



Types of digestion from the perspective of Persian medicine

Saeed Sepehrikia^{1,2}, Fatemeh Kolangi^{1,2}, Mahdi Zarvandi^{1,2}, Marzieh Qaraaty^{1,2,*}

¹ Clinical Research Development Unit (CRDU), Sayad Shirazi Hospital, Golestan University of Medical Sciences, Gorgan, Iran

² Department of Persian Medicine, School of Persian Medicine, Golestan University of Medical Sciences, Gorgan, Iran

Abstract

Introduction: According to the Basic principles of Persian medicine, there are 4 digestions in the human body, which are gastric, liver, vascular and organ digestion, and each of these digestions plays an important role in the health of the body, soul and strength of the body. The importance of digestion in the body is that it makes the food eaten into a part of the body.

Materials and Methods: This study is a library review that has been conducted using 40 authoritative scientific books and articles in the field of Persian Medicine as well as through search engines SID, Magiran, PubMed, Google Scholar. Keywords that were searched: Persian medicine, four digestions, gastric digestion, liver digestion, vascular digestion and organ digestion. In this research, taking notes was performed by studying the mentioned sources about four digestions (gastric, liver, vascular and organ digestions) from the perspective of Persian medicine, and the results are presented in this article after classifying and summarizing the contents.

Results: According to the schools of Persian medicine, food is eaten until it becomes part of all organs of the body, has transformed (quantitative and qualitative changes) in four parts of the body, each of these four parts is called a type of digestion. These four parts are the gastric (Mead), liver (Kabedi), vascular (Oroghi) and organs (Ozvi); respectively, and therefore they are called the first digestion (gastric), the second digestion (liver), the third digestion (vascular) and the fourth digestion (organ). In each digestion, a series of useful and waste (unuseful) materials are produced, which are separated from each other. The useful material is preserved in the body for nutrition, The waste material is excreted from the body. I through feces in first digestion, through urine in the second digestion and the third and fourth digestion, are through various methods including sweat, pus.

Conclusion: Persian medicine is one of the holistic medical schools which have a special perspective on digestion. Since digestion plays a very important role in the health of the body, so Persian medicine's scientists have fully addressed both the role of nutrition in health and the factors affecting digestion. Therefore, the health of the digestive faculty is one of the basic necessities and principles of the health of the whole body.

Keywords: Persian medicine, Quadruple digestion, Gastric digestion, Liver digestion, Vascular and organ digestion

*Corresponding Author: Marzieh Qaraaty

✉ Email: dr.qaraati@goums.ac.ir

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Introduction

Human nature is always inclined to eat food in different ways and enter the body and feed on it. Nutrition is the process by which food is used by the body. In this process, first, the food is provided and then this food enters the body and then the nutrients are separated from the eaten food and absorbed by the body and waste products are excreted from the body. In ancient medical sources, attention to nutrition has been an important axis of medical education and laws related to nutrition and type of food have played a significant role in medical science (1). Digestion plays an important role in proper nutrition and health (2). According to the doctrines of Persian medicine, the choice of quantity and quality of food depends on various factors such as age, physical condition, digestive status and climate of the place of residence (3-5).

Medical knowledge, like other sciences, has its principles and rules, and just as there are many schools in other sciences and each group acts in accordance with its principles, medicine is like this and there are many different schools in medicine, each of which has its principles, method and system. Nowadays, when common medicine is spread all over the world, other medical schools are called complementary medicine or alternative medicine. One of these schools is the humoral medicine school which is known as Persian medicine in Iran (6, 7). This medicine is known as one of the branches of Persian medicine is several thousand years old and the teaching and learning of this medicine have been common in European universities for many centuries (8-11).

Digestion refers to a set of processes during which the nutrients and heat embedded in food are changed in a way that allows it to become a member (12, 13). From the perspective of Persian medicine, there are four types of digestion in the human body. In each digestion, a number of useful materials are produced and also there is some waste material that is removed from the body through specific ways of each digestion (14). The need for the digestive faculty that the force that makes food an organ is effective if it is prepared to become a part of the body and become an organ, and this is what the digestive faculty must do to prepare it (15). Food that enters the body until it becomes part of all organs of the body, undergoes four transformations, each of

these four transformations is called digestion. These four parts in which the transformation takes place are the gastric, liver, vascular and organs, respectively, and therefore they are called the first digestion (gastric), the second digestion (liver), the third digestion (vascular) and the fourth digestion (organ), and in each digestion, useful materials and waste materials are separated from each other and useful materials are preserved in the body for nutrition and waste products are excreted from the body (16, 17). Some sources of Persian medicine have combined vascular digestion (third digestion) and liver digestion (second digestion) and have divided the stages of body digestion into three types (18).

Materials and Methods

This research is a library review study that has been conducted using 40 authoritative scientific books for example Hefz o Sehe Naseri, Kholase al Hekma, Al ghanoun, Bahr Aljavaheer, Mufarrah al-gulub, Risaleye Choe Chini, Kholasat al-Tajaro, Kamil al-Sinaa, Exir-e Azam, Tebb-e-Akbari, Al Tasrif leman Ajz an Taalif, Khazaen al-Moluk, al-Mutaalemin Fi-al-Tib and... and articles in the field of Persian medicine and also through search engines *SID*, *magiran*, *Pubmed*, *Google Scholar*. Keywords searched included: Persian medicine, four digestions, gastric digestion, liver digestion, vascular digestion and organ digestion. In this research, by studying the mentioned sources regarding four digestions (gastric, liver, vascular and organ digestions) from the perspective of Persian medicine, taking note was carried out and the results are presented in this article after classifying and summarizing the contents.

