Original Article

Ilm-e-Iẓā‘m (Osteology): Historical Development from Classical Greek Thought to Arab Scholarly Contributions and Modern Relevance

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Abstract

Background: Ilm-e- Iẓā‘m (Osteology), the study of bones, occupies a foundational place within Unani medicine, tracing its intellectual origins to classical Greek philosophy and its subsequent systematization during the Islamic Golden Age. Iẓā‘m (Bones), classified as A'ḍā-e-Mufradah (simple organs), were understood by early scholars such as Buqrāt (Hippocrates) and Jalinūs (Galen) as structures vital to bodily support, protection, and movement. This study aims to trace the historical evolution of Ilm-e- Iẓā‘m by consolidating insights from classical Unani texts, integrate these perspectives with contemporary scientific discourse, and highlight the relevance of historical osteological knowledge for modern medical research and practice. **Objective:** This study aims to trace the historical evolution of Ilm-e-Iẓā‘m by consolidating insights from classical Unani texts, integrating these perspectives with contemporary scientific discourse, and highlighting the relevance of historical osteological knowledge for modern medical research and practice. **Material and Methods:** This comprehensive review draws upon classical Unani texts, including Al-Qānūn fī al-Ṭibb, Kitāb al-Mukhtarāt fī al-Ṭibb, Kitāb al-Kulliyyāt, Kitāb al-Manṣūrī, Kitāb al-Ḥāwī, and Kāmil al-Ṣanā'ah, supplemented by contemporary peer-reviewed literature to provide broader scientific context. **Results:** Galen's synthesis of earlier Greek anatomical knowledge was expanded by Arab scholars, including Ibn Sīnā, Al-Rāzī, Al-Zahrāwī, Al-Masīḥī, Al-Majūsī, Ibn Rushd, Ibn Hubal al-Baghdādī, and Ibn al-Nafīs, through detailed anatomical enumeration, functional classification, and clinical application. Comparison with modern anatomical science reveals notable continuities regarding bone classification, joint mechanics, and fracture management, alongside advances in microscopic and biochemical understanding absent from classical accounts. **Conclusion:** Bridging classical Unani perspectives with contemporary scientific discourse underscores the enduring relevance of historical osteological knowledge, affirming its potential contribution to modern medical education, research, and clinical practice.

Keywords: Ilm-e- Iẓā‘m, Osteology, Iẓā‘m, Skeletal anatomy, Greco-Arab Medicine.

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Introduction

Classical Unani literature puts Iẓā’m (bones) under the group A'ḍā-e-Mufradah (Simple Organs) which refers to organs made of a single homogeneous material and having mainly structural or supportive functions. The anatomical and philosophical understanding of bone as a construct is based on the observations and thinking of classical writers, particularly of Ibn Sīnā (Avicenna) whose ideas are still the bases of Unani osteological thought.[1]

According to this system, simple organs are defined as organs made up of one substance: flesh, bone, nerve, cartilage, ligament, artery, vein, brain, spinal cord and skin. This category is therefore characterized by a compositional uniformity, not found in composite organs, as well as being, in general, without a specialized sensory or motor function. Bone, especially, is considered to be one of the strongest structures of the body, and its formation has three main functions: (1) to provide support to the whole body, (2) to limit the movement of particular parts of the body, and (3) to provide protection for the encased organs and delicate tissues.[2] The Unani tib, as a comprehensive system of medicine, is a product of the Greeks' medical philosophy, added to by systematisation in the Islamic Golden Age. In such a tradition, anatomy is a core subject area, and the knowledge of bones is a very special area. The human skeletal system is composed of bones and the joints that allow them to move. It has an important role in: providing structural support; protecting organs; and storing minerals. In the larger context of Unani medical paradigm, an ancient medicine based on the intellectual legacy of Greco-Arab tradition, Iẓā‘m (bones) are therefore not only inert structural components of the human body but also dynamic and a functional, active part of it.[2]

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The human skeleton has always held the fascination of healers and scholars not only as a construction of bones but as a structure in which the exact number, shape, and assembly of bones held the attention of physicians for more than a millennium before the development of modern osteology.[3] Both Greek and Islamic physicians attempted to describe, classify, and explain the skeleton and reached strikingly different conclusions, one that nevertheless had an impact on the other, and that formed a common medical inheritance and influenced both eastern and western anatomical thoughts.[4]

It was a real challenge to list all the bones. The Hippocratic texts listed about 101 bones, and this number has since been found to be rather close to the mark, but Galen never claimed to know the exact number of bones, although he was influential. Increased accuracy came in the form of Arab and Persian scholarship; Al-Qānūn fī al-Ṭibb, written by Ibn Sīnā, listed 248 bones (excluding the hyoid and sesamoids), with detailed regional breakdowns, such as the twenty-six bones of the foot.[3] Al-Zahrāwī's writings also provided this count, indicating a shared anatomical consensus.

