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TEACHING ANATOMY

"Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan": the first illustrated anatomy handwritten textbook in Ottoman-Turkish medicine

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Abstract

Introduction Şemseddîn-i Itâkî is a key Turkish scientist in the field of anatomy. His book entitled *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* which was written in the seventeenth century is accepted as the first illustrated anatomy handwritten textbook in Turkish language.

Materials and methods In this article, it was examined an original copy of *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan*, which is available at the Süleymaniye Library in Istanbul, Turkey, as well as the transliteration of this book from old Turkish (Ottoman-Turkish) alphabet to contemporary Turkish alphabet by Esin Kâhya. In this book, the anatomical drawings and their descriptions were evaluated.

Results In this ancient handwriting, Itâkî begins with thanking God and then describes the general structure of the organs, bones, nerves, muscles and vessels, supporting with various illustrations. These illustrations are mainly focused on cranial bones, muscles, cranial nerves, spinal nerves, stomach, intestines, urogenital system, bladder, trachea, larynx and bronchi.

Conclusion While some of these illustrations are similar to the illustrations of the earlier authors such as Ahmed Ibn Mansur, Andreas Vesalius and Juan Valverde de Amusco, others are peculiar to this book. This book is highly significant for it's being the first Turkish book in the field of anatomy in Ottoman-Turkish medicine and the text's being supplemented by illustrations. This book is also a fundamental source for translation of anatomical terms into Turkish. Our knowledge of anatomy continues to improve thanks to the contributions of leading scientists such as Itâkî and, therefore, he deserves praise.

Keywords Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan · Şemseddîn-i Itâkî · Ottoman-Turkish medicine · History of anatomy

Introduction

Humans have been trying to understand their own structure since the beginning of humankind. This curiosity directed them to perform dissections on animals and their own kind. They have been adapting what they learned from animals' dissections to humankind by means of comparison [3]. A sufficient education and knowledge of anatomy is a necessity for success in medical practice. Accumulation of knowledge in hundreds of years, with the contribution of most scientists to the improvement of anatomy, is resulted with a current extremely detailed database of anatomy [9].

During the Ottoman Empire period, undergraduate studies were taught at madrasahs. A person who wanted to work as a medical doctor was supposed to get his primary studies at a madrasah, then the candidate was receiving medical education. In the 16th and 17th centuries, there were important developments in the field of Anatomy as in all other fields in Europe. But Ottoman Empire could not keep up with these developments. At madrasahs, usually classical medicine books were taught. But this situation does not mean that there were no developments in the field of the anatomy. Knowledge about anatomy was usually contained in the first pages of the medical books. Additionally, a small number of anatomy books were written and the

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most important one of these books is *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [18].

Şemseddîn-i Itâkî is a key Turkish scientist in the field of anatomy. His book, entitled *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan,* written in the seventeenth century, is accepted as being the first illustrated anatomy handwritten textbook in Turkish language [11, 14, 15, 17, 18, 29]. *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* means "*Dissection of the body and scholars' knowledge of birth*" [15, 16].

Who was Şemseddîn-i Itâkî?

Şemseddîn-i Itâkî was born in the 1570 s in Şirvan (Northern Azerbaijan). He studied in the different field of science for nearly 20 years, read most of the fundamental books of that period about medicine and pharmacy [19]. He was also interested in various academic fields, such as philosophy, history, mathematics, and astronomy in addition to medicine [13, 20]. The serious wars in Şirvan, where he was born and grew up, and the deaths of the members of his family

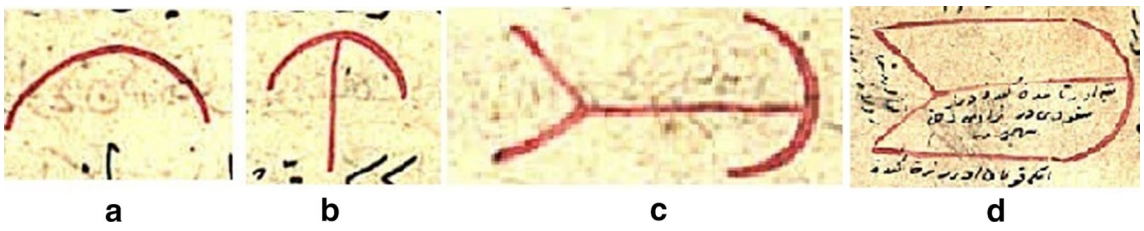

Fig. 1 The drawings of the sutures in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* (**a** coronal suture, **b** coronal and sagittal sutures, **c** lambdoid suture and **d** coronal, sagittal and lambdoid sutures) [17]

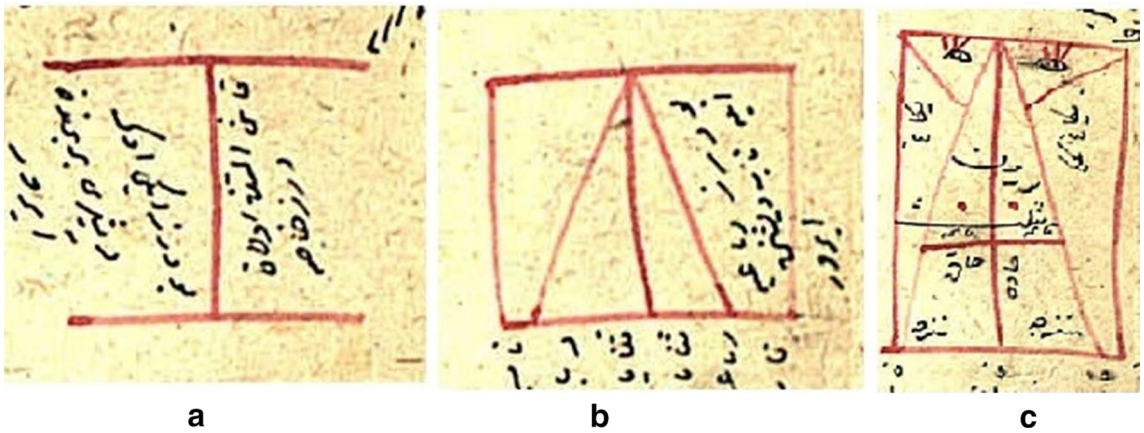

Fig. 2 The drawings about the maxilla in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

