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Research Article

Exploring the Association of *Sū' Mizāj al-Kabid al-Bārid* with the Clinical Profile of Non-Alcoholic Fatty Liver Disease: A Cross-Sectional Observational Study

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Abstract

Background: Non-alcoholic fatty liver disease (NAFLD) is the most prevalent chronic liver disease worldwide and is strongly associated with obesity, insulin resistance, type 2 diabetes mellitus, and metabolic syndrome. Although *Tashaḥḥum-i-Kabid Ghayr Khamrī* not explicitly described in classical Unani literature, its clinicopathological features closely resemble *Sū'-i-Mizāj al-Kabid al-Bārid*, involving impaired hepatic temperament, defective metabolism, and fat accumulation. **Objectives:** To explore the etiopathogenesis of *Tashaḥḥum-i-Kabid Ghayr Khamrī* (NAFLD)from the Unani perspective, correlate classical concepts with contemporary medical understanding, and assess the role of *Sū'-i-Mizāj al-Kabid* and associated risk factors. **Materials and Methods:** An observational cross-sectional study was conducted on 60 ultrasonography-confirmed NAFLD patients attending the OPD/IPD of HAHRDM Hospital, State Unani Medical College, Prayagraj. Demographic characteristics, lifestyle factors, clinical features, laboratory investigations, ultrasonographic findings, Mizāj, and *Sū'-i-Mizāj al-Kabid* were assessed using a validated questionnaire developed from classical Unani literature. Statistical analysis was performed using Chi-square/Fisher's exact test at a 5% level of significance. **Results:** Most participants were females (65.0%) aged 41–50 years (43.3%). *Balghamī Mizāj* (76.7%) and *Sū'-i-Mizāj al-Kabid al-Bārid* (80.0%) predominated. Frequent consumption of fatty foods, sedentary lifestyle, and non-vegetarian dietary habits were common. Elevated AST (78.3%) and ALT (75.0%), dyslipidaemia, and Grade I fatty liver (71.7%) were the predominant laboratory and ultrasonographic findings.**Conclusion:** The findings suggest that *Sū'-i-Mizāj al-Kabid al-Bārid*, impaired *Quwwat Ṭabī'iyya*, and unhealthy lifestyle factors contribute to *Tashaḥm-ul-Kabid*, supporting an integrated Unani and contemporary approach to its prevention and management.

Keywords: *Balghamī Mizāj*, Non-Alcoholic Fatty Liver Disease, NAFLD, *Sū'-i-Mizāj al-Kabid al-Bārid, Tashaḥḥum-i-Kabid Ghayr Khamrī*, Unani Medicine

INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) is widely regarded as the most prevalent chronic liver disease globally. It encompasses a diverse range of hepatic conditions, beginning with simple liver steatosis and potentially progressing to non-alcoholic steatohepatitis (NASH), advanced liver fibrosis, cirrhosis, and hepatocellular carcinoma.[1] NAFLD is characterized by an abnormal accumulation of triglycerides in hepatocytes, typically affecting more than 5–10% of the liver, in the absence of excessive alcohol intake or other recognized causes of secondary hepatic steatosis.[2] The growing incidence of obesity, type 2 diabetes mellitus, insulin resistance, dyslipidaemia, physical inactivity, and unhealthy dietary habits has contributed substantially to the rising prevalence of NAFLD. Consequently, it has emerged as a major global public health challenge, with a particularly significant impact in India and across the Asia-Pacific region.[1-5]

The prevalence of non-alcoholic fatty liver disease (NAFLD) differs substantially across various regions of the world. Studies suggest that approximately 30–46% of adults in Western countries are affected, while the prevalence in the Asia-Pacific region is estimated to be around 25%. In India, reported prevalence rates vary between 9% and 35%.[1] NAFLD is particularly prevalent among individuals with obesity and type 2 diabetes mellitus, which are important associated metabolic risk factors.[4,5] As the disease often progresses without noticeable symptoms, it is frequently detected incidentally during routine biochemical investigations or abdominal ultrasonography performed for other clinical indications. [1,4,6]

Although the specific term *Tashaḥḥum-i-Kabid Ghayr Khamrī* is not explicitly mentioned in classical Unani texts, its pathological features may be interpreted in relation to the Unani concept of *Sū'-i-Mizāj al-Kabid al-Bārid*. In Unani medicine, the liver is regarded as an inherently hot and moist (*Ḥārr Raṭb*) organ and is considered the primary site associated with *Quwwat Ṭabī'iyya*. It has a central role in the production of *Akhlāṭ* and the maintenance of normal metabolic functions. [7–13]