In addition to enumeration, Ibn Sīnā's classification of bones by shape and function anticipated modern anatomical classification,[5] his description of the premaxillary bone did so, and later corrected, remarkably, it was Goethe who attributed it to the premaxillary.[6] Classical anatomists also observed ossification processes: "ossification" denotes the development of bones from a number of fusing centres, such as the development of the sternum.

Al-Zahrāwī's Kitāb al-Taṣrīf supplemented this theory with some practical knowledge about surgery that affected the training of physicians in Europe,[7,8] while Al-Rāzī's, Al-Majūsī's, and other classical Unani books introduced questions of bone structure into the general framework of Unani medicine. The study shows that the process of osteology is dynamic and ongoing rather than merely the transmission of information, a process that this paper outlines.

Materials and Methods

In this study, a comprehensive review approach has been taken and information has been collected and consolidated from classical Unani texts – Al-Qānūn fī al-Ṭibb, Kitāb al-'Umda fī al-Jarāḥat, Kitāb al-Mi'a, Kitāb al-Mukhtarāt fī al-Ṭibb, Kitāb al-Kulliyyāt, Kitāb al-Manṣūrī, Kitāb al-Ḥāwī and Kāmil al-Ṣanā'ah. To supplement and place into context this traditional knowledge, some additional information was also drawn from more recent academic literature, including peer-reviewed journal articles, research papers and other modern reference books, contextualizing classical osteological knowledge in a wider context of evidence.

Objective

The aim of the present study is to achieve the following objectives:

1. To trace the history of Ilm-e-Iẓā'm (Osteology) through the classical Unani scholars.
2. To incorporate the classical Unani concepts of the anatomical structure of bones in the current scientific debates.
3. To emphasize how useful historical osteological information is in contemporary medical studies and treatment.

Literature Review

The history of Ilm-e- Iẓā'm (Osteology) starts in the Ancient Greece and grows in the Islamic Golden Age as a tale of ideas passing on, being tested and improved over time. It is often credited to Hippocrates for early observation-based descriptions of fractures and joint injuries, and to Jalinūs for the vocabulary which started to be used for describing and classing the bones, which was accepted without challenge in Europe for more than 1000 years. The course of this development was altered dramatically once these Greek works were translated into Arabic by scholars at Bayt al-Ḥikmah, and translated Greek works such as those by Ibn Sīnā took this knowledge and adapted it into a more complete system, as in Al-Qānūn fī al-Ṭibb. Al-Zahrāwī took this further into practice in his surgical works, Kitāb Al-Taṣrīf, and Ibn al-Nafīs openly challenged the Galenic statements for which there was evidence, making it clear that the Arab tradition of scholarship not only preserved but tested and changed the Galenic tradition.

Greek Foundations of Osteology

Ilm-e- Iẓā'm (Osteology) is the earliest systematic expression of which is found in the ancient Greek medicine: where the philosophical theory, empirical observation, and clinical practice are brought together to explain the human body.[9] The Greeks' interest in osteology was far more than practical and applied, however, as they studied it in relation to natural philosophy, and dealt with its structure, function, and the mechanics of the body.[10]. The Greek intellectual climate fostered careful observation, logical classification and comparative study and has set the groundwork for an exact knowledge of the anatomy of the skeleton.

Hippocrates, regarded as the "Father of Medicine," is known for his movement away from speculation towards systematic observation and thought in the practice of healing. His treatises, especially On Fractures and On Joints, provide a detailed record of injuries to bones, dislocations of joints and therapeutic procedures to correct them. His most significant contributions to orthopaedic practice were the recommendation to use splints and traction for managing skeletal trauma.[11]

In Unani, Buqrāt is known as Hippocrates, and is credited with formulating several of the early ideas of anatomists and physiologists, especially concerning the bones or Iẓā'm. Later his anatomical texts, such as On Fractures and On Joints, were translated into Arabic, and incorporated into the larger body of Unani medical literature. The quality of bone, according to Hippocrates, was cold and dry, appropriate for its functions—namely support, protection, and facilitation of movement—which later echoed in the writings of Al-Qānūn fī al-Ṭibb by Ibn Sīnā and Kāmil al-Ṣanā'ah by Al-Majūsī.

