfia serpentine* [L.] Benth. ex Kurz), *Filfil siyāh* (*Piper nigrum* L.), and *Asgandh* (*Withania somnifera* (L.) Dunal) in a case of chronic Insomnia on scientific parameters.

Methodology

This single-center case study was conducted in the Department of Moalijat (Medicine) of Ayurvedic and Unani Tibbia College and Hospital, Karol Bagh, New Delhi. The Case study was practiced under Good Clinical Practice guidelines. The study involved a 35-year-old male patient residing in Uttam Nagar, Delhi, who was enrolled in December 2023 following a detailed clinical evaluation, including history-taking, physical examination, and assessment using the insomnia severity index (ISI) questionnarie.

The patient reported a 1-year history of insomnia, with symptoms worsening over the preceding 5 months. Clinical manifestations included prolonged sleep onset latency exceeding 3–4 h, early morning awakenings, irritability, anxiety, fatigue, and cognitive impairments such as decreased concentration and memory issues. The patient, who was married and employed, denied any history of smoking, alcohol consumption, or chronic illnesses. Findings of General Physical and Systemic examinations were normal and unremarkable. The patient was stable and well oriented. His build was good with fair color, height: 5.2 ft., weight: 65 kg, and body mass index: 21. There was no pallor, anemia, cyanosis, icterus, or palpable lymph nodes. The vitals were recorded as, pulse rate- 75 b/m, temperature- 98.2°F, and Systemic blood pressure- 128/82 mmHg. Written informed consent was taken from the patient for both participation and publication.

The ISI, a widely validated 7-item self-report questionnaire, was used to diagnose, assess the nature/severity/impact of insomnia and evaluate the efficacy of the Unani polyherbal formulation. This index categorizes insomnia severity into four levels: no clinically significant insomnia (0–7), subthreshold insomnia (8–14), moderate insomnia

(15–21), and severe insomnia (22–28). Each item is rated on a 5-point Likert scale (0–4), with total scores ranging from 0 to 28 as depicted below. Objective assessment was performed using the ISQ index, with pre and posttreatment scores analyzed for statistical significance.

Insomnia severity index questionnaire

The ISI has seven questions. The seven answers are added up to get a total score.[24]

Insomnia problem	None	Mild	Moderate	Severe	Very severe
1. Difficulty falling asleep	0	1	2	3	4
2. Difficulty staying asleep	0	1	2	3	4
3. Problems waking up too early	0	1	2	3	4

4. How SATISFIED/DISSATISFIED are you with your CURRENT sleep pattern?

Very satisfied	Satisfied	Moderately satisfied	Dissatisfied	Very dissatisfied
0	1	2	3	4

5. How NOTICEABLE to others do you think your sleep problem is in terms of impairing the quality of your life?

Not at all noticeable	A little	Somewhat	Much	Very much noticeable
0	1	2	3	4

6. How WORRIED/DISTRESSED are you about your current sleep problem?

Not at all worried	A little	Somewhat	Much	Very much worried
0	1	2	3	4

7. To what extent do you consider your sleep problem to INTERFERE with your daily functioning (e.g. daytime fatigue, mood, ability to function at work/daily chores, concentration, memory, mood, etc.) CURRENTLY?

Not at all interfering	A little	Somewhat	Much	Very much interfering
0	1	2	3	4

Guidelines for Scoring/Interpretation:
- 0–7 = No clinically significant insomnia
- 8–14 = Subthreshold insomnia
- 15–21 = Clinical insomnia (moderate severity)
- 22–28 = Clinical insomnia (severe).

Baseline investigations, encompassing routine hemogram, fasting blood sugar, renal function test (RFT- blood urea and serum creatinine), liver function test (LFT- Serum glutamic-oxaloacetic transaminase (SGOT), Serum glutamic-pyruvic transaminase (SGPT), and Alkaline phosphatase (ALP)) were performed to exclude comorbidities and ensure the safety of the patient before initiating treatment [Table 1].

Based on the above-mentioned clinical findings and ISI questionnaire results, the patient was diagnosed with primary insomnia (Clinical insomnia in severe category with ISI score of 26) and deemed eligible for the study.

