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Comparative evaluation of the concept of digestion (HAḌM) in Unani and modern medicine

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Abstract
Digestion is the breakdown of large food components into small components, so that they can be absorbed from the intestinal mucosa. Unani literature describes digestion that the digestive faculty (Quwwat Hāḍima) digests food (Ghidhā) and converts it into the components of body. According to Unani scholars, digestion involves vital faculties (Quwa), innate heat (Ḥarārat Gharīziyya), temperament (Mizāj), and the balance of humours (Akhlāṭ). This review examines the Unani perspective of digestion, outlines its stages, and compares it with modern physiological concepts.

Keywords: Digestion, Unani medicine, Quwwat Hāḍima, Mizāj, Akhlāṭ

Introduction
In Unani medicine, digestion is a dynamic process governed by the innate heat (Ḥarārat Gharīziyya) and the digestive faculty (Quwwat Hāḍima). Unani scholars, including Hippocrates (Buqrat), Galen (Jalinoos), and Avicenna (Ibn Sina), described digestion as a Nuḍj (concoction), transforming food into humours (Akhlāṭ) and tissues (A'ḍā) [3, 4, 5, 6]. Modern physiology focuses on enzymatic, hormonal, and mechanical aspects, while Unani medicine focuses on maintaining balance, considering temperament, organ strength, and innate faculties [1, 2].

Unani Perspective on Digestion
Stages of Digestion (Marahil-e-Haḍm) in Unani Medicine
In Unani medicine, digestion (Haḍm) is regarded as an essential physiological function in which food (Ghidhā) passes through gradual and systematic stages of transformation (Taghayyurat), eventually becoming the nutritive substances that supports and maintains life. This process is governed by natural faculties (Quwā Ṫabī'iyya) and occurs in different organs of the digestive systems. Each stage is characterized by specific functions and forms of transformation (Taghayyurat) [5, 6].
According to Unani scholars such as Ibn Sina (Avicenna), Abu Sahl Masihi, and Allama Hussain Gilani, digestion is not limited to the stomach but continues through the intestines, liver, vessels, and tissues, ultimately forming the structural and functional components of the human body [3, 4, 5, 7].
The entire digestive process is divided into four main stages (Huḍūm Arba'a):
1. Haḍm-e-Mi'dī (Gastric Digestion)
2. Haḍm-e-kabidī (Hepatic Digestion)
3. Haḍm-e-'Urūqī (Vascular Digestion)
4. Haḍm-e-'Uḍwī (cellular Digestion)

Haḍm-e-Mi'dī (Gastric Digestion)
Gastric digestion refers to the changes occurring in food within the mouth, stomach, upper alimentary canal and mesenteric vessels. It consists of four major steps: Haḍm-e-Fami (Oral Digestion), Haḍm-e-Mi'dī (Gastric Digestion), Haḍm-e-Mi'wī (Intestinal Digestion) and Haḍm-e-Ma'sarika (Mesentric digestion) [3, 4, 6].

a) **Haḍm-e-Fami (Oral Digestion):** Digestion begins in the mouth where food mixes with salivary secretions. The saliva contains moisture (Ruṭūbat) with digestive and transformative powers. Chewing (mastication) by the teeth helps in breaking the foods

into smaller particles, softens its texture, and initiates the first qualitative changes. During this stage, both the consistency and temperament (Mizāj) of the food are altered, preparing it for further digestion in the stomach.

b) **Haḍm-e-Mi'dī (Gastric Digestion Proper):** In stomach, Ḥarkat-e-Dudiya (peristaltic movements) and Ruṭūbat-e-Mi'dī (gastric secretions) acts together to produce chemical transformation. The food becomes semi-digested, forming a mixture known as Kaylūs (chyle), which then passes into the intestines for the next phase of digestion [6, 7].

c) **Haḍm-e-Mi'wī (Intestinal Digestion):** The intestinal phase of digestion involves two major processes: Injazab-e-Kaylūs (absorption of chyle) and Injazab-e-Ṣafrā (absorption of bile).