According to Unani principles, a shift in the hepatic temperament toward increased coldness (*Burūdat*) may weaken the liver's digestive and metabolic activities, thereby promoting the abnormal accumulation of *Shaḥm* (fat). Such alterations may contribute to hepatic dysfunction and produce pathological changes that correspond to those observed in NAFLD. [7,9–13]

The present study was undertaken to investigate the clinical profile of *Tashaḥḥum-i-Kabid Ghayr Khamrī* by integrating the principles of classical Unani medicine with contemporary medical knowledge. It further aimed to evaluate the association of *Sū'-i-Mizāj al-Kabid*, *Quwwat Ṭabī'iyya*, and lifestyle-related risk factors with NAFLD. The study sought to establish an evidence-based correlation between traditional Unani concepts and current hepatological understanding, thereby providing a scientific framework for interpreting NAFLD within the Unani system of medicine.

LITERATURE REVIEW

Historical Background

Although NAFLD is a relatively recent clinical entity, its pathological features may be correlated with the classical Unani concept of *Sū'-i-Mizāj al-Kabid al-Bārid*. In Unani medicine, the liver (*Kabid*) is regarded as the principal organ involved in *Akhlāṭ* formation and metabolic regulation. Disturbance of its normal *Ḥārr Raṭb* temperament may impair hepatic digestive functions and promote abnormal fat accumulation, resulting in manifestations comparable to NAFLD. [7,9,14]

Classical Unani physicians provided detailed descriptions of hepatic disorders. Buqrāṭ (Hippocrates) described hepatic inflammation and pain, while Jālīnūs (Galen) classified liver diseases according to disturbances of temperament, inflammation, injury, and obstruction.[14] Raban Ṭabarī emphasized sedentary habits, heavy diets, and phlegmatic imbalance as contributing factors, whereas Rāzī associated *Sū'-i-Mizāj al-Kabid al-Bārid* with impaired hepatic function and abnormal humour formation.[14,15] Thābit ibn Qurra further described anorexia, fatigue, obstruction, and impaired digestion in cold hepatic temperament.[16] These concepts were subsequently elaborated by scholars such as Al-Qamarī, Majūsī, Ibn Sīnā, Jurjānī, Ibn Hubal Baghdādī, Ibn Rushd, and Nafīs al-Kirmānī, particularly regarding the causes, manifestations, diagnosis, and management of hepatic disorders.[7,9,10,17–19]

From a modern perspective, Leevy (1962) reported fatty liver in individuals without significant alcohol consumption.[20] Ludwig et al. (1980) subsequently introduced the term *non-alcoholic steatohepatitis (NASH)*, followed by the "two-hit hypothesis" proposed by Day and James.[21,22] The term NAFLD was later introduced by Schaffner and Thaler, while subsequent research established obesity, insulin resistance, and metabolic syndrome as major contributors to its pathogenesis.[23–26]

Non-Alcoholic Fatty Liver Disease

Non-alcoholic fatty liver disease (NAFLD) refers to excessive fat accumulation in the liver in individuals without significant alcohol consumption. It is generally defined in people who abstain from alcohol or consume less than 20 g/day. [1] Before diagnosing NAFLD, other causes of hepatic steatosis, including certain medications, hepatitis C infection, intestinal bypass surgery, and total parenteral nutrition, should be excluded.[1]

NAFLD represents a broad spectrum of liver disease, ranging from simple hepatic steatosis to steatohepatitis, progressive fibrosis, cirrhosis, and hepatocellular carcinoma. [5] While a small amount of hepatic fat is physiological, fat accumulation exceeding approximately 5–10% of liver weight is considered abnormal. [3] Non-alcoholic steatohepatitis (NASH) is the progressive form of NAFLD characterized by steatosis with hepatocellular injury, inflammation, and varying degrees of fibrosis, and carries a higher risk of cirrhosis and hepatocellular carcinoma. [5,28] Increasing evidences also suggests that a proportion of cases previously classified as cryptogenic cirrhosis may actually represent advanced NASH. [2]

Synonyms

Various terms have been used for non-alcoholic fatty liver disease, including:

Steatosis, Non-alcoholic hepatitis, NAFLD, NASH, Fatty liver hepatitis, Alcohol-like hepatitis, Diabetic hepatitis, Pseudo-alcoholic liver disease, Non-alcoholic Laennec's disease, and Steatonecrosis. [1,2,4,8,10,29,30]

Among these, NAFLD remains the most commonly used medical term.

Unani Perspective

Classical Unani scholars, including Hippocrates, Jālīnūs, Rāzī, Ibn Sīnā, and Ibn Rushd, regarded the liver as an essential organ involved in metabolism and the production of *Akhlāṭ* (humours), and referred to it as the *Maṭbakh* (kitchen) of the body. [11,13,18,25] Its functions were considered to be regulated by *Quwwat Ṭabī'iyya* through five faculties: *Jādhiba* (absorptive), *Māsika* (retentive), *Hāḍima* (digestive), *Mumayyiza* (discriminative), and *Dāfi'a* (expulsive).