The idea of the origin of bones from the most concentrated and dense fluid substances of the body was again put forward by Hippocrates, which is closely similar to the Unani notion of formation of bones from the balghamī (phlegmatic) matter under the influence of harārat-e-gharīzīyah (innate heat). His systematic approach of classification of fractures and dislocations is considered to be an early forerunner of surgical

thought that was practiced in unani system of medicine. Later physicians in the Arab and Persian tradition followed and transformed the above ideas leading to their continued transmission and preservation within the classical Unani text.[12]

Arastū or Aristotle (384–322 BCE), enlarged on the understanding of the skeleton with systematic classifications of bones and joints. In Parts of Animals he described long, short, flat and irregular bones, and their functional adaptations in locomotion, protection and structural support.[9,13] Rather than just describing the anatomy, Aristotle also studied form and function — how bones function in the mechanics of motion. Aristotle carried out comparative studies with animals and discovered universal rules of skeletal structure, thus laying the groundwork for early functional osteology.[10]

During the Hellenistic period (335–280 BCE) anatomical knowledge advanced considerably by the writings of Herophilūs and Erasistrātūs. These anatomists carried out systematic dissections of human cadavers, an innovative practice, and documented the skeletal structures, articulations and inter-individual variation in Alexandria.[10] Herophilūs made commentaries on the bones of the vertebral column, the rib cage and the bones of the extremities, and Erasistrātūs focused on the functional interaction of bones in supporting organs and in the facilitation of movement. They used an empirical method that was used later to integrate osteology with physiology, thereby underscoring the relationship of skeletal structures with the function of the whole body.[9]

The Greek physician Jalinūs (Galen, 129–216 CE) compiled and added to the Greek osteological information in an extensive body of work. Galen described bones, cartilage, joints, periosteum, and bone marrow, providing detailed descriptions in ‘De usu partium’ (On the Usefulness of the Parts of the Body) and ‘De anatomicis administrationibus’ (On Anatomical Procedures/Operations), which relate anatomical structure to physiological function. He distinguished bones into long, short and flat bones and described the articulations in detail, and studied how the bones function mechanically to provide stability and protect the internal organs during movement. Galen also made contributions on the part of bone marrow in health and disease, and he gave a forerunner to the ideas of skeletal physiology. Galen's synthesis of empirical observation, philosophical theory, and clinical acumen resulted in a holistic framework that became the basis of Greek and subsequent Arabic medical studies.[9,15]

Theoretical osteology was supplemented by practical aspects of bone injury management, as provided by Greek surgical treatises like Celsus (c. 25 BCE-50 CE) and Oribasius (c. 320-400 CE). Describing precise methods for fracture reduction, splinting and immobilization, Celsus wrote in ‘De Medicina’, and Oribasius gathered the Greek knowledge into ‘Collectiones Medicae’ the encyclopedic volumes, combining theory with practice. These writings emphasized the empirical-philosophical approach of Greek medicine: anatomical theory led to the treatment of illness, and clinical observation fed into theoretical knowledge. One noteworthy aspect of Greek osteology was its combination of anatomy, biomechanics and physiology. Bones were not studied alone, but were known in relation to muscles, tendons and joints, and the relationship of bones to the actions of the muscles and joints was carefully examined. The Greeks also noted the inter-individual and inter-species variation of the human bones, indicating a precocious understanding of the diversity of the human skeletal system and its function. The classification, comparison and application to the clinic guaranteed Greek osteology's theoretical soundness and clinical relevance.[9,16]

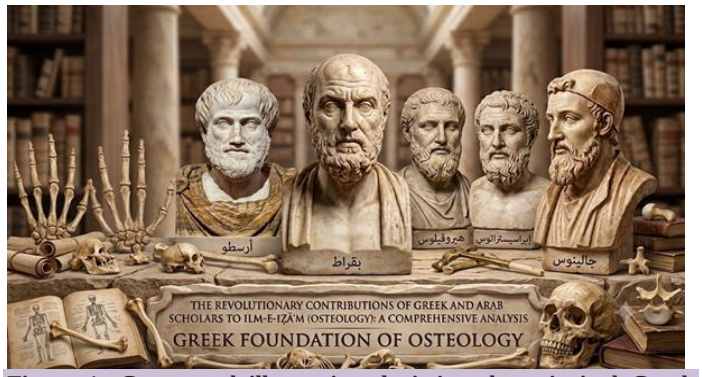

Figure 1: Conceptual illustration depicting the principal Greek scholars and their contributions to the development of osteological knowledge in classical medicine. Created using Google Gemini.