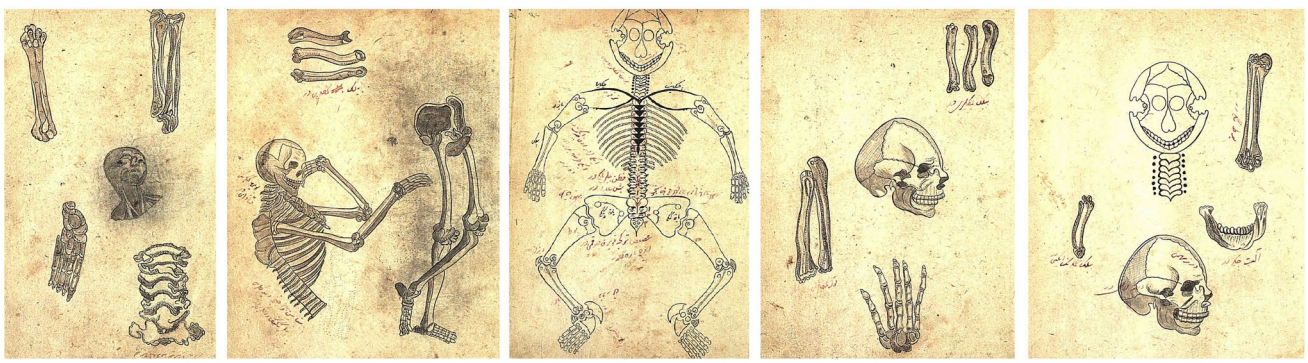

Fig. 3 The drawings of the clavicle, upper and lower extremities bones, cervical vertebrae, cranial bones, mandible and various bones of the skeleton in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

led Itâkî leave from his country. Although he traveled to several countries, he was unable to find success when he was abroad. He stated that no one valued his knowledge of medicine and the natural sciences, therefore, he thought his life was in vain [19]. Finally, after moving to Istanbul, he was supported by Ali Efendi and İbrahim Efendi and was introduced to Recep Pasha by them. Grand Vizier Recep Pasha valued Itâkî's opinion and assigned him to an administrative function [20]. By means of encouragement of Ali Efendi and İbrahim Efendi, Itâkî decided to write a book in the field of anatomy. In the history of Turkish medicine, this book has an utmost importance, as it was written in Turkish and only contains anatomical information and illustrations [20, 21]. The book provided Turkish physicians an opportunity to easily access anatomical data in their own language. In addition, Turkish anatomical terms were formed thanks to contributions of this book. The work contains Turkish terms with generally Arabic and rarely Persian equivalents [11, 13, 20]. Itâkî dedicated his book to Sultan Murad the IVth [4]. It is thought that the book was written in 1632 [7, 13, 19, 20]. There are seven diverse copies of the handwritten book at the present time. It is known that some of these copies were replicated in the eighteenth century [20]. This implies that the book was invaluable in that period and scientists benefited from this book for a long time. It is not known whether Itâkî wrote another book apart from this [19, 20]. There is no more data about the rest of his life. The majority of the information about his life is reached from what he wrote about himself in the book [20].

Materials and methods

In this article it was examined an original copy of *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17], written by Şemseddîn-i Itâkî, which is available in Hüsrev Paşa 464 at the Süleymaniye Library collection in Istanbul, Turkey, as well as the transliteration of this book from old Turkish (Ottoman Turkish) alphabet to the contemporary Turkish alphabet by Kâhya [20]. In this book, the anatomical drawings and their descriptions were evaluated.

Results

Itâkî commences the book with a chapter where he first thanks God and expresses his gratitude to Sultan Murad the IVth and Grand Vizier Recep Pasha. Then he describes the general structure of the organs, bones, nerves, muscles and vessels. Afterwards, he defines the internal organs, brain, sensory organs, respiratory system, heart, breasts, digestive system, spleen, urinary system, genital system and embryology. Towards the end of the book, he gives information about his life and the challenges he encounters and he once

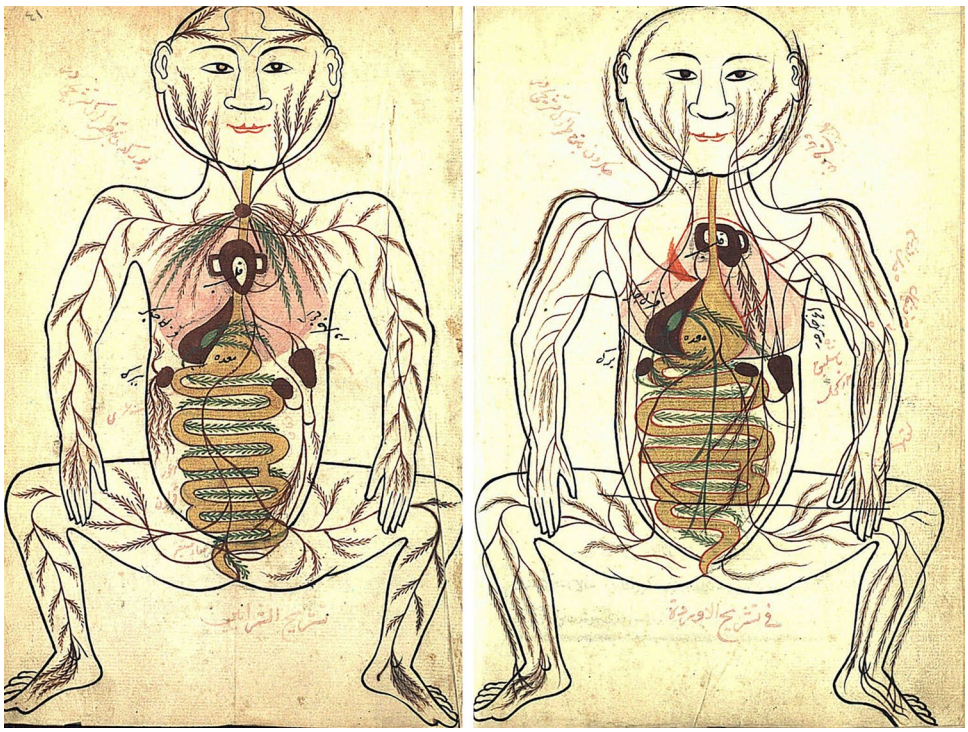

Fig. 4 The drawings of the stomach and intestines in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

Fig. 5 The drawings of the cranial nerves in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