Intervention and follow-up

As part of the precautionary measures, the patient was advised to drink plenty of water, consume fruits regularly, and maintain a sleep schedule between 9 and 10 PM. Further, the patient was advised to avoid daytime naps and remain active throughout the day. These lifestyle modifications were recommended to complement the Unani treatment and avoid potential interference with its effectiveness.

The treatment protocol comprised a Unani polyherbal formulation containing *Asrūl* (*Rauvolfia serpentina* [L.] Benth. ex Kurz, 100 mg), *Filfil siyāh* (*Piper nigrum* L., 200 mg), and *Asgandh* (*Withania somnifera* (L.) Dunal, 200 mg), formulated as a 50% hydroalcoholic extract in a 500 mg capsule, exhibited in Table 2. The use of a 50% hydroalcoholic extract in this study was chosen to ensure comprehensive extraction of both polar (water-soluble) and non-polar (alcohol-soluble) phytoconstituents present in medicinal plants. Water alone may not effectively extract lipophilic bioactive compounds such as alkaloids, flavonoids, and certain withanolides, while pure alcohol can denature thermolabile compounds and may not efficiently extract hydrophilic components such as glycosides and tannins. The patient received one capsule orally daily at bedtime with warm milk for a total duration of 42 days. Bi-weekly follow-up visits were conducted to monitor treatment progress and assess clinical symptoms, while concomitant medication use was prohibited. The safety of the formulation was assessed by investigating haemogram, LFT, and RFT after a week of starting the treatment and then again at the end of the treatment [Table 3].

Table 1: Investigation reports before treatment

Investigations	Results
Hemogram	
Hb (g/dL)	14
Hct (%)	45.8
WBCs ($\times 10^3/\mu L$)	8.99
PLT ($\times 10^3/\mu L$)	181
ESR	14
FBS (mg/dL)	81
RFT (mg/dL)	
Blood urea	16
Serum creatinine	0.74
LFT (U/L)	
SGOT	45
SGPT	26
ALP	112

SGOT: Serum glutamic-oxaloacetic transaminase, SGPT: Serum glutamic-pyruvic transaminase, ALP: Alkaline phosphatase, LFT: Liver function test, RFT: Renal function test, FBS: Fasting blood sugar, WBCs: White blood cells, Hb: Hemoglobin, Hct: Hematocrit, PLT: Platelets, ESR: Erythrocyte sedimentation rate

Table 2: Pharmacological actions of test formulation

Botanical name	Unani name	Part used	Dosage of extract used (mg)	Actions and uses reported in Unani Medicine	Active constituents	Modern pharmacological actions
Rauwolfia serpentine (L.) Benth. ex Kurz (Apocynaceae)	Asrūl	Root	100	*Musakkin-i Aʿṣāb* (sedative), Musakkin-i ʿAlam (analgesic), Munawwim (tranquilizer), Mukhadir (anesthetic), *Dāfiʿ-i Ẓaġṭ al-Dam-i Qawī* (antihypertensive), Mubarrid (Refrigerant) Muṣaffī-i Khūn (blood purifier)[17,18]	Reserpine, reserpinine, serpentine, serpentine, ajmaline, ajmalicine, rescinnamine, reserpiline[25]	Anti-hypertensive, Anti-psychotic, Anti-arrhythmic, Vasodilator, Sedative, Hypolipidemic[21,26,27]
Withania somnifera L. (Solanaceae)	*Asgandh*	Root	200	*Musakkin-i Aʿṣāb* (sedative), *Mufattiḥ sudad* (deobstruent), *Muqawwī-yi baḥ* (aphrodisiac), *Muqawwī-yi Aʿṣāb* (nervine tonic), anxiolytic, Muqawwī-yi ʿamm (general-tonic), Muḥallil-i awram (anti-inflammatory) [17,18,28]	Withaferin, withanolides, withasomnine, withanine, withananine, ashwagandhine, withasomniferol A, B, C, withanosides, β-sitosterol[30]	Hypolipdemic, spermatogenic, anti-inflammatory, immunomodulatory, anti-diabetic, cardio-protective, neurological and psychological conditions like alzheimer's, anxiety, sleep deprivation etc.[29,31]
Piper nigrum L. (Piperacae)	*Filfil siyāh*	Fruit	200	*Muqawwī-yi Aʿṣāb* (Nervine tonic), *Jādhīb* (Absorbent), *Muḥarrik* (Stimulant), anxiolytic, *Dāfiʿ-i Ẓaġṭ al-Dam-i Qawī* (Anti-hypertensive), *Mudīr-i bawl* (Diuretic), *Muqawwī-yi miʿda* (Stomachic), *Kāsir-i riyāḥ* (Carminative), *Mushtahī* (Appetizer), *Mudīr-i ḥayḍ* (Emmenagogue)[17,18]	Piperine, pipene, piperamide, piperamine, pipericide, β-caryopyllene, limonene, β-pinene, α-pinene, δ–3-carene[32,33]	Bio-availability enhancer, anxiolytic, anti-depressant, anti-inflammatory, analgesic, anti-thyroid, anti-platelet, hypolipidaemic, hepato-protective[32,34,35]