These faculties were believed to regulate the absorption, retention, digestion, differentiation, and elimination of substances, while their dysfunction was thought to disrupt humoral metabolism and contribute to disease. [13,14] The liver was also considered responsible for the elimination of *Fuḍlāt* (waste products), including *Mā'iyya* (watery), *Ṣafrāwiyya* (bilious), and *Sawdāwiyya* (black-bilious) wastes. [13] Therefore, according to Unani medicine, the liver plays a central role in digestion, metabolism, humour formation, and the removal of waste products.

Metabolic Functions of The Liver

The liver is a highly metabolically active organ that plays a crucial role in the utilization, synthesis, storage, and transport of nutrients and various other substances.

Its major functions include the metabolism of carbohydrates, lipids, and proteins, as well as the storage of vitamins and iron, synthesis of coagulation factors, and metabolism and elimination of drugs and hormones.[31]

Fat Metabolism

The liver has a central role in lipid metabolism through the following processes:

1. Oxidation of fatty acids to generate energy.

2. Synthesis of cholesterol, phospholipids, and lipoproteins.

3. Conversion of carbohydrates and proteins into fatty acids and other lipid compounds.

Within hepatocytes, fatty acids undergo β-oxidation, producing acetyl-CoA, which subsequently enters the citric acid cycle to generate energy. When acetyl-CoA is produced in excess, it can be converted into ketone bodies, which are released into the bloodstream and utilized as an energy source by other tissues. The liver is also a major site for the synthesis of cholesterol, phospholipids, and lipoproteins. In addition, excess carbohydrates and proteins can be converted into fat within the liver, after which these lipids are transported to adipose tissue for storage.[31]

Manāfiʿ Al-Kabid

Classical Unani physicians considered the liver an essential organ for maintaining metabolism and humoral equilibrium. According to Unani principles, its principal role was to transform *Kaylūs* (chyle) into *Akhlāṭ* (humours), thereby contributing to the maintenance of health and physiological balance.[13,32] *Al-Quwwat al-Ṭabīʿiyya* (natural faculty) was considered responsible for regulating nutrition, growth, tissue regeneration, and the elimination of waste, with the liver regarded as its principal seat. Abu Sahl Masīḥī stated that this faculty provides *Ghizā'* (nourishment) and facilitates the removal of Fuḍlāt (waste).[33] Nafīs further described its functions as including *Badal Mā Yataḥallal* (replacement of tissues), blood formation, and growth.[14] ʿAli ibn al-ʿAbbās Majūsī categorized this faculty into three aspects: *Quwwat Muwallida* (reproductive), *Murabbiya* (growth-promoting), and *Ghādhiya* (nutritive).[22] Therefore, *Al-Quwwat al-Ṭabīʿiyya* contributes to nourishment, growth, reproduction, tissue renewal, and the elimination of waste products.

Sū'-I-Mizāj Kabid

In Unani medicine, every organ is believed to possess a particular *Mizāj* (temperament), and its normal physiological functioning is dependent on maintaining a balanced state, known as *Muʿtadil*.[14] The liver is traditionally regarded as having a naturally hot and moist temperament (*Ḥārr Raṭb*).[13] Abu Sahl Masīḥī suggested that organs receiving a greater blood supply tend to possess greater inherent warmth. *Sū'-i-Mizāj al-Kabid* denotes an alteration or disturbance in the normal temperament of the liver and was discussed by Rāzī in his work *Kitāb al-Ḥāwī fī al-Ṭibb*.[23] *Sū'-i-Mizāj kabid* occurs in four forms:[23,26]

***1. Sū'-i-Mizāj Kabid Ḥārr*:** Excessive hepatic heat, either *Ḥārr Sāda* (without material cause) or *Ḥārr Māddī* (with material cause).
'Alāmat: Thirst, poor appetite, yellow urine/skin, fever, rapid pulse, constipation, dry tongue, *burning sensation, and right hypochondrial heaviness.* [23.]

