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A comparative evaluation of *Tauleed-e-Harārat* and thermogenesis: An interdisciplinary perspective

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Abstract
The generation and regulation of heat within the human body have been central to both classical Unani medicine and modern physiological science. In Unani literature, *Tauleed-e-Harārat* (production of heat) is described as an intrinsic process essential for the maintenance of life, governed by the innate heat (*Harārat-e-gharīziya*) and influenced by temperament (*Mizāj*), humours (*Akhlāṭ*), and vital organs (A'ḍā' Ra'īsā). Unani scholars such as Ibn Sīnā, Rāzī, Majūsī, and Jurjānī described in great detail how heat is produced, distributed, and preserved in the human body. Modern physiology, on the other hand, explains this phenomenon under the concept of thermogenesis, involving biochemical and metabolic pathways such as mitochondrial oxidative phosphorylation and hormonal regulation through thyroid hormones and catecholamines. This comparative study aims to explore conceptual parallels and scientific correlations between *Tauleed-e-Harārat* and thermogenesis. The study reveals that both systems recognize heat as a vital factor in sustaining life and regulating metabolic processes, though their explanatory frameworks differ. While Unani theory emphasizes qualitative and holistic aspects of heat, modern science defines it quantitatively through energy metabolism. The study concludes that integrating Unani and modern perspectives can enrich the understanding of human thermoregulation and support interdisciplinary approaches to health and disease management.

Keywords: *Tauleed-e-Harārat*, thermogenesis, *Harārat-e-gharīziya*, *Mizāj*, metabolism, interdisciplinary study

Introduction
Heat production is a fundamental physiological process that maintains life and enables metabolic functions. In Unani medicine, this concept is referred to as *Tauleed-e-Harārat*, which literally means "generation of heat." The Unani scholars considered heat as the essence of vitality (حرارتِ غریزیہ), without which the human body cannot sustain its structure or function. In contrast, modern physiology interprets heat production through the mechanisms of thermogenesis, a metabolic process that converts biochemical energy into thermal energy. The objective of this study is to analyse and compare these two concepts, *Tauleed-e-Harārat* and thermogenesis, to establish their philosophical, physiological, and functional parallels. By doing so, it highlights how traditional and modern systems of medicine approach the same biological phenomenon from different yet complementary perspectives. In the Unani system of medicine, the human body is governed by Tabī'at (طبیعت), the vital force maintaining balance among the four humors. *Harārat* (حرارت) is central to this philosophy and represents the essence of life.

Concept of *Harārat* (*حرارت*)
According to *Al-Qānūn fī'l-Ṭibb* by Ibn Sīnā and Kitāb al-Ḥāwī by Rāzī, *Tauleed-e-Harārat* arises from the interaction between the innate heat (حرارتِ غریزیہ) and *Rutūbat-e-Gharīziya* of the body. The process is primarily governed by the heart, which is regarded as the origin of heat, and distributed through the blood to other organs. Unani scholars proposed that heat generation varies according to *Mizāj*, *Akhlāṭ*, and environmental factors. For example, individuals with a hot temperament exhibit stronger metabolic activity and faster heat production, while those with a cold temperament display reduced metabolic functions. The regulation of heat was seen as crucial for maintaining homeostasis. Excessive heat leads to dryness and tissue damage, while deficiency causes coldness and metabolic slowdown.

In modern physiology, thermogenesis refers to the biological process by which organisms produce heat. It occurs primarily in the mitochondria through oxidative metabolism, where nutrients like carbohydrates and fats are converted into ATP and heat.

There are three major types of thermogenesis

1. **Basal Thermogenesis:** The resting metabolic heat required for maintaining vital functions. Basal metabolism or *Sharah Qaedi Istehala* is the best example.
2. **Shivering Thermogenesis:** Muscle contractions generate heat in response to cold. *Harārat* Muqasshirah produced during hypothermic conditions.
3. **Non-shivering Thermogenesis:** Mainly mediated by brown adipose tissue (BAT) and regulated by hormones such as thyroxine and norepinephrine.

The hypothalamus plays a key role in controlling body temperature through feedback mechanisms involving vasomotor activity, sweating, and metabolic adjustments. *Harārat* and Barūdat are the two principal qualities shaping all physiological functions. Life is sustained through the balance between them, known as I'tidāl-e-*Harārat* (اعتدال حرارت). The heart (قلب) is the source of heat, while the brain (دماغ) provides cooling.

