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Exploring the association between ABO blood groups and temperament: Bridging Unani concepts with biomedical evidence

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Abstract
Temperament (*Mizaj*) forms the cornerstone of Unani medicine, shaping physical constitution, psychological disposition, and disease susceptibility. Rooted in the balance of the four humors; Dam, Balgham, Safra, and Sauda, this framework parallels constitutional biology in contemporary science. The ABO blood group system, discovered by Landsteiner in 1901, is one of the most significant genetic markers in biomedical research, linked with infectious, cardiovascular, metabolic, and behavioral outcomes. Recent studies have attempted to bridge Unani and biomedical perspectives by examining associations between ABO groups and temperaments. Emerging evidence, including cross-sectional analyses using validated *Mizaj* questionnaires, suggests possible links: group O aligning with circulatory robustness of Damvi temperament, group A with sluggish metabolic tendencies of Balghami, group B with inflammatory predispositions of Safravi, and group AB with restrictive traits of Saudavi. Furthermore, biomedical correlates of temperament, ranging from genetic polymorphisms and neurotransmitter systems to autonomic, hormonal, metabolic, and immunological pathways reinforce the plausibility of these overlaps. Although current findings remain preliminary, integrative evaluation highlights a promising avenue for personalized and culturally sensitive healthcare. Robust interdisciplinary research combining serological and genotypic data with validated temperament assessment tools is warranted to substantiate these associations.

Keywords: ABO blood groups, Unani medicine, *Mizaj*, Temperament

Introduction
Temperament (*Mizaj*) is a fundamental concept in Unani medicine, derived from the interaction of the four humors; *Dam* (blood), *Balgham* (phlegm), *Safra* (yellow bile), and *Sauda* (black bile). Each individual possesses a dominant temperament (*Damvi*, *Balghami*, *Safravi*, *Saudavi*) that determines physical constitution, psychological disposition, and susceptibility to disease. This classification has long guided preventive and therapeutic practices in Unani medicine [1, 2].

The ABO blood group system, discovered by Karl Landsteiner in 1901, is one of the most widely studied genetic markers in biomedical science [3]. Beyond its role in transfusion compatibility, several studies have reported associations of ABO groups with infectious diseases, cardiovascular risk, metabolic conditions, and even behavioral traits. The ABO locus on chromosome 9q34 encodes glycosyltransferases that regulate antigen expression, thereby influencing physiological and pathological processes [4, 5].

Recent attempts to explore correlations between ABO blood groups and temperament reflect an effort to bridge Unani concepts with biomedical evidence. Although findings remain inconclusive, the possibility that humoral balance described in Unani theory corresponds with biological variations of blood groups provides a unique avenue for integrative research [6]. This review aims to examine the available literature on ABO groups and temperament, highlighting areas of convergence and scope for future studies.

2. Concept of Temperament in Unani Medicine (*Mizaj*)
Temperament (*Mizaj*) represents one of the cardinal principles of Unani medicine and provides a theoretical framework to explain interindividual variability in health and disease [7]. It is defined as the qualitative state emerging from the interaction of the four fundamental humors: *Dam* (blood), *Balgham* (phlegm), *Safra* (yellow bile), and *Sauda* (black bile). Each humor is characterized by intrinsic qualities: heat, coldness, moisture, and dryness that,

when combined in varying proportions, determine the constitutional makeup of an individual [8, 9]. Classical Unani texts describe four predominant temperaments: *Damvi* (sanguine, hot and moist), *Balghami* (phlegmatic, cold and moist), *Safravi* (choleric, hot and dry), and *Saudavi* (melancholic, cold and dry) [10]. These temperaments are regarded as relatively stable constitutional attributes that manifest in physical characteristics, metabolic tendencies, psychological disposition, and patterns of disease susceptibility. For instance, a *Damvi* temperament is often associated with robustness and vitality, whereas a *Saudavi* temperament is linked to introversion and predisposition to depressive states [11].