2. Sū'-i-Mizāj Kabid Bārid: Abnormal coldness of the liver, associated with improper diet, fatty foods, and excessive cold regimens.
'Alāmat: Pallor, reduced thirst and appetite, pale tongue/lips, whitish urine, anaemia, slow pulse, and indigestion.[23]

3. Sū'-i-Mizāj Kabid Raṭb: Excessive hepatic moisture.
'Alāmat: Reduced thirst, soft body, periorbital swelling, salivation, sleepiness, whitish urine, weak pulse, indigestion, and soft stools. [23]

4. Sū'-i-Mizāj Kabid Yābis: Excessive dryness of the liver.
'Alāmat: Dry mouth and tongue, hard pulse, reduced body fluids, weakness, anaemia, poor appetite, and abdominal muscular tension. [23]

Etiology

The causes of NAFLD are broadly classified into primary and secondary types. Primary NAFLD is mainly associated with insulin resistance, obesity, type 2 diabetes, and metabolic syndrome, whereas secondary NAFLD may result from drugs, toxins, nutritional deficiencies, systemic diseases, infections, and surgical procedures. [27,35]

Major causes include:

1. ***Metabolic disorders:*** Obesity, insulin resistance, diabetes, dyslipidaemia, rapid weight loss, starvation, cachexia, refeeding syndrome, and TPN.

2. ***Nutritional deficiencies:*** Protein-calorie malnutrition, marasmus, kwashiorkor, and coeliac disease.

3. ***Genetic/metabolic disorders:*** Glycogen storage diseases, galactosaemia, fructose intolerance, tyrosinemia, homocystinuria, abetalipoproteinemia, lipodystrophy, Wilson disease, Refsum syndrome, and α1-antitrypsin deficiency.

4. ***Endocrine disorders*:** Hypopituitarism and hypothyroidism.

5. ***Systemic disorders:*** Acute fatty liver of pregnancy, inflammatory bowel disease, short bowel syndrome, urea-cycle disorders, and fatty-acid oxidation defects.

6. ***Medications:*** Amiodarone, tamoxifen, methotrexate, glucocorticoids, oestrogens, antiretrovirals, valproic acid, calcium-channel blockers, vitamin A, and certain antibiotics.

7. ***Toxins and metals:*** Cocaine, organic solvents, petrochemicals, dimethylformamide, mushroom poisoning, uncooked ackee fruit, barium, antimony, and phosphorus.

8. ***Surgical procedures:*** Jejunoileal/gastric bypass, gastroplasty, biliopancreatic diversion, extensive small-bowel resection, and post-liver transplantation.

9. ***Infections:*** HIV, hepatitis C, small-bowel bacterial overgrowth, and *Bacillus cereus* toxins.

10. ***Miscellaneous:*** PCOD with insulin resistance, obstructive sleep apnoea, hypothalamic/pituitary dysfunction, jejunal diverticulosis with bacterial overgrowth, and family history of steatohepatitis or cryptogenic cirrhosis. [3,6,8,10,30,34,36,37]

Overall, primary NAFLD is predominantly associated with metabolic factors such as insulin resistance, obesity, diabetes, and metabolic syndrome. In contrast, secondary NAFLD may arise from a wide range of nutritional, genetic, endocrine, systemic, drug-induced, toxic, infectious, and surgical factors.

Sū'-I-Mizāj Al-Kabid Al-Bārid

In Unani medicine, *Sū'-i-Mizāj al-Kabid al-Bārid* denotes a cold disturbance in the normal temperament of the liver. Excessive accumulation of fat, characterized as *Bārid Raṭb* (cold and moist), is believed to adversely affect hepatic function and is particularly associated with obesity and a predominance of the *Balghami* (phlegmatic) temperament.[38] *Balgham*, one of the four *Akhlāṭ* (humours), is described as cold and viscous; therefore, its excessive accumulation is traditionally regarded as a predisposing factor for cold dysfunction of the liver.[14]

Asbāb: Sū'-I-Mizāj Al-Kabid Al-Bārid

The major causes described in Unani literature include:

- Excessive physical activity or prolonged inactivity. [39,40]
- Overeating and unhealthy dietary habits. [39,40]
- Excessive intake of cold foods, drinks, medicines, and regimens. [13,39]
- Abnormal retention or excessive evacuation (*Iḥtibās* and *Istifrāgh*). [18]
- Accumulation or obstruction by waste materials.
- Cold-producing occupations or environmental conditions. [39,40]
- Excessive emotional disturbances such as fear, anxiety, worry, or excitement. [13,39,40]
- Excessive accumulation of *Balgham* in the liver. [13]
- Intake of cold water after bathing, exercise, sexual activity, or on an empty stomach. [11,18]
- Exposure to cold/damp conditions and depletion of *Ḥarārat Gharīziyya* (innate heat). [21]
- Impaired gastric digestion and inadequate delivery of matured *Kaylūs* to the liver. [13]
- Weakness of the spleen (*Ḍu'f al-Ṭihāl*), causing inadequate purification of *Sawdā'* and subsequent hepatic coldness. [13]
- *Waram-i-Ṣulb* (hard swelling). [18]

Overall, Unani literature relates *Sū'-i-Mizāj al-Kabid al-Bārid* to coldness, excess moisture and *Balgham*, impaired digestion, metabolic dysfunction, and fat accumulation.