According to Abu Sahl Masihi, the nutritive extract (Usarah-e-Ghidhā) that passes from the stomach to the small intestine and absorbed through the warīd Māsārīqī (mesentric vein) and in the process of Injazab-e-Ṣafrā, it enters the first part of the small intestine (Asna-e-Ashri) and performs three primary functions:

- Imdad-e-Haḍm (Helps in digestion),
- Tahreek Quwwat-e-Dafi'ah (Stimulates the propulsive force), and
- Imdad Injazab-e-Ghidhā (Helps in nutrient absorption) [7].

Similar to the gastric phase, three factors that are essential in intestinal digestion are heat (Hararat), moisture (Rutubat), and peristaltic movement (Harkat-e-Dudiya). The intestines also possess a transformative faculty (Quwwat-e-Mughayyirah) that induces further changes in the semi-digested food, making it suitable for absorption through the mesenteric vessels (Urooq-e-Ma'sarika) into the bloodstream [7].

The bile not only helps in digestion but also stimulates intestinal movements and helps in the elimination of waste. The small intestine (Am'ā Diqāq) is more active in digestion and propulsion than the large intestine (Am'ā Ghilāẓ), where these activities are slower.

(d) Haḍm-e-Ma'sarika (Mesentric digestion)

According to Allama Hussain Gilani, the stage that follows intestinal digestion are when chyle passes through the mesenteric vessels is known as Tatimma-e-Haḍm-e-Mi'wī (completion of intestinal digestion). The intestinal glands (Ghudad-e-Mi'wīya) fill the empty spaces between the intestinal walls and assist in the continuation of the digestive and transformative processes.

Haḍm-e-kabidī (Hepatic Digestion)

In Hepatic digestion, the liver (Kabid) serves as the chief organ for the conversion of absorbed nutrients into humours. Blood vessels of liver branched into minute capillaries and spread throughout the hepatic tissue, forming a fine interconnection. So, it draws the nutritive material from the stomach and intestines to the liver. The material is "cooked" and refined under the influence of innate heat (Hararat-e-Ghariziyah), and finally producing the four humours (Akhlāṭ-e-Arba'a) that are blood (Dam), phlegm (Balgham), yellow bile (Ṣafrā), and black bile (Sawdā) [4, 9, 14].

Among these, Dam is considered the principal humour and the essence of nourishment. Once perfected, it is distributed throughout the body via the vessels (Urūq) to supply nutrition and sustain vital functions [3, 11].

Haḍm-e-'Urūqī (Vascular Digestion)

Vascular digestion refers to the transformations that occur in the blood within the vessels. During its circulation through the arteries and veins, the blood undergoes further refinement and subtle modification, enabling it to adapt to the specific needs of different tissues and organs. This stage ensures that the nutritive material is adequately prepared for assimilation and incorporation into the structures of the body [3].

Haḍm-e-'Uḍwī (Cellular Digestion)

Cellular digestion involves the changes that take place within the tissues and organs (A'ḍā) themselves. Here, the nutritive portion of the blood is absorbed into the structure of the organ, where it undergoes the final stage of transformation and becoming an integral part of the tissue. This stage marks the completion of the entire digestive process, as food is ultimately converted into living substance, ensuring the maintenance, growth, and repair of the body [3, 12].

Modern Perspective of Digestion

Digestion is a fundamental physiological process that transforms complex food substances into simpler absorbable molecules for energy, growth, and maintenance of life. The process involves both mechanical and chemical breakdown of food, into smaller components that can be absorbed and utilized by the body [1, 2, 8]. It occurs within the gastrointestinal tract, assisted by accessory organs such as the liver, pancreas, and gallbladder [1, 9, 10].

Structure of the Digestive System

The human digestive system comprises the alimentary canal including the mouth, pharynx, oesophagus, stomach, small intestine, large intestine, and accessory organs such as salivary glands, pancreas, and liver. Together, these organs coordinate to facilitate digestion through muscular movements, secretions, and enzymatic actions.

Stages of Digestion

Digestion is a complex and coordinated physiological process through which food is broken down, absorbed and assimilated to meet the nutritional and energy requirements of the human body. It takes place in five main stages: ingestion, propulsion, digestion, absorption, and defecation, each governed by specific organ and regulatory mechanisms.

1. Ingestion

The process begins with the intake of food and liquids through the mouth. During first stage, food is mechanically broken down by mastication and chemically acted upon by salivary enzymes. These enzymes initiate the breakdown of carbohydrates and lipids while saliva lubricates the food to form a bolus that can be easily swallowed. This makes the starting point of the digestive process and prepares food for further breakdown in the gastrointestinal tract [1].