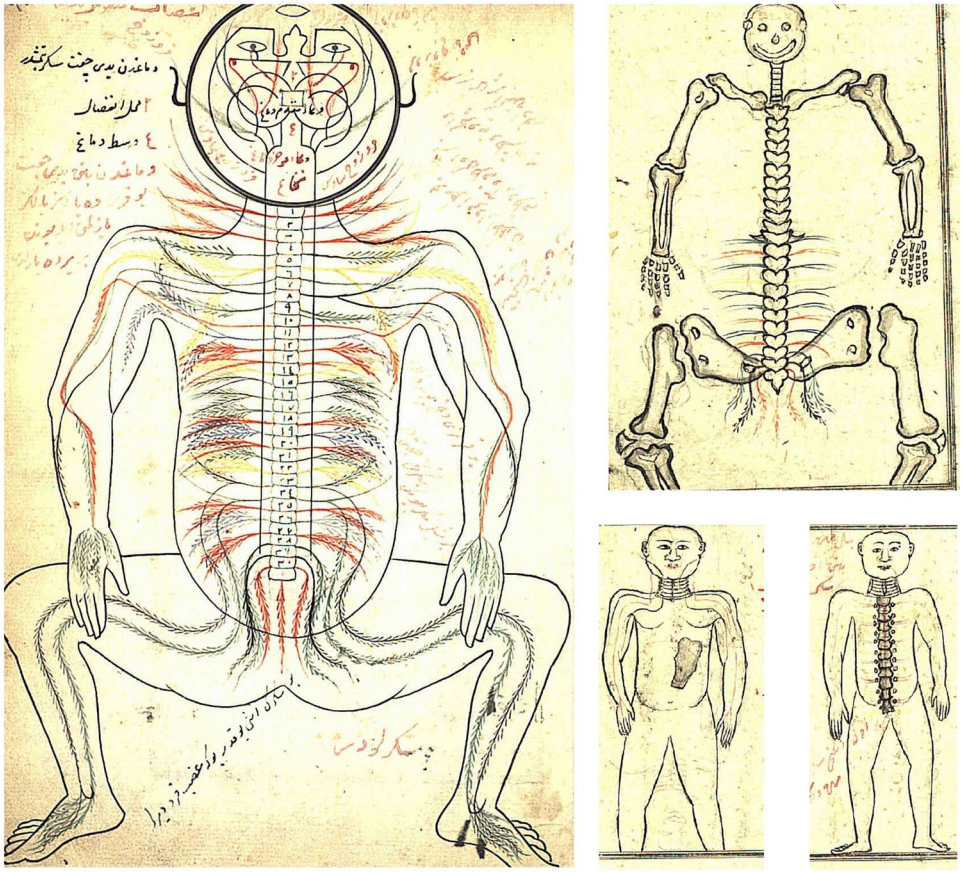

Fig. 6 The drawings of the spinal nerves in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

again expresses his gratitude to Sultan Murad the IVth for his support.

Anatomical drawings in the book

In the section where he described the cranial bones, the coronal, sagittal and lambdoid sutures were described and they were depicted through drawings (Fig. 1). These drawings demonstrated the *coronal suture* (Fig. 1a), *coronal and sagittal sutures* (Fig. 1b), *lambdoid suture* (Fig. 1c) and *coronal, sagittal and lambdoid sutures* (Fig. 1d).

In the section where he described the maxilla, the relationships between the teeth were illustrated through drawings (Fig. 2). Itâkî stated that maxilla is the upper jaw bone. He mentioned the structures, which the maxilla forms a joint. He expressed that two maxillae form a joint on the facial midline and on the palate and these were depicted with an illustration (Fig. 2a). He explained and showed how the teeth form a joint with each other (Fig. 2b). Then he depicted the view of maxilla on the face and its relationship with other bones (Fig. 2c).

The book includes drawings of the clavicle, upper and lower extremities bones, cervical vertebrae, cranial bones, mandible and bones of the human skeleton (Fig. 3). Although most of the provided data concerning bones are proper, there is also some incorrect information. For example, he correctly described the condylar process, coronoid process and condylar fossa which forms a joint with the mandible in a detailed manner and there are five metatarsal bones and 14 phalanges in an ankle. On the other hand, he incorrectly stated that the mandible consists of two bones and the ankle consists of four bones.

In the other parts of the book, he depicted some internal organs such as the stomach and intestines, as well as the bloodstream (Fig. 4).

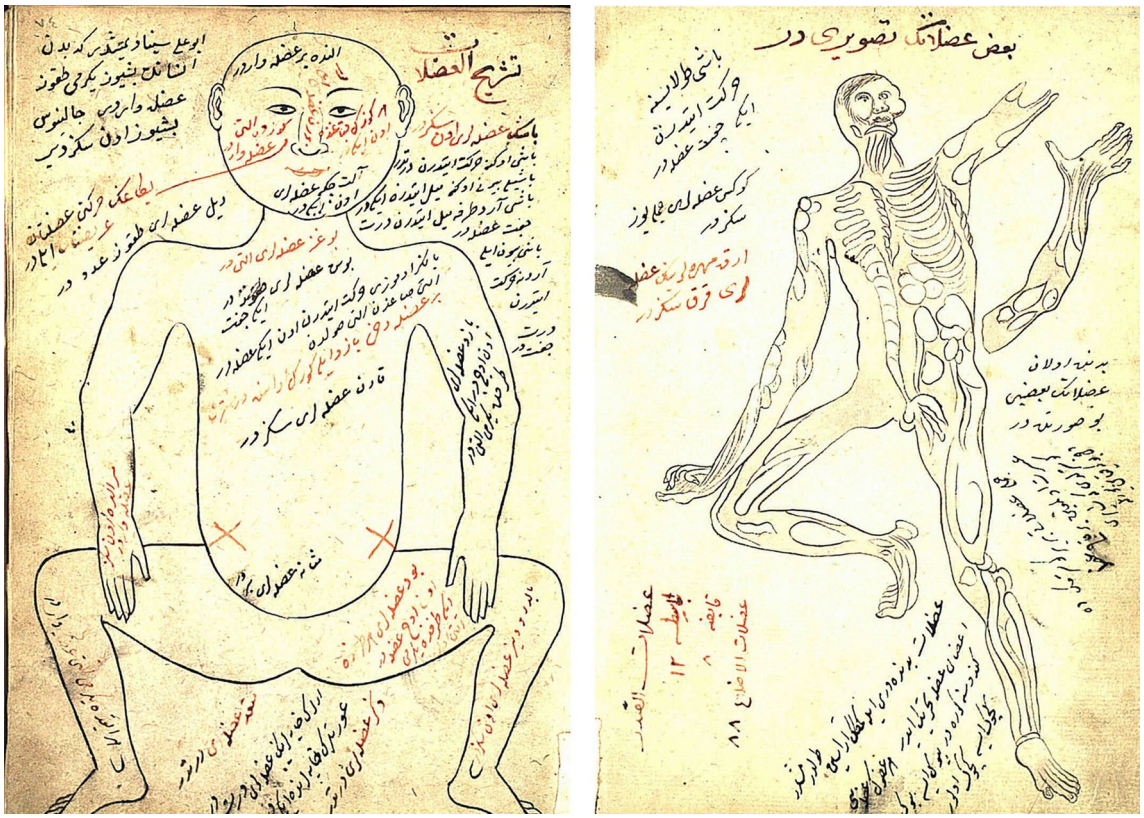

Fig. 7 The drawings of the human body and various muscles in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