Innate Heat (حرارتِ غریزیہ)

Harārat-e-gharīziya or natural heat with which every living being is endowed at birth. It originates in the heart and spreads through the blood, sustaining life and vitality. Its functions include maintaining metabolism, supporting digestion, and promoting circulation. When *Harārat-e-gharīziya* weakens, aging begins. Innate heat is a fundamental concept in Galenic medicine, referring to a physiological heat proper to living beings. It's nature and role is bound up with the definition of life within a theoretical framework combining natural philosophy and medicine. Within the human body, the innate heat is sourced in the heart and cooled down by the inspiration of air in the lungs during breathing. Galen systematized the notion of heat in his medical theory built upon Hippocratic, pre-Socratic, Platonic, Aristotelian, and Stoic philosophies. In this respect, the Galenic physiological system owes a significant debt to Aristotelian biology, which theorized the nutritive functions of the innate heat. It is also rooted in the Stoic pneuma responsible for the sensory and motive functions.

***Harārat*-e-Gharībah (Acquired Heat) حرارتِ غریبیہ**

A secondary form of heat produced by external factors such as exercise (Riyāzat ریاضت), emotions, and diet. It is pathological heat arising from humoural imbalance and inflammation etc. *Harārat* Gharībāah is not the part of innate heat but environmental heat which strengthens or weakens innate heat depending on balance. *Harārat* Gharībāah produced by excessive Safrā', Dam-e-fāsid, Warm-e-a'zā and decomposition of humours producing burning heat, febrile heat and toxic heat respectively. The characteristics of *Harārat* Gharībāah are sudden onset, drying effect, restlessness and localized or systemic fever.

Mechanisms of Heat Production

The heart, liver (جگر), and muscles play roles in heat generation. Hippocrates viewed digestion as a process of cooking requiring heat, while Galen elaborated the distinction between innate heat (heart-origin) and natural heat (liver-origin). Ibn Sīnā refined these ideas, asserting that the liver prepares nutritive material through which the heart sustains its heat. In Unani physiology, the liver has a hot and moist temperament (ḥārr-ratab). Its heat supports digestion and transformation, while its moisture preserves innate heat. This temperament makes the liver ideal for producing humours and the natural spirit. The liver produces rūḥ tabī'ī, generated during the second digestion where nutrients are transformed into blood. This spirit fuels the heart. The liver also generates *Harārat*-e-tabī'īyah through metabolism. It forms blood as the primary fuel source of *Harārat-e-gharīziya* and regulates moisture essential for the endurance of heat. The heart acts as the primary source, the liver refines nutrients for blood formation, and muscular activity generates additional heat. The heart and liver exist in a complementary relationship. The liver provides fuel and moisture necessary for sustaining the heat present in the heart, while the heart's warmth facilitates hepatic digestion. Together, they constitute a closed thermal circuit essential for life. These processes are similar to modern concepts of metabolic thermogenesis.

Modern physiology recognizes thermogenesis as a complex interplay between the nervous system, endocrine system, and cellular metabolic pathways. It is influenced by nutrition, physical activity, ambient temperature, hormonal, and genetic factors. Thermogenesis is a dynamic and complex process essential for maintaining body temperature, energy balance, and metabolic health. Enhancing thermogenesis through pharmacological agents or lifestyle interventions may increase daily energy expenditure. Organs with the highest contribution to heat production are- Liver (20-25%), Brain (15-20%), Heart (10%) and Kidneys (10%). These organs have high ATP turnover and consistent metabolic activity, resulting in steady thermogenic output. Diet-induced thermogenesis accounts for 10-15% of total daily energy expenditure. Macronutrient-specific thermogenic effects are- Protein: 20-30%, Carbohydrates: 5-10%, Fat: 0-3%. Protein-rich diets demonstrate the highest thermogenic impact due to increased ATP demand for deamination, urea synthesis, and protein turnover.

Mitochondria are the central organelles responsible for thermogenesis. Uncoupling proteins are a family of mitochondrial transporters involved in the regulation of energy dissipation. Thermogenesis is tightly regulated by the sympathetic branch of the autonomic nervous system.

Cold exposure → hypothalamic activation → sympathetic discharge → norepinephrine release → β-adrenergic receptor stimulation → thermogenesis.

BAT is crucial for thermogenesis due to its dense mitochondrial population and high vascularity. BAT activation in adults significantly affects energy expenditure even at thermoneutral conditions. Functions of BAT include: Non-shivering thermogenesis, Glucose and lipid metabolism, Enhancement of insulin sensitivity and Detoxification of reactive oxygen species.