2. Propulsion

The second stage, refers to the movement of food through the gastrointestinal tract, driven primarily by coordinated

muscular contractions. It includes both swallowing (deglutition), which is a voluntary act in the oropharynx and peristalsis, an involuntary wave-like movement that propels the bolus along the oesophagus, stomach and intestines. These rhythmic contractions of the circular and longitudinal smooth muscles ensure unidirectional movement of food and mix the digestive contents with digestive secretions. Therefore, propulsion is essential for the smooth transit of food and maintained by neural and hormonal control mechanisms [2].

3. Digestion

In third stage, food is progressively disintegrated into simpler absorbable substances. Mechanical digestion involves physical processes such as the churning of food in the stomach and segmentation movements in the intestines, which increase the surface area available for enzymatic action.

Chemical digestion is achieved through the secretion of digestive enzymes and juices from the salivary glands, stomach, pancreas, liver, and small intestine. Carbohydrates are broken down into monosaccharides, proteins into peptides and fats into fatty acids and glycerol. These reactions transform complex food molecules into a semisolid substance known as chyme, which can be efficiently absorbed in the subsequent stages [8, 9].

Absorption

The fourth stage, is the most important phase of digestion as it allows the transfer of digested nutrients into the macromolecules of the body. This process primarily occurs in the small intestine, particularly in the jejunum and ileum, where the mucosal surface is highly adapted for absorption due to villi and microvilli. Nutrients such as monosaccharides, amino acids, water-soluble vitamins, and minerals enters the bloodstream directly, while lipids and fat-soluble vitamins are absorbed into the lymphatic system as chylomicrons. The mechanism of absorption involves various processes including diffusion, facilitated transport, and active transport, which ensure that essential nutrients are efficiently taken up regardless of concentration gradients. Water and electrolyte absorption also continue in the large intestine to maintain fluid and electrolyte balance [9, 10].

Assimilation and Egestion

Assimilation refers to absorbed nutrients enter the hepatic portal circulation and are transported to the liver for metabolic processing. Then body tissues utilize these nutrients for energy production, tissue synthesis, and repair.

During egestion, the large intestine collects undigested residues, reabsorbs water, and forms faeces. The process of defecation expels the waste material through the rectum and anus [1, 10].

Comparative Discussion with Modern Physiology

In modern science, digestion is defined as the mechanical and enzymatic breakdown of ingested food into absorbable molecules, followed by absorption, transportation, metabolism, and assimilation at the cellular level [1, 2]. Unani scholars described this process under the concept of Haḍm (digestion), encompassing not only the physical transformation of food but also its qualitative refinement through a series of four distinct stages that Haḍm-e-Mi'dī, Haḍm-e-Kabidi, Haḍm-e-Urūqī, and Haḍm-e-Ud'wi [3, 4]. Although the terminologies and theoretical frameworks differ, both systems converge on the fundamental idea that digestion is a stepwise process transforming food into body substance and energy.

Haḍm-e-Mi'dī and Gastric Digestion

Haḍm-e-Mi'dī, occurs in the stomach (Mi'da), where ingested food is acted upon by Quwwat Hāḍima (digestive power) and Hararat-e-Ghariziya (innate heat). This process involves the softening and liquefaction of food, producing a semisolid material. In modern physiology, this corresponds to gastric digestion, where mechanical churning and secretion of hydrochloric acid and enzymes initiate the breakdown of food, producing chyme [1, 6]. The Unani concept of Quwwat Hāḍima functionally parallels the enzymatic and chemical activity, while Hararat-e-Ghariziya reflects the metabolic energy essential for maintaining enzymatic function. Thus, Haḍm-e-Mi'dī can be interpreted as a qualitative and functional equivalent of the modern gastric digestive phase [13].