Clinical Features

- NAFLD is often asymptomatic, particularly in the early stages of simple hepatic steatosis.
- Some patients may experience fatigue, generalized weakness, or malaise.
- Mild discomfort or dull pain in the right upper abdomen may occur, particularly when hepatomegaly is present.
- Hepatomegaly may be detected on physical examination in some patients.
- Clinical manifestations may become more prominent with disease progression from simple steatosis to NASH, advanced fibrosis, or cirrhosis.[41,42]

Alāmāt: Sū' Mizāj Al-Kabid Al-Bārid

- **General Features**
  - Pale, dull, or lifeless facial appearance
  - Facial puffiness
  - Generalized dryness of the body
  - Difficulty or discomfort in body movements
- **Oral Cavity**
  - Pallor of the tongue and lips
  - Altered appetite, with an initial increase in appetite followed by decreased appetite or anorexia
  - Reduced thirst
  - Preference for hot-natured foods
- **Gastrointestinal Features**
  - Indigestion or dyspepsia
  - Sensation of heaviness, fullness, or stretching in the right hypochondrium
  - Altered bowel habits
  - Passage of blood in the stools
  - Tenesmus during defecation
- **Haematological Features**
  - Anaemia [11,15,19,23,24,26,43]

Tests and Tools for Diagnosis

- Most individuals with NAFLD remain asymptomatic, particularly during the early stages.[44]
- There is no single diagnostic test that can independently confirm NAFLD; diagnosis is based on a combination of laboratory investigations, imaging studies, and clinical assessment.[7]

▪ **Imaging Modalities:** The principal imaging techniques used to detect hepatic steatosis are ultrasonography (USG), computed tomography (CT), and magnetic resonance imaging (MRI). USG is commonly used as an initial non-invasive investigation, while CT and MRI provide more detailed assessment of hepatic fat accumulation.[8]

▪ The diagnostic evaluation primarily involves excluding other causes of liver disease and confirming the presence of hepatic steatosis.

▪ Associated metabolic risk factors, including obesity, diabetes, insulin resistance, and dyslipidaemia, should also be evaluated.

▪ The severity of liver disease and degree of fibrosis should be assessed using non-invasive scoring systems, laboratory parameters, and imaging techniques.

▪ **Liver biopsy:** may be considered when non-invasive investigations are inconclusive or when confirmation of steatohepatitis and assessment of fibrosis are clinically necessary.[1,45]

Tashkhīṣ Sū' Mizāj Al-Kabid Al-Bārid

In Unani medicine, diagnosis primarily relies on **clinical evaluation**, supported by the examination of *Nabḍ* (pulse), *Bawl* (urine), and *Barāz* (stool).[11,15,16,19,26,43]

▪ ***Nabḍ* (Pulse):** The pulse may generally be Ḍa'īf (weak), Baṭī (slow), or Mutafāwit (irregular).

▪ ***Bawl* (Urine):** Urine is usually Abyaḍ (pale) and Raqīq (thin), but may become thick and Balghamī (mucous-like) when Mādda is present.

▪ ***Barāz* (Stool):** Stools are commonly pale or whitish, soft to relatively dry, and may have reduced or absent odour; in some cases, they may exhibit a Ghassālī appearance.

Complications

Simple hepatic steatosis may progress to NASH with hepatocellular injury, inflammation, and fibrosis. Progressive fibrosis can lead to cirrhosis and HCC. [46]

Major complications include: NASH, Hepatic fibrosis, Cirrhosis, Hepatocellular carcinoma (HCC), Ascites, Liver failure. [1,2,4,30]

Awāriḍāt

Classical Unani physicians associated *Sū'-i-Mizāj al-Kabid al-Bārid* with impaired hepatic function and the development of related complications. These may include *Ḍu'f al-Kabid* (liver weakness or dysfunction), *Waja' al-Kabid* (hepatic pain), *Sū' al-Qinya* (anaemia), and *Istisqā* (ascites).[17,24–26]

MATERIALS AND METHODS

Study Design and Setting

An observational, cross-sectional study was conducted in the Department of Mahiyatul Amraz, State Unani Medical College & HAHRDM Hospital, Himmatganj, Prayagraj, Uttar Pradesh, India, over an 18-month period. A total of 60 patients with non-alcoholic fatty liver disease (NAFLD) were enrolled.