Role of Organs in Thermogenesis: Each organ contributes to heat balance. The heart produces innate heat; the liver assists by forming blood; the brain moderates excessive heat; and the lungs cool and purify it. Muscular movement adds temporary warmth. Modern physiology recognizes that the liver generates significant metabolic heat through biochemical reactions and ATP production. Unani concepts of rūḥ tabī‘ī correspond to nutrients and biochemical intermediates. Moisture regulation parallels fluid-electrolyte balance, while cardiac-hepatic synergy resembles modern perfusion dynamics. The liver is essential for producing and sustaining heat. It forms natural spirit, metabolic heat, and nutritive blood, all of which enable the heart to maintain innate heat. The role of liver is central to thermal physiology, metabolism, growth, and systemic health.

Factors Influencing Thermogenesis

Unani scholars identified temperament (مزاج), age (سن), diet (غذاء), exercise (ریاضت), emotions(جزبات) and environment as determinants of heat production (تولید حرارت). These correspond to metabolic rate, physical activity, and thermoregulation in modern physiology. Thermogenesis refers to the generation of heat within the body, primarily attributed to the Qūwat-e-Tabī'iyyah and the liver (کبد) as the chief organ responsible for heat production. This heat sustains life and governs physiological functions. The quality, quantity, and balance of humours directly affect heat production.

Modern physiology divides thermogenesis into basal metabolic heat, diet-induced thermogenesis, exercise-related thermogenesis, and adaptive or non-shivering thermogenesis. Thermogenesis is influenced by a broad range of physiological, environmental, hormonal, genetic, and behavioural factors. Depending on the factor, thermogenesis can increase (e.g., cold exposure, exercise, high-protein diet) or decrease (aging, hypothyroidism, obesity, poor sleep). Poor sleep reduces thermogenesis due to- Lower leptin, higher ghrelin, reduced sympathetic tone and impaired thyroid hormone balance.

Preservation and Regulation of Heat

Tabī‘at (طبیعت) is the supreme controller of temperature of the body by balancing the production of heat in the body and its loss through the thermoregulatory centre located in the Hypothalamus. Preservation of heat is not merely a physical process but a holistic one, involving diet, lifestyle, emotions, environment, and organ health. This emphasizes Unani medicine's integrative approach. Preservation of vital heat (*Hifz-e-Hararat-e-Ghariziyah*) is a foundational concept in Unani medicine. It involves multiple organs, humours, physiological processes, and lifestyle practices.

Ensuring the balance of heat is essential for digestion, metabolism, vitality, and overall health. Classical scholars have outlined detailed dietary, medicinal, and regimental measures to preserve this heat, many of which align with modern biomedical understanding of thermoregulation and metabolism. The holistic Unani framework offers valuable insights for contemporary research in integrative and traditional medicine. Preservation of the heat is done by skin vasoconstriction throughout the body. Methods include Tadbīr (تدبیر) by regimenal therapy, Ilāj bil-Ghidhā, (علاج بالغذاء), and Ilāj bil-Dawā (علاج بالدواء). Hot bath opens pores, stimulates circulation and preserve heat. In Dalk, warm oil massage improves heat retention by enhancing blood flow, reducing stiffness and closing pores in cold environments. Exercise generates heat and strengthens organ faculties. Woolen and layered clothing reduce heat loss. Drugs that preserve and support innate heat:

1. **Zanjabeel (Ginger):** digestive stimulant
2. **Asl (Honey):** heat-preserving tonic
3. **Qaranfal (Clove):** cardiac and digestive stimulant
4. **Darchini (Cinnamon):** warms liver and stomach
5. **Filfil Siah (Black Pepper):** increases metabolic heat
6. **Khameera Gaozaban:** strengthens heart and heat
7. **Majoon Falasfa:** rejuvenates innate heat
8. **Jawarish Amla Sada:** strengthens liver

Decline of *Harārat-e-gharīziya*h with Age

Innate heat diminishes with aging, leading to Barūdat (برودت) and reduced metabolism. Thermogenesis is highest in youth and declines progressively through middle and old age. During Sinn-e-Shabab, *Harārat-e-gharīziya* reaches peak level. Growth Hormone has a direct influence on cellular metabolism and thus can increase the metabolic rate by 15 to 20 per cent. In old age, metabolic activity decreases and thermogenesis become in decline condition. Warm diet and lifestyle are essential to preserve vitality in old age. During Sinn-e-Kuhulat, thermogenesis is moderately high but declining, indicating onset of aging changes. In Sinn-e-Sheikhukhat, thermogenesis is significantly reduced, making the elderly more vulnerable to cold and metabolic disorders. The balance of moisture determines the quality of thermogenesis.