The assessment of temperament is central to Unani clinical practice, guiding preventive recommendations, dietary prescriptions, and therapeutic interventions. Maintenance of equilibrium between humors is considered essential for preservation of health, while deviation from the balanced state predisposes to pathological conditions [12, 13]. Thus, the doctrine of *Mizaj* not only reflects the individualized approach inherent in Unani medicine but also provides a conceptual bridge to contemporary notions of constitutional biology and personalized healthcare.

3. ABO Blood Group System in Biomedicine

The ABO blood group system, first described by Karl Landsteiner in 1901, remains the most clinically significant blood group classification in transfusion medicine and immunohematology. It is determined by the presence or absence of A and B carbohydrate antigens on the surface of erythrocytes, which are in turn defined by allelic variations at the *ABO* locus located on chromosome 9q34. This locus encodes glycosyltransferase enzymes that catalyze the transfer of specific monosaccharides to the H antigen precursor, giving rise to the A and B antigens. Individuals lacking functional transferases express only the H antigen, thereby constituting blood group O [7, 8].

The distribution of ABO groups varies markedly across populations, reflecting genetic drift, selective pressures, and evolutionary adaptations. From a biomedical perspective, these polymorphisms are more than transfusion markers; they exert wide-ranging influences on physiology and pathology [9]. Numerous studies have demonstrated associations between ABO blood groups and susceptibility to infectious diseases, including *Plasmodium falciparum* malaria, *Helicobacter pylori* infection, and certain viral illnesses. Blood group O, for example, has been linked to relative protection against severe malaria, whereas non-O groups may confer increased risk of venous thromboembolism due to higher circulating levels of von Willebrand factor and factor VIII [12, 13].

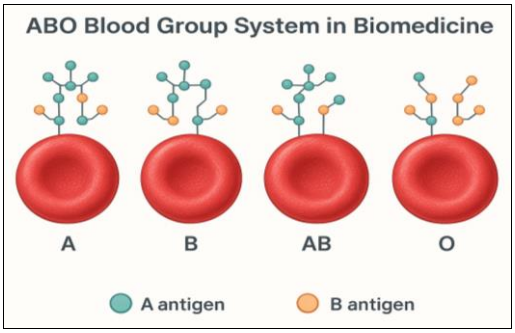

Fig 1: ABO blood group system in biomedicine

Beyond infectious and hematological implications, ABO groups have been implicated in the pathogenesis of metabolic and cardiovascular disorders. Non-O groups have been reported to exhibit elevated risk of coronary artery disease and myocardial infarction, potentially mediated through prothrombotic and proinflammatory pathways [14]. Associations have also been described with malignancies, including gastric and pancreatic cancers, where blood group A has emerged as a consistent risk factor. More recently, research has extended into behavioral and psychological domains, with exploratory studies suggesting potential links between ABO polymorphisms and personality traits, although evidence remains inconclusive [14].

4. Evidence Linking ABO Blood Groups with Temperament: Empirical investigations into the relationship between ABO blood group polymorphisms and temperament within the framework of Unani medicine remain limited but noteworthy. While a substantial body of research has explored potential associations between ABO phenotypes and modern psychological constructs such as personality traits, only a few studies have directly examined the correspondence between blood groups and *Mizaj*, the constitutional typology central to Unani theory. These studies represent an initial effort to empirically evaluate classical humoral concepts against biomedical markers [15, 16, 17].

A cross-sectional study conducted by Parvizi *et al.* (2023) [18] in Iran is the most methodologically rigorous contribution to date. Using the validated Mojahedi *Mizaj* questionnaire to assess both simple and compound temperaments in a cohort of 308 adults, the authors reported statistically significant associations between specific ABO groups and defined temperamental categories. Individuals with blood group AB demonstrated a nearly three-fold increased likelihood of exhibiting a "cold" (*barid*) temperament compared with those of group O (OR = 2.88, 95% CI: 1.16-7.15), while group A was inversely associated with "dry" (*yabis*) temperament (OR = 0.46, 95% CI: 0.23-0.92). Importantly, no significant relationships were observed for the Rh system, suggesting specificity of the association to ABO antigens. Although cross-sectional in nature, this study is significant in that it integrates validated Unani diagnostic tools with biomedical laboratory markers, thereby providing a replicable model for future investigations.