Study Population

Patients attending the outpatient and inpatient departments of HAHRDM Hospital were screened for eligibility. NAFLD was diagnosed on the basis of clinical assessment and confirmed by abdominal ultrasonography. Eligible participants were enrolled after obtaining written informed consent. Patients of either sex aged 20–50 years with ultrasonographically confirmed grade I–III NAFLD were included. Patients who were pregnant or lactating, had other chronic liver diseases including cirrhosis or viral hepatitis, were receiving hypolipidemic medication, or had a history of alcohol consumption were excluded.

Clinical and Unani Assessment

A structured questionnaire was developed to assess the clinical features described in Unani literature in relation to *Sū'-i-Mizāj al-Kabid al-Bārid*. The questionnaire was developed with reference to classical Unani sources, including *Al-Qānūn*, *Kāmil al-Ṣanā'a*, *Mu'ālajāt al-Buqrāṭiyya*, *Kitāb al-Ḥāwī fi 'l-Ṭibb*, *Kitāb al-Mukhtārāt fi 'l-Ṭibb*, *Dhakhīra Khwārazm Shāhī*, *Iksīr-i-A'ẓam*, and *Ṭibb-i-Akbar*. The draft instrument was reviewed by subject experts, and necessary modifications were incorporated before its administration.

The assessed features included altered or dull complexion, reduced thirst (hypodipsia), increased appetite (polyphagia), pallor of the lips and tongue, whitish urine, anaemia, slow or irregular pulse, pale and less odorous stools, indigestion, reduced appetite in cold conditions, and a history of early-morning consumption of cold water. Relevant lifestyle and dietary factors, including consumption of fatty foods and sweetened beverages, physical activity, and family history of NAFLD, were also documented.

Laboratory and Ultrasonographic Assessment

Laboratory investigations included haemoglobin, total leukocyte count, erythrocyte sedimentation rate, liver function tests, lipid profile, and blood glucose. Whole-abdomen ultrasonography was performed to assess hepatic steatosis and classify NAFLD severity as grade I, II, or III.

Data Collection and Management

Demographic characteristics, clinical findings, questionnaire responses, lifestyle factors, laboratory parameters, and ultrasonographic findings were recorded in predesigned case record forms. Data were checked for completeness and maintained confidentially throughout the study.

Statistical Analysis

Categorical variables were summarized as frequencies and percentages, whereas continuous variables were expressed using appropriate descriptive statistics. Associations between categorical variables were evaluated using the chi-square test or Fisher's exact test,

as appropriate. A two-sided *P* value <0.05 was considered statistically significant.

Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee, State Unani Medical College, Prayagraj (Meeting dated 14/10/2023, Minutes No. 03, S. No. 28). Written informed consent was obtained from all participants before enrolment.

RESULT

Demographic Characteristics

Among 60 patients with NAFLD, the majority were aged 41–50 years (43.3%, n=26), followed by 31–40 years (36.7%, n=22) and 20–30 years (20.0%, n=12). Females constituted 65.0% (n=39) of the study population, while males accounted for 35.0% (n=21). Most participants were non-working or engaged in domestic activities (66.7%, n=40), followed by skilled/manual workers (18.3%, n=11), business/self-employment (11.7%, n=7), and professional occupations (3.3%, n=2).

Clinical Characteristics

The number of symptoms reported per patient ranged from none to five. Three symptoms were reported by 35.0% (n = 21) of participants, followed by two symptoms in 28.3% (n = 17) and four symptoms in 23.3% (n = 14). Five symptoms were reported by 8.3% (n = 5), while 3.3% (n = 2) reported one symptom. Only one patient (1.7%) was asymptomatic.

Heaviness in the right upper abdomen was the most frequently reported symptom (98.3%, n = 59), followed by dull pain in the right upper abdomen (78.3%, n = 47) and nausea (61.7%, n = 37). Dyspepsia was reported by 28.3% (n = 17), vomiting by 26.7% (n = 16), and anorexia by 23.3% (n = 14).