Comparison with Modern Thermogenesis

Unani concepts mirror modern physiology: *Harārat-e-gharīziya*h equals basal metabolism; *Harārat*-e-Gharībah equals adaptive thermogenesis; and Tadbeer-e-Sihhat parallels lifestyle regulation. All of these phenomena are inter-related.

Table 1: Comparative overview of heat concepts

S.No.	Aspect	***Tauleed-e-Harārat*** **(Unani)**	**Thermogenesis (Modern Physiology**
1.	Source of Heat	*Harārat-e-gharīziya*h produced in the heart	Cellular metabolism, primarily in mitochondria
2.	Mechanism	Interaction between heat and moisture; influenced by temperament	Oxidative phosphorylation and hormone-mediated metabolism
3.	Seat of Heat	Heart (as the centre of vitality)	Brown adipose tissue, muscles, and liver
4.	Control System	Qualitative, by *Mizāj*, Akhlaṭ, and Arwāḥ	Quantitative, by hypothalamic thermoregulation
5.	Purpose	Maintenance of life and physiological balance	Maintenance of body temperature and energy balance
6.	Pathological Conditions	Baroodat and *Harārat*-e-Ghair Ṭab‘īya (abnormal heat)	Hypothermia, fever, metabolic disorders

This comparison shows that both systems recognize heat generation as vital for sustaining life. Unani medicine uses qualitative, holistic interpretations, while modern science provides molecular and biochemical explanations. Unani philosophy integrates physical, emotional, and environmental factors in thermogenesis. Emotions like anger increase heat, while fear and sadness lower it. The system emphasizes balance between body, mind, and environment.

Discussion

The Unani concept of *Tauleed-e-Harārat* aligns closely with the physiological idea of thermogenesis. Both involve energy transformation processes essential for maintaining body functions. The Unani explanation, though couched in philosophical language, intuitively recognizes the interplay of metabolic activity, environmental influence, and organ function. The concept of *Harārat-e-gharīziya* may be paralleled with the metabolic energy generated by mitochondria, while Rūḥ may symbolically represent oxygen or biochemical energy carriers. Thus, Unani scholars, through observation and inference, articulated an early understanding of metabolic thermodynamics.

Conclusion

Thermogenesis in Unani medicine centers on *Harārat-e-gharīziya*h, the innate heat sustaining life. The harmony between *Harārat* and Barūdat ensures balance and health, reflecting a profound understanding of energy and vitality centuries before modern metabolic science.

The comparative evaluation of *Tauleed-e-Harārat* and thermogenesis reveals remarkable conceptual similarities despite differences in terminology and framework. Both emphasize the centrality of heat in maintaining life and health. Unani medicine explains it through qualitative and holistic parameters, while modern science interprets it in quantitative biochemical terms. An interdisciplinary understanding of these concepts can foster integrative medical research, particularly in areas such as metabolism, energy regulation, and thermal homeostasis. Bridging traditional and modern paradigms offers new pathways for understanding physiological balance and developing holistic therapeutic approaches.

References

1. Ibn Sīnā. Al-Qānūn fi al-Ṭibb. Vol. I, Maqālah II. New Delhi: Jamia Hamdard, CCRUM; 1993. p. 101-103.
2. Al-Rāzī. Kitāb al-Ḥāwī fī al-Ṭibb. Vol. II. Hyderabad; 1955. p. 166-170.
3. Al-Majūsī (Haly Abbas). Kāmil al-Ṣinā‘ah al-Ṭibbīyah. Book I; p. 210-211.
4. Jurjānī. Zakhīrah Khwārazm Shāhī. Book II. Tehran: Tehran University of Medical Science Press; 1954. p. 125-127.
5. Nafīs ibn. Sharḥ-e-Qānūncha, on Tabī‘at and *Harārat*.
6. Kabeeruddin M. Kulliyat-e-Qanoon. Lahore: Matba Nizami; 1930.
7. Ahmad S. Introduction to Unani Medicine. New Delhi: CCRUM; 1980.
8. Guyton AC, Hall JE. Textbook of Medical Physiology. 14th ed. Philadelphia: Elsevier; 2021.
9. Speakman JR. The physiological regulation of body temperature. Physiol Rev. 2018;98(3):1459-1528.

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