Arabic Transformation and Innovations in Osteology

This is partly because the translation movement (8th-10th century CE) from Greek to Arabic was crucial for the preservation, transmission, and expansion of knowledge of Greek osteology. The movement concentrated in Baghdad and other centres of learning in the Abbasid Caliphate was responsible for the translation of the most important Greek medical texts into Arabic, and for the diffusion of Greek medical concepts of bones, joints and skeletal physiology into a new cultural and scholarly environment. Key translators, such as Hunayn ibn Isḥāq and Thābit ibn Qurra, did careful translations of Galen, Hippocrates, and Aristotle in which they preserved the technical precision of anatomical terminology, while also clarifying ambiguities in the original Greek treatises.[15]

One of the main facilitators in this intellectual transfer was Hunayn ibn Isḥāq (809-873 CE). In his translation of Galen's works on bones and joints, he kept the theoretical system of Greek osteology, and standardized the terminology, which served as the standard for future Arab physicians. Rather, Hunayn highlighted the interdependence of bones and soft tissues, and wrote detailed prefaces to his translations to highlight the philosophical and practical importance of the bones. His work not only saved the knowledge of Greek osteology, but also brought it within the reach of an Arabic-speaking scholarly community.[18,19]

In Kitāb-al-Mansūrī (865–925 CE), Abū Bakr Moḥammad Ibn Zakriyā Al-Rāzī stated that the bones provide support for the body and that each individual bone is fitted for a particular role with its joints connected to each other by ligaments. The joints, where bony projections fit into complementary depressions allow for selective and not free movement, controlled by ligaments; for example, the shoulder joint allows the whole upper limb to move.

Movement starts in the brain by the transmission of nerve impulses to other muscles and tendons that, in concert and with particular emphasis on the muscles contracting, apply the necessary pull and pressure to the bones to create coordinated movement.[20]

After translation, Al-Rāzī became one of the greatest Arab physicians, combining Greek with clinical experience. Al-Rāzī described fractures, dislocations and bone pathologies in great detail in his seminal works Kitāb-al -Ḥāwī, describing diagnostic techniques and methods used for immobilization. He sorted out the various kinds and places of skeletal injuries, and outlined practical procedures of bone-setting and bandaging, reflecting an unusual synthesis of theory with the clinically observed results. His work is an example of how Arabic scholars extended Greek osteology with practical, patient-centered methods.

Alī ibn al-'Abbās al-Majūsī, in his work Kāmil al-Ṣinā'ah, believed that bones are essential to the structure and protection of the body in part because they are hard and dry. He believed that the organs of the body were supported by the bones and that the bones enabled the body to carry out physical activity and exertion like lifting, and that there were some non-osseous organs which needed this extra reinforcement. In addition to the supportive functions, he assigned to bones the additional functions: to prevent injuries, help with movement, aid in the elimination of waste, and contribute to the strength of the body, which, in his account, had 6 major functions: movement, waste elimination, injury prevention, accommodation of organs of varying sizes, protection of vital organs, and mobility. He noted that the skeletal system's many articulations are essential for waste products to be expelled from bodily organs in an unobstructed manner, with specific tracks in the bones, especially in the cranium where waste may tend to accumulate, which allow for its discreet removal without any visible build-up, therefore maintaining the integrity of the organs. He also said the bones are so numerous and diverse that they can provide up to as much support as needed according to the size of the organ; for instance, the femur bone can support a large-sized organ, and the finger bones can support the small part of the fingers.[21]

Kitāb al-Tasrīf li-man 'ajiza 'an al-ta'lif fī al-tibb (The Book of the Abridgement to those who desire to be abridged in the practice of medicine) is one of the most important works on practical osteology by Abū Al-Qāsim Khalaf Ibn 'Abbās Al-Zahrāwī (Albucasis) (936–1013 CE), which recorded surgical methods, fracture treatment and orthopedic instruments. He explained how to treat various fractures, how to fix bones in place and instruments invented especially for bone surgery. Such practical innovations illustrate the emphasis of Arabic medicine on the transfer of theoretical anatomical knowledge into medical practice. Al-Zahrāwī also included illustrations of bones and joints, providing an example of the value of pictorial aids for instruction and in surgical planning.[15]

Ibn Sīnā (Avicenna, 980-1037 CE) also classified the bones and the joints in Al-Qānūn fī al-Ṭibb, according to their shape, function and anatomical location. He explained long bones, flat bones and irregular bones, their articulation points and role in motion and structure. Avicenna also studied cartilage, ligaments and bone marrow and gave information on the physiology of the skeleton. Importantly, he spoke of the mechanical and functional integration between bones and muscles and organs, showing profound knowledge of biomechanics, which was so advanced that it was centuries ahead of his time. Avicenna's work had a profound impact on both Islamic and European medicine, connecting the theoretical knowledge of Greek doctors to applied medicine in clinical practice.