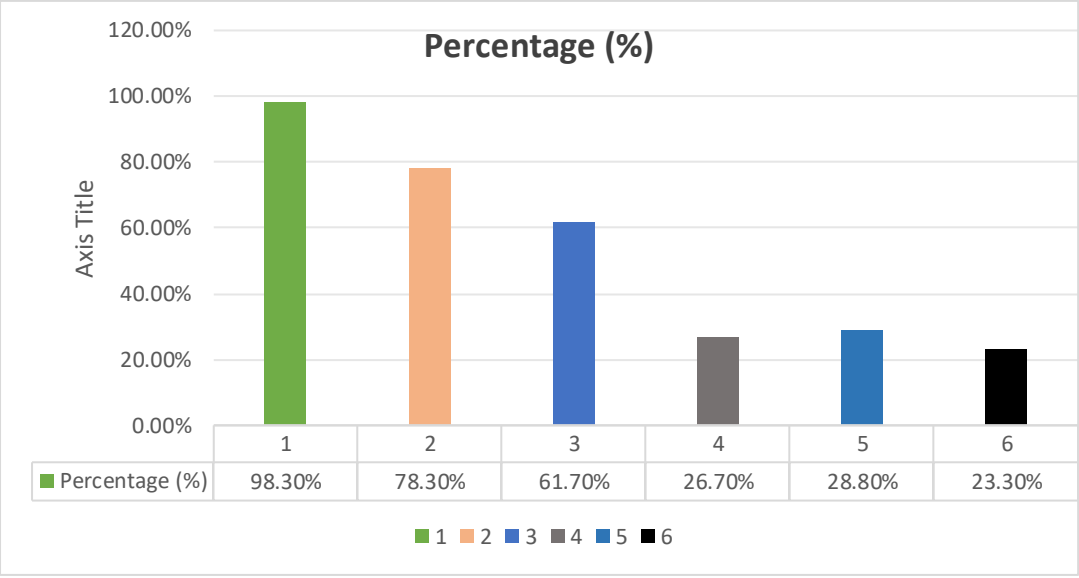

Figure 1: The predominant symptoms were heaviness in the right upper abdomen (98.3%, n = 59) and dull ache in the right upper abdomen (78.3%, n = 47), followed by nausea (61.7%, n = 37). Vomiting (26.7%, n = 16), dyspepsia (28.8%, n = 17), and anorexia (23.3%, n = 14)

Lifestyle and Dietary Characteristics

Most participants (71.7%, n=43) reported no smoking, tobacco, or alcohol-related habits, while 20.0% (n=12) reported tobacco chewing and 8.3% (n=5) reported smoking. Sound sleep was reported by 51.7% (n=31), whereas 48.3% (n=29) had disturbed sleep. Bowel habits were regular in 66.7% (n=40) and irregular in 33.3% (n=20).

A non-vegetarian diet was reported by 75.0% (n=45) of participants, while 25.0% (n=15) followed a vegetarian diet. Fatty-food consumption was daily in 51.7% (n=31), weekly in 30.0% (n=18), and occasional in 18.3% (n=11), with 81.7% (n=49) consuming fatty foods at least weekly.

Regarding physical activity, moderate activity was most common (45.0%, n=27), followed by mild (30.0%, n=18) and sedentary activity (18.3%, n=11). Overall, 48.3% (n=29) were classified as having low physical activity. By frequency, 61.7% (n=37) reported occasional and 31.7% (n=19) daily physical activity, with 68.4% (n=41) demonstrating minimal or irregular physical activity.

Assessment of *Mizāj* & *Sū'-i-Mizāj al-Kabid*

Mizāj: The findings indicated a predominant *Balghamī* (phlegmatic) temperament, which was observed in 76.7% (n = 46) of the participants, whereas *Damawī* (sanguine) temperament was identified in 23.3% (n = 14) of participants.

Sū'-i-Mizāj al-Kabid: The assessment revealed that *Sū'-i-Mizāj al-Kabid Bārid* (cold hepatic dyscrasia) was predominant, occurring in 80.0% (n = 48) of patients, while *Sū'-i-Mizāj al-Kabid Ḥārr* (hot hepatic dyscrasia) was observed in 20.0% (n = 12) of the patients.

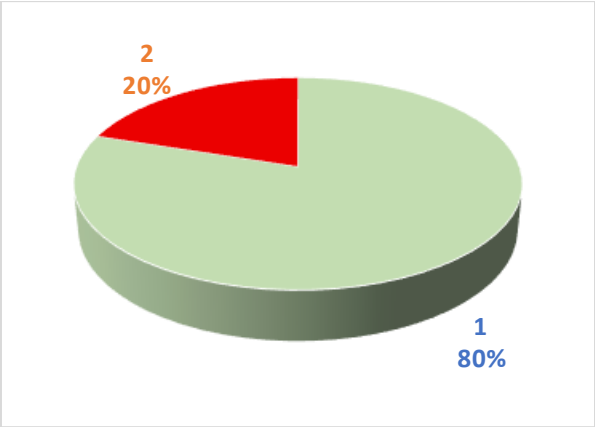

Figure 2: Majority of patients (80.0%) suffering from NAFLD exhibited a *Bārid* (Cold) *Sū'i Mizāj al-Kabid*, while a smaller proportion (20.0%) showed a *Ḥārr* (Hot) *Sū'i Mizāj al-Kabid.*

DISCUSSION

The present cross-sectional observational study explored the association of *Sū' Mizāj al-Kabid al-Bārid* with the clinical profile of NAFLD in 60 patients. The study demonstrated a predominance of *Sū' Mizāj al-Kabid al-Bārid* (80%) and *Balghamī Mizāj* (76.7%), along with characteristic dietary, lifestyle, clinical, biochemical, and radiological findings.