5. Parallels between Unani Temperaments and ABO Blood Groups: The conceptual framework of Unani medicine emphasizes *Mizaj* as a determinant of constitutional characteristics, disease susceptibility, and behavioral disposition. In parallel, the ABO blood group system has been shown to influence immunological reactivity, coagulation pathways, metabolic regulation, and, to a limited extent, psychological traits. Although rooted in distinct epistemologies, both constructs aim to explain interindividual variability, providing a basis for exploring potential overlaps [19].

From the Unani perspective, individuals with *Damvi* (sanguine; hot and moist) temperament are described as physically robust, energetic, and sociable, reflecting dominance of blood (*Dam*). Interestingly, population-based biomedical studies frequently report that individuals with group O the "universal donor" phenotype, exhibit lower risk

of thromboembolic disorders due to reduced circulating von Willebrand factor and factor VIII. This pro-circulatory profile has been tentatively aligned with the vitality and vigor attributed to *Damvi* temperament, suggesting a possible biological substrate for the classical description [17-19].

Conversely, *Balghami* (phlegmatic; cold and moist) temperament is characterized by lethargy, slow metabolism, and emotional steadiness. Blood group A, associated in biomedical studies with elevated total cholesterol, higher risk of ischemic heart disease, and increased susceptibility to certain malignancies, may resonate with the sluggish metabolic features traditionally ascribed to *Balghami* constitution [17].

Safravi (choleric; hot and dry) temperament is linked to irritability, heightened reactivity, and susceptibility to febrile and inflammatory conditions. Some Unani scholars have speculated parallels with blood group B, which has been reported in certain epidemiological studies to correlate with autoimmune and inflammatory disorders, though the evidence is inconsistent [19].

6. Biomedical Correlates of Temperament

Temperament, though originally conceptualized within Greco-Arab and Unani traditions, has parallels in modern biomedical and psychological sciences. Contemporary research increasingly recognizes temperament as a biologically influenced construct shaped by genetic, neurochemical, and physiological mechanisms. Understanding these correlates not only strengthens the bridge between Unani theory and biomedicine but also provides a mechanistic framework through which constitutional differences may influence health outcomes.

6.1 Genetic and Neurobiological Influences

Twin and family studies demonstrate that temperament traits, such as emotional reactivity, sociability, and activity level, are moderately heritable. Genetic polymorphisms influencing neurotransmitter systems including dopamine (DRD4, COMT), serotonin (5-HTTLPR), and noradrenaline pathways have been associated with temperament dimensions such as novelty seeking, harm avoidance, and persistence.

These findings suggest a stable constitutional basis for temperament akin to the *Mizaj* framework in Unani medicine [20].

6.2 Neurotransmitter Systems and Emotional Regulation

Neurochemical activity strongly influences temperamental traits. Elevated serotonergic tone has been linked to harm avoidance and emotional inhibition, whereas dopaminergic activity correlates with reward sensitivity, vigor, and novelty seeking. Cholinergic and GABAergic systems further modulate arousal, stress responsiveness, and adaptability. Dysregulation in these pathways is associated with psychiatric vulnerabilities, paralleling the Unani notion that disturbance in temperament predisposes to disease [21, 22].

6.3 Autonomic Nervous System Activity

Physiological studies consistently show associations between baseline autonomic tone and temperament. High vagal activity (parasympathetic dominance) has been correlated with calm, socially adaptive temperaments, while heightened sympathetic activity predisposes to excitability, irritability, and stress reactivity. Heart rate variability (HRV), a biomarker of autonomic flexibility, has emerged as a strong predictor of individual differences in emotional and behavioral regulation, reflecting the constitutional stability of temperament [23, 24].

6.4 Hormonal and Endocrine Correlates

Endocrine systems contribute significantly to temperamental expression. Cortisol reactivity to stress has been linked to anxiety-prone temperaments, while testosterone and estrogen modulate dominance, aggression, and sociability. Thyroid hormone imbalances are also known to influence mood, energy, and metabolic traits. These hormonal effects resonate with Unani descriptions of *Safravi* (choleric, hot-dry) and *Balghami* (phlegmatic, cold-moist) constitutions, which are respectively predisposed to heightened excitability or metabolic sluggishness [25, 26].