Ibn Rushd's Kitāb al-Kulliyyāt was divided into seven volumes: the first, called Tashrīḥ al-A'ḍā', dealt with organ anatomy in twenty-five chapters. He followed previous writers and divided the organs into simple and compound and listed fifty-five bones in the head: six in the cranium, fourteen in the upper jaw, two in the lower jaw, one pterygoid under the cranium, and sixteen teeth in each jaw—with the exception of the lower jaw bones, which, he said, are sutured together and the rest are joined by a true joint as Galen described. Seven cervical and seventeen back vertebrae (twelve thoracic, five lumbar) and three fused sacral and three fused coccygeal vertebrae, the last one cartilaginous.[24]

‘Alī Ibn Abī Al-Ḥazm Al-Qarashī (Ibn Al-Nafīs) (1210–1288 CE) was a good example of the fusion of skeletal anatomy and physiology. Although his work is known for the description of the pulmonary circulation, his commentaries on Galen and Avicenna also covered a great deal on how bones function in the chest wall, vertebral column and ribcage, and thus have made a connection between osteology and respiratory mechanics.[25,26] He corrected misconceptions in Galenic texts, emphasising the biomechanical and protective functions of bones, among other things, showing a critical and analytical approach, typical of Arabic scholarship. Ibn al-Nafīs's work exemplifies the Arabic tradition of simultaneously saving for Greek knowledge and enriching and improving it.

In his book, Kitāb al-Mi'a, Abū Sahl al-Masīḥ described two main mechanisms of bony attachment: joints, which are movable, and sutures, which are immovable. Joints were also subcategorized based on the perceived mobility of the joint (hands, feet vs skull sutures). He recognized three types of movable joints: the ball-and-socket joint (where one bone has a rounded end into the concavity of another); the smooth curved end (where there are no distinct sockets or projections); and interlocking joints (as found in the vertebrae). Immobile sutures had interlocking bone edges.

He estimated human bones to be 246, with the two bones at the end of the ulna and the bones of the joints being excluded. Principal bones included: Skull (6—two parietal, one occipital, one frontal, two temporal with ossicles); upper jaw (15, including maxilla); lower jaw (36, including teeth); hands and feet (60 each); and thorax (37, including vertebrae and coccyx, not including ribs). Occipital-frontal sutures were lambdoid and coronal (soft bones); temporal bones were joined by squamosal suture; parietal bones joined by sagittal suture. [11] In Kitāb al-Mukhtarāt fī al-Tibb, Ibn Hubal al-Baghdādī explained that bone gives the body its structure, stability, and strength, and that it comes in many forms: long, short, thick, thin, hard, soft, solid, and hollow with joints that allow the body to move. He described the bones of the cranium - frontal, occipital and temporal bones, 6 in each eye socket, 2 cheek bones, nasal bones, bone of the

lower jaw and the bone underlying the skull.[21] He counted 6 incisors, 1 canine, and 5 molars on each side of his jaw and 32 cranial bones in total (excluding the cartilage hyoid) for him.[21] The back bones were called vertebrae and consisted of seven cervical, twelve thoracic, five lumbar, three sacral, and three coccygeal vertebrae, in addition to twenty-four ribs, of which fourteen were attached to the sternum.

There were two shoulder bones, two arm bones, four carpal bones, sixteen hand bones, eight metacarpals and twenty-eight phalanges in each upper limb. The pelvis was composed of two bones, the ilium, the pubis and the ischium.[11]

Figure 2: Conceptual illustration depicting the Arabic Transformation and Innovations in Osteology in classical medicine. Created using Google Gemini.