Association of *Sū' Mizāj al-Kabid al-Bārid* with NAFLD

The predominance of *Sū' Mizāj al-Kabid al-Bārid* and *Balghamī Mizāj* supports the traditional Unani concept that a cold and moist temperament may be associated with impaired hepatic metabolism and accumulation of fatty matter. Unani literature describes *Burūdat* of the liver as capable of weakening *Quwwat Hāḍima* and promoting accumulation of *Dasūmat.* [14,38] The present findings therefore provide supportive observational evidence for this association, although causality cannot be established because of the cross-sectional design.

Demographic and Lifestyle Profile

Most patients were middle-aged, with 43.3% in the 41–50-year group. NAFLD is commonly associated with increasing age and metabolic risk factors such as insulin resistance and metabolic syndrome.[1] Females constituted 65% of the study population. The predominance of women may partly reflect the demographic characteristics of the study population and the higher representation of middle-aged females.

Most participants (66.7%) were non-working or engaged in domestic activities, while physical activity was largely occasional or irregular. Reduced physical activity is an established metabolic risk factor for NAFLD [10] and is also considered detrimental to hepatic function in Unani literature. [19,39,40]

Dietary Factors

A non-vegetarian diet was reported by 75% of participants, while 81.7% consumed fatty foods at least weekly. Frequent intake of energy-dense and fatty foods is associated with metabolic dysfunction and hepatic fat accumulation. Similarly, Unani literature cautions against excessive intake of *Ghalīẓ Ghidhā'* and considers it detrimental to hepatic function.[19] These findings indicate a conceptual overlap between Unani and contemporary perspectives on dietary risk factors.

Clinical Profile

The predominant symptoms were right upper abdominal heaviness (98.3%), dull right upper abdominal pain (78.3%), and nausea (61.7%). Dyspepsia was reported by 28.3% of patients. Right hypochondrial heaviness and pain are compatible with the traditional description of hepatic disorders and *Sū' Mizāj al-Kabid* [17,19]. Dyspepsia and bowel disturbances may further reflect impaired digestion associated with hepatic dysfunction in Unani literature.[11,15–17]

Biochemical and Radiological Findings

Elevated AST and ALT were observed in 78.3% and 75.0% of patients, respectively, while dyslipidaemia was also common. These findings are consistent with the metabolic and hepatic abnormalities associated with NAFLD. [10] From the Unani perspective, they may be interpreted in relation to hepatic weakness (*Ḍu'f al-Kabid*) and disturbed humoral metabolism. [13,16]

Grade I fatty liver was the predominant ultrasonographic finding (71.7%), suggesting that most patients had early-stage hepatic steatosis. Early hepatic derangement is considered potentially reversible in the Unani framework before progression to established structural pathology. [18]

Overall Interpretation

Overall, the predominance of *Sū' Mizāj al-Kabid al-Bārid* and *Balghamī Mizāj*, together with frequent fatty-food intake, inadequate physical activity, dyslipidaemia, elevated liver enzymes, and hepatic steatosis, indicates a possible association between Unani temperament-based characteristics and the clinical profile of NAFLD. These findings support the potential role of *Mizāj* assessment as a complementary component of NAFLD evaluation. However, larger controlled and longitudinal studies are required to confirm the strength and clinical significance of this association.

CONCLUSION

The present study demonstrated a marked predominance of *Sū' Mizāj al-Kabid al-Bārid* (80%) and *Balghamī Mizāj* (76.7%) among patients with NAFLD. The study population was characterized predominantly by middle age, female sex, frequent consumption of fatty foods, and insufficient physical activity. Clinically, heaviness and dull pain in the right upper abdomen were the most prominent manifestations, whereas elevated liver enzymes, dyslipidaemia, and Grade I hepatic steatosis represented the principal biochemical and radiological findings. Collectively, the observed predominance of *Sū' Mizāj al-Kabid al-Bārid* alongside the characteristic clinical, lifestyle, biochemical, and radiological features of NAFLD indicates a notable

association between Unani concepts of hepatic temperament and the contemporary clinical profile of NAFLD. These findings highlight the potential relevance of *Mizāj* assessment as a complementary approach in the evaluation of NAFLD and provide a foundation for further investigation into temperament-based risk stratification and individualized Unani therapeutic strategies.

Nevertheless, the observed association should not be interpreted as evidence of causality, given the cross-sectional nature of the study. Future studies involving larger samples, appropriate control groups, and longitudinal follow-up are warranted to validate these findings and determine the clinical significance and reproducibility of the observed relationship.

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