In the book the majority of illustrations belong to the nervous system. Cranial nerves were shown on 12 different drawings (Fig. 5). Itâkî described cranial nerves as the nerves originating from the brain and stated that cranial nerves are seven pairs [20]. Spinal nerves were demonstrated on four different illustrations (Fig. 6). Itâkî categorized spinal nerves as nerves emerging from the neck, back, sacrum and coccyx [20]. The book includes a detailed description of the functions of these nerves. Despite insufficiencies or mistakes, a lot of detailed information about the nervous system has been provided [11, 15, 17, 20]. For example, he correctly described that connection of the spinal nerves with the sympathetic trunk. On the other hand, most of his descriptions regarding the targets of the cervical spinal nerves were identified incorrectly [15].

In addition, he depicted some muscles both on the human body and on the dimidiate upper left extremity (Fig. 7). Itâkî described muscles according to their localization and clarified their functions in the text.

The urogenital system was shown in three different drawings (Fig. 8). In one of the drawings, right kidney was illustrated above left kidney. Both kidneys were illustrated at the same level in another drawing and, in one another drawing, left kidney was depicted above the right kidney. In these drawings, the kidneys, bladder and testicles were demonstrated clearly.

The trachea, larynx and bronchi were demonstrated in two drawings (Fig. 9). Itâkî described these structures and their adjacency in a detailed manner and mentioned the adjacency of the trachea and the esophagus. Moreover, he properly stated that some of the cartilages have a semilunar shape and some of the cartilages have a circular shape in the respiratory system.

The female genital system was described in three illustrations (Fig. 10), in which, an embryo and uterus, as well as their functions and adjacencies were described in a detailed manner. Furthermore, he mentioned pregnancy and the relationship between the menstrual cycle and the uterus.

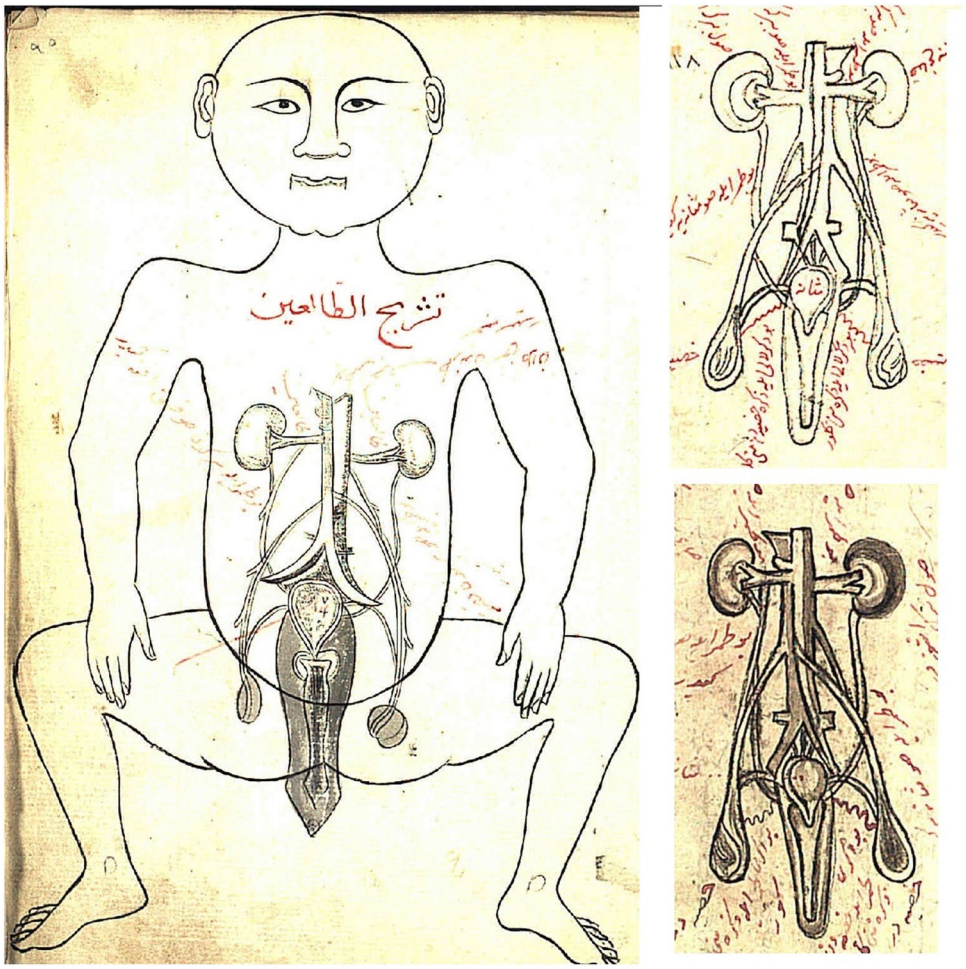

Fig. 8 The drawings of the urogenital system in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

Discussion

There are many important studies with Itâkî's book named *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* in the academic history of medical literature. The most important of these studies is, undoubtedly, the book entitled *Illustrated Anatomy Book of Şemseddîn-i İtakî* written by Kâhya [20]. Aciduman and Arda [2] evaluated the female genital system, Acıduman et al. [3] evaluated the brain anatomy, Bahşi et al. [9] evaluated the kidney anatomy, Bahşi et al. [11] evaluated the cranial nerves, Batırel [12] evaluated the thorax, Çetkin et al. [15] evaluated the spinal nerves, Uzel [29] evaluated oral and dental diseases, Turgut [25] evaluated neuroanatomy and embryology and Ulucam et al. [28] evaluated the parts of neuroanatomy. In addition, Acıduman [1], Akar [5, 6], Akdoğan [7], Akkin and Dinc [8], Kâhya [18, 19], Tiryaki [25], Tsoucalas and Sgantzos [26] and Zeren [33] gave general information about Itâkî and/or his book. Çıkmaz [16] examined the contribution of Itâkî to the Turkish anatomic terminology. According to Mossensohn's [24] statement, Itâkî is one of the first Ottoman physicians to receive information from European medicine. In this study, it was aimed to evaluate all anatomical drawings in Itâkî's book [17].