Assessment of Mizāj (temperament)

In addition, the patient's temperament (*Mizāj*) was assessed using the classical Unani framework of *Ajnas al-ʿashrah*, which categorizes individuals into different temperamental types based on their physical and emotional characteristics [Table 4].

Results

The study tracked the progress of insomnia severity over a series of follow-up visits, with notable reductions in the ISI scores at each stage, as exhibited below in Table 5 and Figure 1.

- Baseline (initial visit): The clinical insomnia score was recorded at 26, indicating moderate to severe insomnia
- 2nd week Follow-up: The patient's condition further improved, with the score decreasing to 9, categorized as subthreshold insomnia
- 4th week follow-up: By the 4th week, the score continued to decline, reaching 5, indicating no clinically significant insomnia
- Final (6th) week follow-up: At the end of the study, the score was reduced to 2, signifying that the patient had no clinically significant insomnia.

This progressive reduction in insomnia severity, as indicated by the ISI scores, highlights the formulation's efficacy in alleviating both the physiological and psychological symptoms of insomnia. The improvement continued over time, with the patient ultimately reaching a level of insomnia that was no longer clinically significant. Furthermore, no adverse events, including palpitations, dizziness, or other side effects, were reported during the treatment period. In addition, following the treatment, the patient's temperament shifted from Safravi (bilious) to Damwi (sanguine), indicating a positive change in their internal balance.

Safety parameters – hemogram, RFT, and LFT remained within normal physiological limits throughout, with no significant deviations observed after 1 week and at the end of the study [Table 3]. These findings indicate that the test formulation was well tolerated and did not produce any adverse biochemical effects.

Discussion

The outcomes of this case study indicate that the Unani polyherbal formulation, composed of *Asrol* (*Rauwolfia serpentina* [L.] Benth. ex Kurz), *Filfil Siyah* (*Piper nigrum* L.), and *Asgandh* (*Withania somnifera* (L.) Dunal), holds significant therapeutic potential in the management of chronic insomnia. The observed reduction in the ISI score from 26 to 2 over 6 weeks is indicative

not only of symptomatic relief but also the formulation's effectiveness in addressing both the physiological and psychological dimensions of insomnia. This improvement is consistent with previous studies that highlight the therapeutic potential of Unani herbs in the treatment of sleep disorders.[36-39]

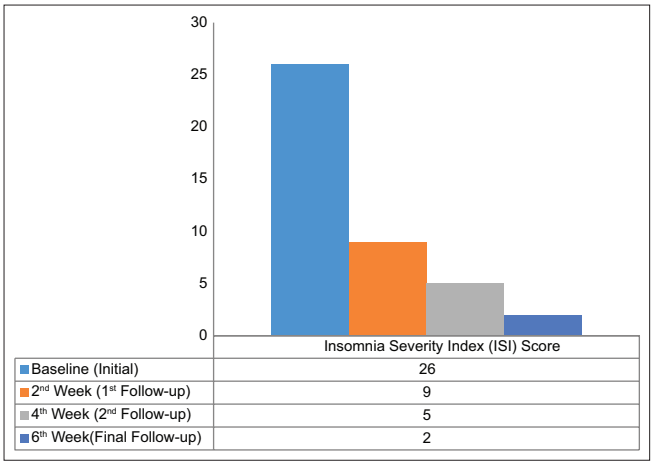

Figure 1: Insomnia severity index score

Table 3: Investigation reports after 1 week and at the end of the treatment

Investigations	Results (1 week)	Results (AT)
Hemogram		
Hb (g/dL)	13.9	14.1
Hct (%)	45.3	46
WBCs (×10³ µL)	9.05×10³	8.55×10³
PLT (×10³ µL)	185×10³	183×10³
ESR	13	11
RFT (mg/dL)		
Blood urea	17	18
Serum creatinine	0.72	0.76
LFT (U/L)		
SGOT	42	39
SGPT	29	28
ALP	107	113