Comparative Analysis, Continuities, and Historiography

The intellectual development of osteology is a continuous thread that stretches from the Greeks' empirical and philosophical investigations to the Arabs' synthesis and refinement. Its early beginnings were laid by the Greek scholars, who emphasized functional interpretation, classification and systematic observation, and Arabic physicians continued to preserve, critically interpret, and significantly contribute to this knowledge in a more clinically oriented tradition, making it a cumulative tradition that would influence European medicine.[9,15]

Theoretical knowledge was the main concern of Greek work in osteology, including Hippocrates' practical work with the management of fractures, Aristotle's functional classification of bones, the systematic dissections carried out by Herophilūs and Erasistrātūs, and Galen's general integrative synthesis.[10,14,27,28] But on the whole, these works were descriptive and philosophical rather than technical or biomechanical, with relatively little work on surgical technique or biomechanical innovation.[16]

Building on this foundation, Arabic scholarship emphasized the applied and the surgical, and figures like Al-Rāzī, Ibn Sīnā, Al-Zahrāwī, and Ibn al-Nafīs synthesized Greek theory with empirical observation and practical innovation.[18,22,23,26]

The Graeco-Arabic translation movement which developed during this transformation was the most important one: it involved the comparison, enrichment, and criticism of inherited texts and received assistance from the introduction of diagrams of anatomy which influenced both surgical practice and medical teaching.[17,19]

This common focus on functional interpretation, ranging from Greek ideas of movement and protection to Arabic ideas of pathology and surgical outcome, is a clear developmental pathway, [24,26] that is well attested in modern historical accounts and is seen as a precursor to the modern history of osteology, which became an independent, empirically-based discipline, integral to the modern science of anatomy.[9,10,15]

Discussion

Later osteological understanding would be built on Greek anatomical thought that provided the conceptual building blocks. Unani literature describes that during the embryogenesis, the densest and driest part of the seminal fluid becomes Iẓā‘m (bones), which gives shape, strength and protection to the body, as it is a A'ḍā-e-Mufradah (simple organ). Buqrāt (Hippocrates) emphasized the structural part of the bone, the functions of joints and the nourishment of bone through marrow and nearby vasculature,

Based on comparative studies across species, Aristotle proposed an early functional classification of bones as long, short, flat or irregular that set the stage for a connection between skeletal form and locomotion and structural support. Herophilūs and Erasistrātūs, who both conducted pioneering dissections of human bodies in Alexandria, greatly furthered this descriptive approach with an empirical rigor which had never before been applied to the study of anatomy, providing detailed descriptions of the vertebral column, ribcage and extremities, and placing skeletal structure into a wider physiological context.

Later, Jalinūs consolidated all these into a unified system, further developing the classification, articulation and mechanical function of bones, and also explaining the physiologic role of bone marrow. These numbers reflect a coherent development, from Aristotle's functional classification to the empirical dissection of the Alexandrian physicians and Galen's integrative synthesis, which was to inform and define the osteological learning of the Arabic medical tradition.

The depth and continuity of osteological thinking in classical Arabic medicine is shown by the Arab scholars. Al-Rāzī synthesized Greek theory into his own and he also personally observed the fractures and taught about their treatment in practical terms, including bone-setting, whereas Ibn Sīnā classified the bones according to their shape and function, which was a step forward in the biomechanical understanding. Al-Masīḥ distinguished between mobile joints and immobile sutures, and his skeletal enumeration, coupled with his precision, paralleled that of Al-Majūsī's greater emphasis on the role of the bone in supporting the body, protecting it, and expelling waste.

Ibn Rushd and Ibn Hubal al-Baghdādī added more details to the number of vertebrae and crania, further refining the earlier Galenic models, while Ibn al-Nafīs ventured into the physiology of respiration by studying the ribcage and the chest wall. Al-Zahrāwī, on the other hand, applied this theoretical knowledge to surgical practice, developing surgical tools and techniques for the treatment of fractures. Their combined work shows a progressive evolution from anatomy to function and to clinical use indicating the continuity of the Arabic tradition in the preservation and development of Greek osteological knowledge.

Conclusion

In Unani medicine, the Ilm-e-Iẓā‘m (Osteology) is a rich amalgamation of Greek philosophical research and the Arab empirical scholarship derived from Aristotle's functional classifications, the Alexandrian anatomists' pioneering dissections, Galen's integrative framework and its further development by other scholars like Al-Rāzī, Ibn Sīnā, Al-Zahrāwī, and others. They all made their own contribution, ranging from bone classification to joint mechanics, and their work in fracture management has foundations that are echoed in today's anatomical knowledge. The synthesis of these classical observations and insights with modern science not only enriches the grasp of historical context but also underscores the timeless value of traditional osteological techniques in current medical education and practice.

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Conflicts of interest

There are no conflicts of interest.

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