This book is accepted as being one of the first treatises written under the influence of the West in the Ottoman period [19]. Itâkî explained some structures in the human body by comparing them with animals [20]. According to

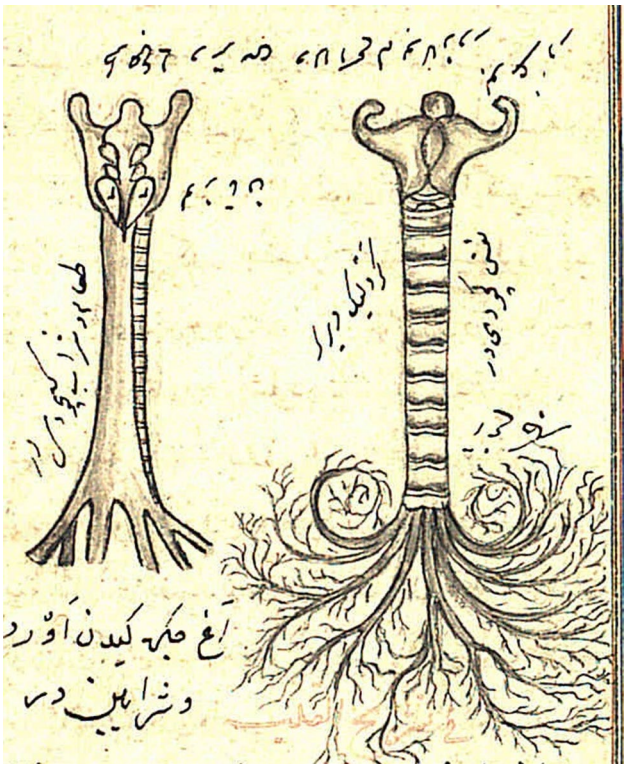

Fig. 9 The drawings of the trachea, larynx and bronchi in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

Çetkin et al. [15], animal dissections were probably performed and the findings were adapted to humans, as human dissection was not common due to religious reasons in the Islamic world in the seventeenth century. Moreover, they imply that some structures were described in details because of the fact that there were many wars in that period and the physicians had the chance to practice of some anatomical structures during treatment [15].

Itâkî benefited from both Islamic and Western works. In his book, some of the drawings are similar to various illustrations in Ahmed Ibn Mansur's book called *Teşrihü'l-Ebdan Min e't-Tıb* (Fig. 11) [22], Andreas Vesalius's book named *De Humani Corporis Fabrica* (Figs. 12, 13, 14) [23, 32], Juan Valverde de Amusco's book called *Anatome corporis humani* (Figs. 15, 16) [31] and Juan Valverde de Amusco's another book called *Historia de la composicion del cuerpo humano* (Fig. 16) [30]. Furthermore, several information was obtained from the Avicenna's book named *Canon of medicine*, Ibn Nefis's book entitled *Şerh-i Teşrihül Kanun* and works of Ali b. Abbâs [10, 13, 15, 18, 20, 27]. Acıduman et al. [3] state that the majority of the data on the brain anatomy provided by Itâkî are similar to Avicenna's works. According to Kâhya's [20] expressions, some authors have claimed that Itâkî's book [17] is an interpretation of Ahmed Ibn Mansur's book [22]. Although these two books possess some similarities, Itâkî's work both contains more information and consists of a higher number of drawings.

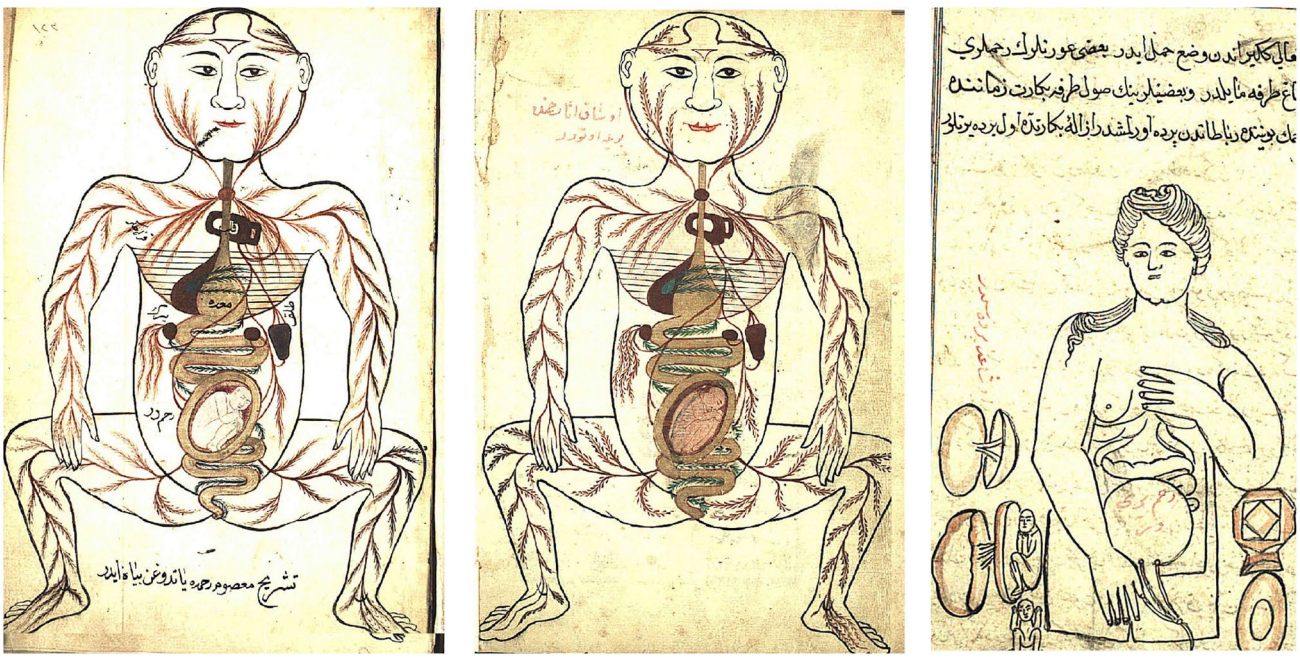

Fig. 10 The drawings of the female genital system in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