Haḍm-e-kabidī and Hepatic Metabolism

In the process of Haḍm-e-kabidī the substance formed in the stomach is refined and converted by Quwwat Tabaiyya into Akhlāṭ-e-Arba'a (Dam, Balgham, Ṣafrā and Sawdā) [4, 9, 14]. These humours are important for nourishment, growth and maintenance of body functions. Modern physiology identifies the liver as a central organ of metabolism responsible for glycogenesis, gluconeogenesis, protein synthesis, lipid metabolism and bile production [9]. So, humours are conceptually coresponds to the metabolic processing of absorbed nutrients and synthesis of essential biomolecules in modern physiology. Therefore, Haḍm-e-Kabidi may be interpreted as the Unani representation of hepatic metabolic and biosynthetic activities.

Haḍm-e-'Urūqī and Vascular Transport

Haḍm-e-'Urūqī is described as the transport of humours through blood vessels (Urūq) to various parts of the body. During this process, qualitative alterations continue as the humours interact with tissues. This corresponds to the modern concept of the circulatory system, where blood distributes oxygen, nutrients, and hormones while maintaining homeostasis through regulatory feedback mechanisms [9, 10, 11]. The Unani view emphasizes subtle refinement of humours during circulation, paralleling the dynamic regulation of plasma composition and nutrient distribution in modern physiology. Hence, this stage signifies vascular transport and ongoing biochemical adjustment within the circulatory system.

Haḍm-e-'Uḍwī and Cellular Assimilation

Haḍm-e-Uḍwī, occurs at the level of organs (A'ḍā) and tissues (Ansīja). Each organ assimilates only from those circulating humours that match its temperament (Mizāj), while the remainder is converted into waste materials (Fuzlat) [3, 11, 12]. In modern physiology, this corresponds to cellular metabolism, where nutrients are taken up by cells for energy production, growth, and repair [2, 9]. Assimilation of nutrients and excretion of waste products relate the Unani explanation of selective absorption according to tissue temperament. Thus, Haḍm-e-Uḍwī represents the final stage of digestion, cellular utilization and homeostasis.

Conceptual Integration

A comparative analysis reveals that both Unani and modern systems describe digestion as a multi-staged continuum from ingestion to assimilation. However, Unani system introduces a qualitative dimension through Mizāj, Quw'a, and Hararat Ghariziya, emphasizing the role of inherent vitality and temperament in maintaining digestive balance [13]. On the other hand, modern physiology explains these processes quantitatively through biochemical pathways, enzymatic reactions and hormonal control. In this way, Quwwat Hāḍima corresponds to enzymatic and metabolic activity, Hararat Ghariziya to metabolic energy, and Istehkam-e-Mizāj (temperamental stability) to the physiological concept of homeostasis [13, 17, 18, 19].

Table 1: Summary of Comparative Stages

Unani Stage	Modern Equivalent	Principal Organ	Function	Nature of Change
Haḍm-e- Mi'dī	Gastric digestion	Stomach	Mechanical and chemical breakdown of food	Physical and chemical
Haḍm-e-Kabidī	Hepatic metabolism	Liver	Conversion of nutrients into humours/metabolites	Biochemical
Haḍm-e-'Urūqī	Vascular transport	Blood vessels	Distribution and regulation of humours/nutrients	Regulatory
Haḍm-e- Uḍwī	Cellular metabolism	Tissues and cells	Assimilation and waste formation	Structural and functional

Conclusion

Though Unani and modern systems explain digestion differently but both addresses the same physiological phenomenon from different perspectives. Digestion is a vital physiological process that sustains life by converting food into nutrients. Modern physiology defines digestion as a sequential mechanical and chemical process regulated by enzymes and hormones resulting in the assimilation of carbohydrates, fats and proteins. In contrast, Unani system views, Haḍm as a qualitative transformation governed by Hararat Ghariziyya and Quwwat Hāḍima, culminating in the formation of the Akhlāṭ-e-Arba'a. This review presents a comparative analysis of the Unani four-stage model of digestion (Haḍm-e-Arba'a) and the modern five-phase process, correlating traditional concepts with biochemical and physiological mechanisms. By corelating classical Unani theory with contemporary science, the study highlights their conceptual continuity and underscores the integrative potential of Unani principles in understanding gastrointestinal physiology.

In Unani physiology, digestion is a continuous process, beginning in the mouth and culminating within the very structure of the organs. Each stage of Haḍm, gastric, hepatic, vascular, and cellular represents a distinct phase of transformation, absorption, and refinement governed by specific faculties and natural forces.

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