AT: After treatment, SGOT: Serum glutamic-oxaloacetic transaminase, SGPT: Serum glutamic-pyruvic transaminase, ALP: Alkaline phosphatase, LFT: Liver function test, RFT: Renal function test, WBCs: White blood cells, Hb: Hemoglobin, Hct: Hematocrit, PLT: Platelets, ESR: Erythrocyte sedimentation rate

The therapeutic effects of this formulation can be attributed to the pharmacodynamic properties of its individual components and their synergistic interactions. *Rauvolfia serpentina* (L.) Benth. Ex Kurz (*Asrūl*) is a traditional sedative and tranquilizer whose primary alkaloid, reserpine, has been extensively studied for its neuropsychotropic properties. Reserpine irreversibly inhibits the vesicular monoamine transporter 2 (VMAT2), leading to the depletion of monoamines – particularly dopamine, norepinephrine, and serotonin – in presynaptic neurons. This neurochemical depletion reduces central sympathetic tone, inducing calmness, reducing hyperarousal, and facilitating sleep initiation.[21,25,40] This aligns with the concept of "Munawwim" (tranquilizer) in Unani pharmacopeia, and modern research substantiates its efficacy in psychoneurotic conditions including insomnia.

Asgandh (*Withania somnifera* (L.) Dunal), a key *Rasayan* (rejuvenator) in Unani and Ayurvedic systems, exhibits GABA-mimetic effects through its active constituents – withaferin A, withanolide A, and somniferine. These compounds interact with GABA-A receptors, enhancing inhibitory neurotransmission, promoting anxiolysis, and stabilizing the sleep–wake cycle. Furthermore, its adaptogenic properties help mitigate the impact of stress, which is a well-established etiological factor in chronic insomnia. Multiple clinical studies have validated *Withania somnifera*'s role in improving sleep quality, reducing sleep latency, and alleviating symptoms of anxiety and depression that frequently co-exist with insomnia.[39,41,42]

The third component, *Filfil siyah (Piper nigrum* L.*)*, though often overlooked in sleep research, plays a vital supportive role in this formulation. Its major bioactive compound piperine acts as a bioavailability enhancer, improving the systemic absorption of co-administered phytoconstituents such as reserpine and withanolides by inhibiting drug-metabolizing enzymes such as CYP3A4 and glucuronosyltransferases. In addition to this pharmacokinetic action, piperine itself possesses

Table 4: *Ajnas al-ʿashrah* (ten parameters) for *mizāj* assessment

Parameters	*Damwī* (sanguine)	*Balghamī* (phlegmatic)	*Ṣafrāwī* (bilious)	*Sawdāwī* (melancholic)
Complexion	Ruddy (reddish)	Chalky (whitish)	Pale (yellowish)	Purple (blackish)
Built	Muscular and broad	Fatty and broad	Muscular and thin	Skeletal
Touch	Hot and soft	Cold and soft	Hot and dry	Cold and dry
Hair	Black and lusty thick, rapid growth	Black and thin slow growth	Brown and thin rapid growth	Brown and thin Slow growth
Movement	Active	Dull	Hyperactive	Less active
Diet (most suitable)	Cold and dry	Hot and dry	Cold and moist	Hot and moist
Weather (most suitable)	Spring	Summer	Winter	Autumn
Sleep	Normal	In excess	Inadequate	Insomnia
Pulse	Normal (70–80/min)	Slow (60–70/min)	Rapid (80–100/min)	Slow (60–70/min)
Emotions	Normal	Calm and quiet	Angry	Nervous

Table 5: Insomnia severity index score

Visit	ISIscore	Severity of insomnia
Baseline (initial)	26	Clinical insomnia
2nd week (1st follow-up)	9	Subthreshold insomnia
4th week (2nd follow-up)	5	No clinically significant insomnia
6th week (final follow-up)	2	No clinically significant insomnia

ISI: Insomnia severity index

anxiolytic, antioxidant, and neuroprotective effects, which contribute to reducing psychological arousal and oxidative stress – factors known to impair sleep. These effects have been demonstrated in both preclinical and clinical studies.[34,43]

The polyherbal formulation thus employs a multimodal mechanism: *R. serpentina* downregulates monoaminergic tone, *W. somnifera* enhances GABAergic activity, and *P. nigrum* boosts systemic efficacy while contributing its own neuroprotective benefits. The cumulative effect leads to improved sleep initiation, maintenance, and overall sleep quality, with no observed adverse effects, underscoring its safety profile.