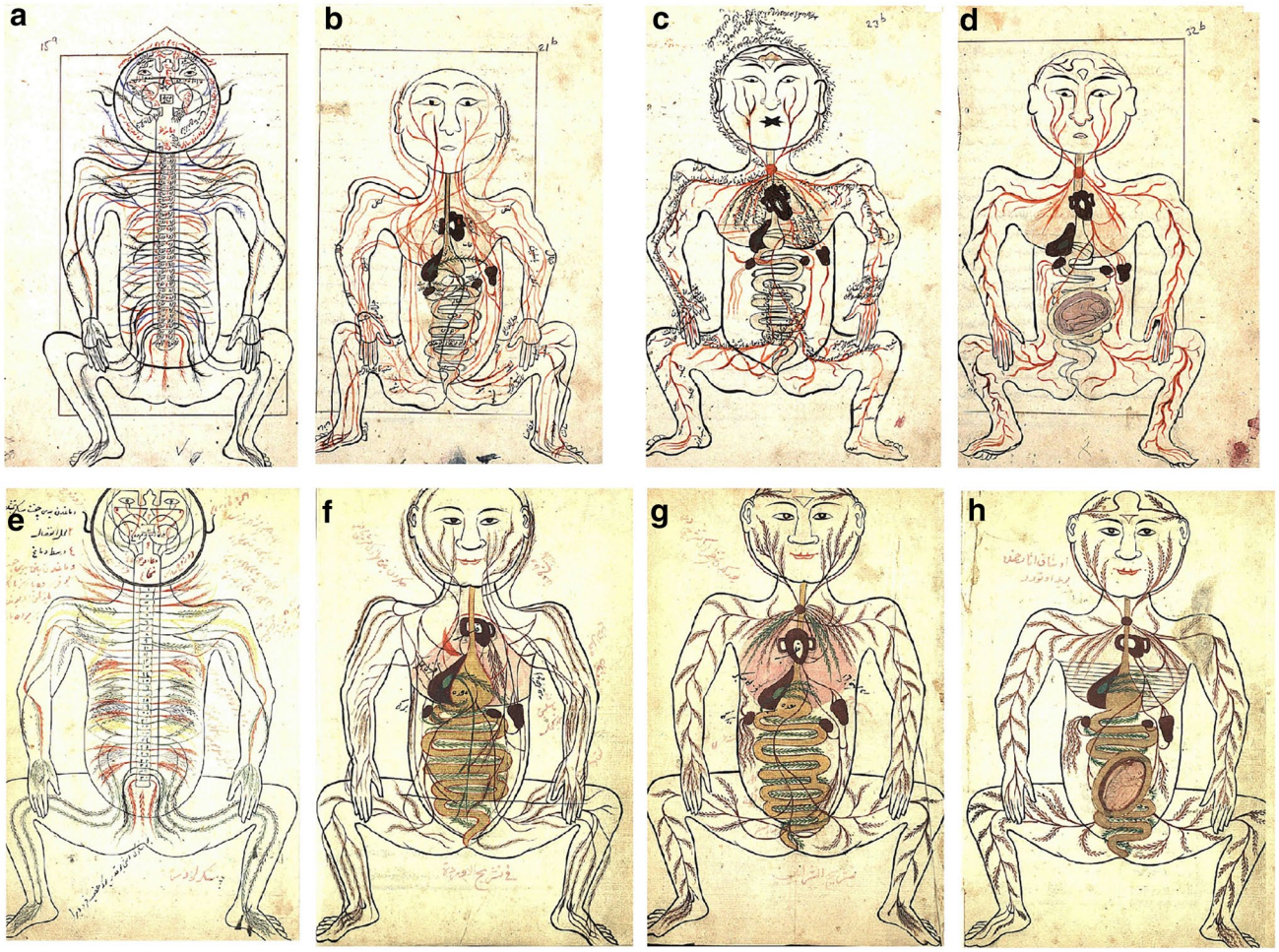

Fig. 11 **a**–**d** The various drawings in Ahmed Ibn Mansur's book named *Teşrihü'l-Ebdan Min e't-Tıb* [22]. **e**–**h** The various drawings in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

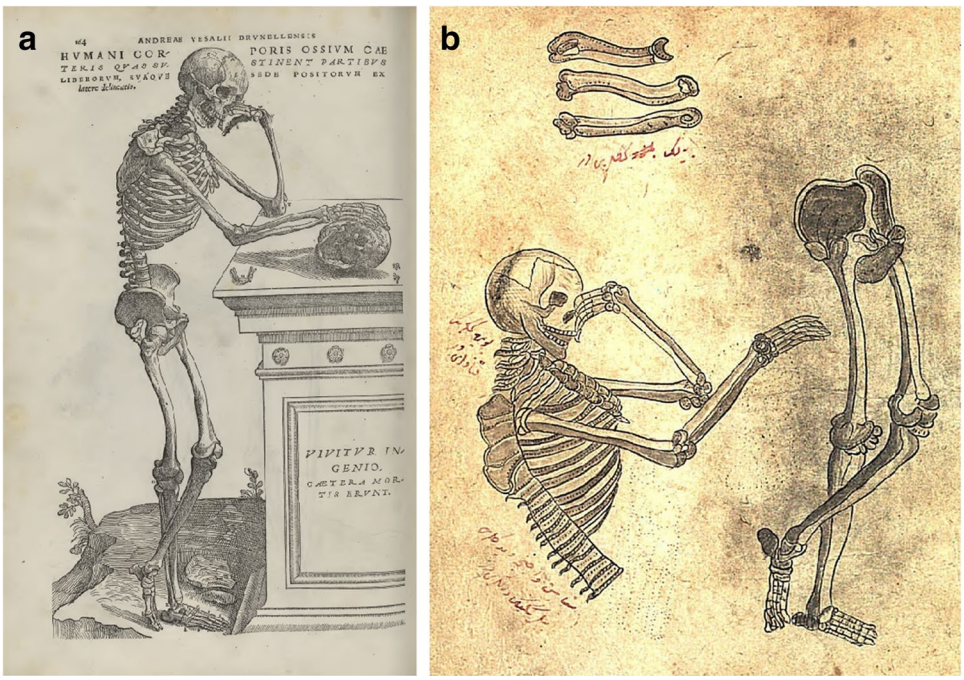

Fig. 12 **a** The drawings of the human skeleton in Andreas Vesalius's book named *De Humani Corporis Fabrica* [32]. **b** The drawings of the human skeleton in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