6.5 Metabolic and Immunological Pathways

Emerging evidence suggests that metabolic and immune mechanisms contribute to stable temperamental tendencies. Pro-inflammatory cytokines such as IL-6 and TNF-α are associated with fatigue, negative affect, and social withdrawal, while metabolic traits such as insulin sensitivity and lipid profiles affect energy levels and activity patterns. These pathways offer biological plausibility for the humoral descriptions of Unani medicine, where excess phlegm or bile corresponds to altered metabolic and inflammatory states [27, 28].

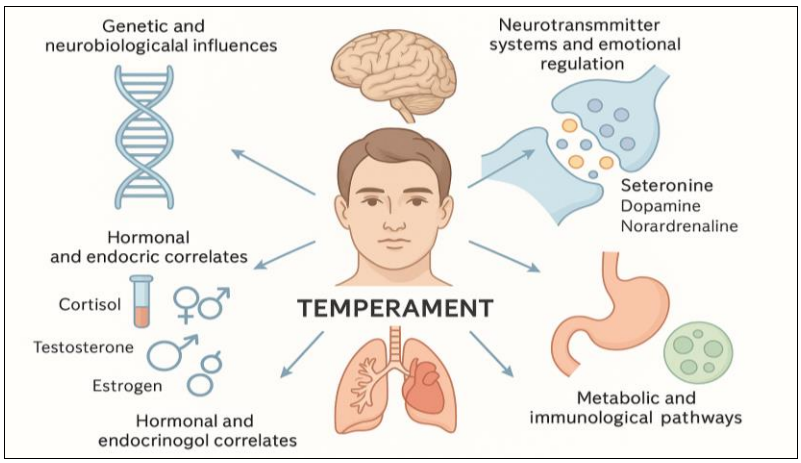

Fig 2: Biomedical Correlates of Temperament

7. Integrative Perspective

The exploration of parallels between ABO blood groups and Unani temperaments provides a unique opportunity to bridge traditional constitutional medicine with contemporary biomedical frameworks [29]. Both systems, though grounded in different epistemological traditions, converge on the recognition of stable interindividual differences that influence physiology, psychology, and disease susceptibility [30]. While Unani medicine attributes these variations to the qualitative dominance of humors manifesting as *Mizaj*, biomedicine identifies them through genetic polymorphisms, immunohematological markers, and metabolic profiles [31, 32].

Integrative evaluation suggests that certain characteristics ascribed to specific temperaments resonate with biomedical observations linked to ABO groups. For instance, the vigor and circulatory robustness of *Damvi* temperament show conceptual parallels with the protective vascular profile of group O, while the sluggish metabolic tendencies of *Balghami* temperament mirror reported associations of group A with hypercholesterolemia and ischemic heart disease [33]. Likewise, the inflammatory predisposition of *Safravi* temperament may correspond with immunological reactivity occasionally observed in group B, and the restrictive, melancholic traits of *Saudavi* temperament find echoes in the vascular vulnerability of group AB.

Although preliminary, such integrative mappings open avenues for hypothesis generation in personalized medicine. By combining temperament assessment with genetic and serological profiling, it may become possible to stratify individuals for targeted preventive strategies, lifestyle modifications, and therapeutic interventions [34, 35]. Importantly, this approach acknowledges the value of traditional diagnostic frameworks while situating them within modern scientific discourse, thereby fostering a culturally sensitive model of integrative healthcare.

8. Conclusion:

Current evidence, though limited, suggests potential associations between ABO blood groups and Unani temperaments (*Mizaj*), with preliminary studies indicating biologically plausible overlaps. While Unani medicine attributes constitutional differences to humoral dominance, biomedical science identifies genetic and serological markers as determinants of physiological and psychological variability. Integrating these perspectives offers a promising framework for personalized and culturally sensitive healthcare. However, robust interdisciplinary research using validated *Mizaj* tools and genotypic confirmation of ABO status is essential before definitive conclusions can be drawn.

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