Moreover, the Unani understanding of insomnia (Sahar) as a condition of excessive *harārat* (heat) and *yubūsat* (dryness) in the brain finds a plausible correlate in the modern neurochemical model of insomnia characterized by hyperarousal and autonomic dysregulation**.** By restoring "tartīb" (moisture) and reducing "*harārat*," this formulation harmonizes the temperament (*mizāj*) of the patient, aligning traditional concepts with contemporary neurobiology. The shift in temperament from *safrāwī* (bilious) to *damwī* (sanguine), as recorded in this case, provides additional evidence for the holistic balancing effect of the treatment.

Despite promising results, it is important to recognize that this is a single-patient case study. While it provides valuable preliminary evidence supporting the therapeutic role of Unani polyherbal combinations in chronic insomnia, larger, randomized controlled trials are necessary to confirm the generalizability of these findings and elucidate long-term safety profiles.

Patient perspective

The patient reported satisfaction with symptom relief and appreciated the natural, side-effect-free approach.

Conclusion

This case study highlights the promising therapeutic potential of AFA formulation in the management of chronic insomnia. The formulation demonstrated significant efficacy in improving sleep onset, quality, and continuity, as evidenced by a marked reduction in the ISI score from 26 to 2 over a 6-week period. The individual ingredients, supported by both traditional Unani literature and modern pharmacological evidence, exerted synergistic effects through mechanisms such as VMAT2 inhibition, GABAergic modulation, and enhanced bioavailability of active compounds.

Importantly, the formulation was well tolerated with no adverse effects reported, underscoring its safety. The patient also exhibited a positive shift in temperament (Mizaj), reflecting holistic improvement consistent with Unani principles of care.

While these findings are encouraging, they are based on a single case and should be interpreted cautiously. Further clinical studies with larger sample sizes and controlled methodologies are warranted to validate these outcomes and establish the formulation as a standardized treatment option for insomnia within integrative healthcare frameworks.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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An Official Publication of Central Council for Research in Unani Medicine

Current Issue

Oct-Dec 2024 - Volume 19 - Issue 4

Editor-in-Chief: Dr. N. ZAHEER AHMED

ISSN: 0974-1291

Frequency: Four issues per year

Current Issue Highlights

Review Article

Gurmar booti (*Gymnema sylvestre* (Retz.) R.Br. Ex sm.): A Comprehensive Review of Its Therapeutic Benefits and Pharmacological Insights

Mudassir, Mohd; Naseer, Mursaleen; Mohsin, Mohammad; More

Hippocratic Journal of Unani Medicine. 19(4):121-128, Oct-Dec 2024.

Most Popular Articles

GENERAL MEDICINE

Clinical Improvement in a Morbidly Obese Patient of Sciatica/lumbosacral Radiculopathy with *Ilaj bit Tadbeer*

'Irq al-Nasā (Sciatica) is one of the most common manifestations of Waja' al-Ẓahr (backache), a type of Waja' al-Mafāṣil (arthritis/ arthralgia). In Unani medicine, Waja' al-Mafāṣil is one of the most common disorders caused prevalent in general population and increases...

***Hippocratic Journal of Unani Medicine*,** September 04, 2025

OPEN

GENERAL MEDICINE

Melancholic Humor (*Khilṭ-e-Sawdā*)

In Unani medicine, melancholic humor, called Sawdā (black bile), is one of the four key humors that regulate both physical and mental health. Each humor corresponds to a particular temperament and physiological role, with imbalances potentially leading to illness. Sauda is...

***Hippocratic Journal of Unani Medicine*,** April 23, 2025

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GENERAL MEDICINE

Fatty Liver Disease: A Holistic Concept and