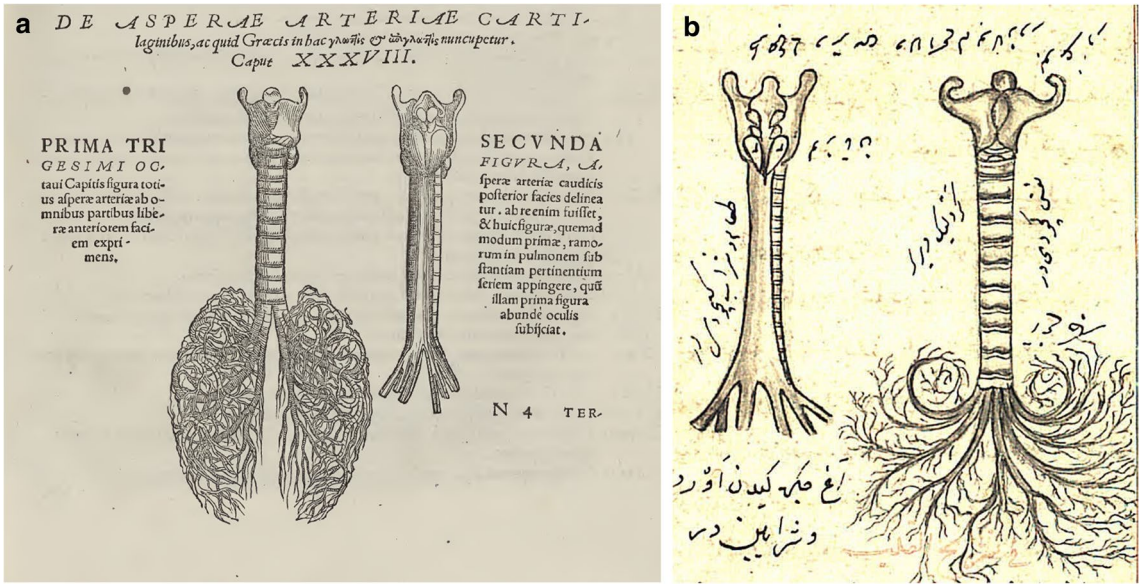

Fig. 13 **a** The drawings of the trachea, larynx and bronchi in Andreas Vesalius's book named *De Humani Corporis Fabrica* [32]. **b** The drawings of the trachea, larynx and bronchi in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

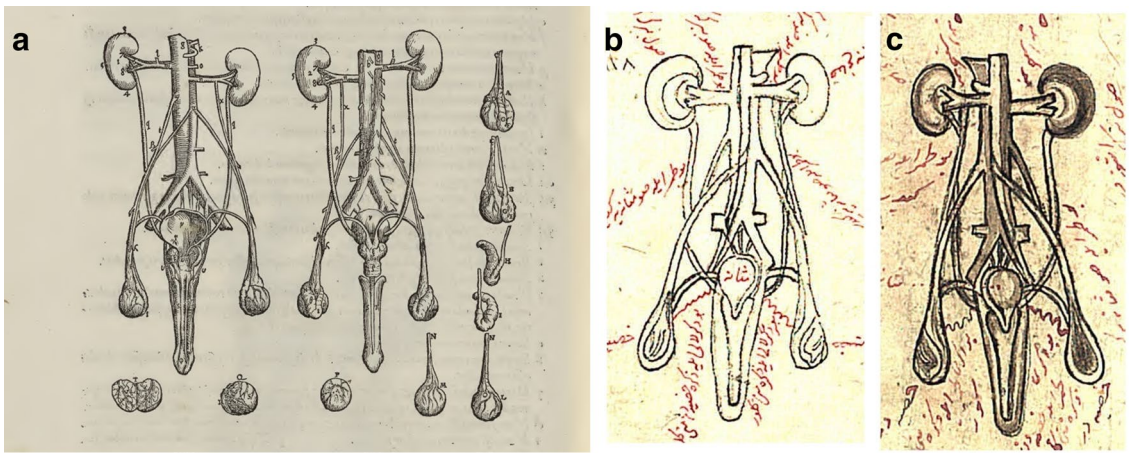

Fig. 14 **a** The drawings of the urogenital system in Andreas Vesalius's book named *De Humani Corporis Fabrica* [32]. **b**, **c** The drawings of the urogenital system in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

Some of the drawings in Itâkî's book are quite a change from Eastern-style drawings. Majority of these illustrations are similar to the Western drawings of the Renaissance period. On the other hand, they are not as good as the drawings of the Renaissance period [6, 19]. It is apparent that certain drawings in the book are especially similar to those in *Teşrihü'l-Ebdan Min e't-Tıb* (Fig. 11) [10, 22]. Margócsy et al. [23] said that the drawings of Itâkî's book were copied from *De Humani Corporis Fabrica*. On the other hand, Kâhya [20] and Turgut [27] asserted that Itâkî combined his own knowledge with the information of previous scientists. Although some of the drawings in Itâkî's book resemble others, it is apparent that his illustrations are distinctive. Even though it is still a matter of debate as to whether Itâkî's book is an interpretation or an original piece of work, the idea, he combined his own knowledge with the information of previous scientists, is more common and for this reason, he is a pioneering Turkish anatomist.

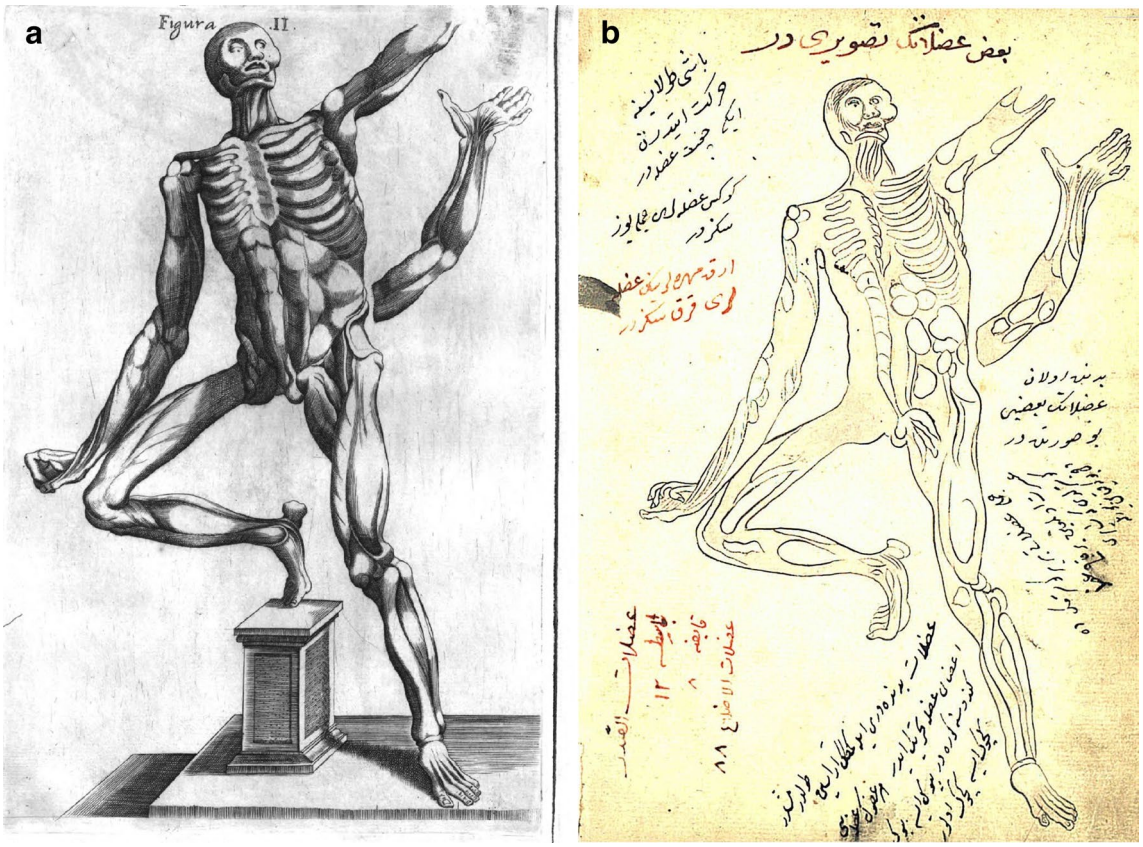

Fig. 15 **a** The drawings of the human body and various muscles in Juan Valverde de Amusco's book called *Anatome corporis humani* [31]. **b** The drawings of the human body and various muscles in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

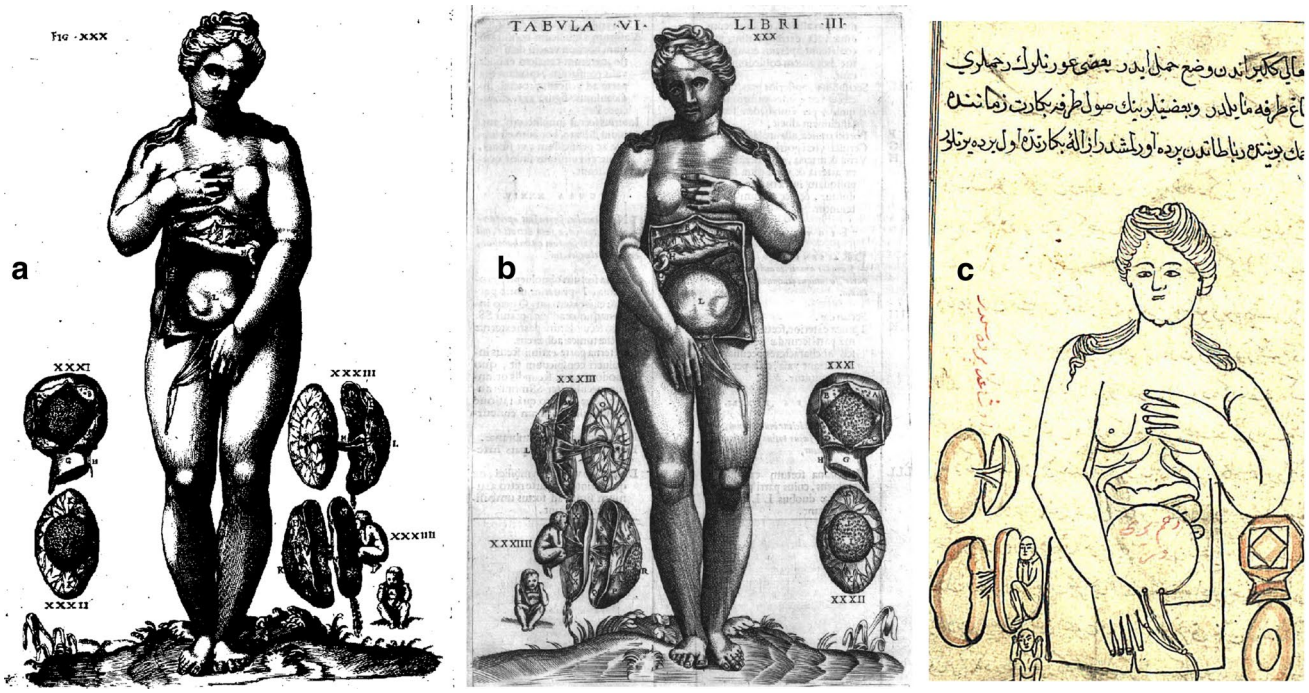

Fig. 16 **a** The drawings of the female genital system in Juan Valverde de Amusco's book called *Historia de la composicion del cuerpo humano* [30]. **b** The drawings of the female genital system in Juan Valverde de Amusco's book called *Anatome corporis humani* [31]. **c** The drawings of the female genital system in *Teşrih-ül Ebdan ve Tercümânı Kıbale-i Feylesûfan* [17]

Conclusion

This book is highly significant for it's being the first Turkish book in the field of anatomy in Ottoman-Turkish medicine and the text's being supplemented by illustrations. This book is also a fundamental source for translation of anatomical terms into Turkish. Our knowledge of anatomy continues to improve thanks to the contributions of leading scientists such as Itâkî. Therefore, he should be appreciated.

Author contributions İB: protocol/project development, data collection or management, data analysis and manuscript writing/editing. AB: protocol/project development, data collection or management, data analysis and manuscript writing/editing

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

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