Results

First digestion (gastric digestion)

In Persian medicine, the gastric is a very important organ and gastric damage affects other organs of the body such as the liver and heart (19). Providing the right quality nutrients for different organs of the body depends on the health of the gastric (20). In Persian medicine, which is known as humoral medicine, the gastrointestinal tract of the body, especially the gastric, is of special importance and due to its close relationship with other organs of the body, it has always been considered in such a way that statements such as noble

member (21), member of the partnership (22) and common treasury (23). have been used for it. The health of the body is related to the health of the gastric. The role of the gastric in the body, in addition to digestion, is to request food and transfer it to other organs (22).

The Gastric Dissection

According to Persian medicine sources, the gastric consists of flesh, nerves, vascular and artery and its shape is similar to a long neck pumpkin, which the main part of the pumpkin is gastric and its neck is the esophagus and the third part is antrum. The junction of the esophagus with the gastric is called cardia and the junction of the gastric with the duodenum at the beginning of the small intestine is called the ports, which plays an important role in the digestion of the gastric due to the narrowing of the urethra (4). The gastric also has two inner and outer layers, which the inner layer has neural tissue and the outer layer has the sarcous tissue and there are three types of longitudinal, transverse and oblique fibers in its structure. The inner layer has longitudinal and oblique fibers, which the longitudinal fibers have a role in absorbing (pulling) food and the oblique fibers have a role in holding (self-control) food, and the outer layer has transverse fibers that play a role in food excretion (14). A branch of the cerebral nerve (sensory nerve) is linked to the cardia. There is the most gastric sensation in this part (cardia) and this region plays an important role in perceiving the feeling of hunger and appetite. The antrum is in the upper part of the umbilicus and slightly inclined to the right and has fleshier layer and the main place of digestion is in this part. From this part (antrum) the vascular of the mesenteric is branched to the end of the gastric and intestines and its function is to absorb the gastric ileus and transfer it to the liver (24). There is liver on the right side of gastric and spleen on the left side of it, there are rigid muscles (back) containing a large jumping artery and large vein in the back of the gastric, and there is the heart with diaphragm on top of that, and the gastric is in contact with these organs from around and the heat generated from these proximities is helpful in gastric digestion function. The heat generated by the abdominal membranes also aids digestion (25).

Gastric Temperament

In some sources of Persian medicine, the natural temperament of the gastric has been described as cold and dry due to the predominance of nerve tissue(26) . In some sources, such as the law book, different natural temperaments are mentioned for the gastric with special symptoms(18) . Also, in some sources, such as the “*Kamel-alsanaye*” book, three methods have been used to determine the natural temperament of the gastric, including examining its actions and function, examining the level of thirst and the factors that enjoy or irritate the gastric, which based on this, the natural temperament of the gastric includes 8 states: hot, cold, wet, dry, hot and dry, hot and wet, cold and wet, cold and dry (25).

The first digestion or gastric digestion begins with chewing food in the mouth and ends with the exit of the smooth and straight part of the gastric ileus through mesenteric veins and the movement towards the liver, and food form is not destroyed in this digestion (4). Digestion is such that what is deliberately chewed inside the mouth is absorbed by the absorptive faculty of the gastric and pulled towards the gastric and held inside the gastric by the retentive faculty (27) and when food enters the gastric, administrative nature of body, along with instinctual heat and digestive faculty, decompose this food and the water that is eaten after the food is mixed with the food and fully cooked by the heat of the gastric (28) and breaks the typical face of the food and makes it into a thick paste, which is a physical change, but the food does not undergo a chemical change, and this is called first digestion or ileus digestion (4). And then the digestive faculty separates the dirty part of the ileus from the clear part, and what is pure, smooth and clean from this digestion moves to the mesenteric by the expulsive faculty of the gastric, and it is absorbed by the liver through absorptive faculty in port of liver (27), and what is dirty is not completely digested by changing force and it should be excreted from the body in order to maintain the health of the body (29) and sent to the intestines by the expulsive faculty of gastric, which are feces and excreted (27). The heat of the gastric alone is not enough in this digestion and the heat of the adjacent organs that are in contact with the gastric helps in the digestion function of the gastric so that the food is fully cooked and ileus are formed (28). In order to gastric digestion or the first digestion is done correctly,

different factors and organs of the body must participate in this work and different faculties of the body, including vegetable force, vital force and even perceptual-stimulatory force, must have proper function. Otherwise, gastric digestion function does not conduct well and at its best state (4).

Second digestion (liver digestion)

From the perspective of Persian medicine, the liver and gastric have a special place in the body and the gastric is a noble organ of participation and the place of the first digestion and the liver is the main member and the place of second digestion and production of humors (20). The role of the liver is to produce blood through the transformation of ileus. It should be noted that the liver also produces other humors, but the most important is sanguine humor (sanguine) (14). Any disturbance in the function of the liver leads to the loss of balance between the humors and the creation of various dystemperament and abnormal humors, which also cause other diseases and dysfunction of other organs of the body (20). The result of the second digestion is the preliminary moisture of the four humors (16).

Liver dissection

The shape of the liver is crescent-shaped and has a concave part and a convex part. The liver is located behind the free ribs of the right abdomen and is connected to the intestines from the concave part and the concave part of the gastric and to the diaphragm from the convex part (30). The liver is a body composed of flesh, blood vessels, arteries and membranes that cover the liver. Liver flesh is red like solid blood (14). The mass of the liver has no sensation and the benefit of not having this sense is that the liver is immune to the sharpness of humors, but the membrane that covers the liver and preserves its shape has a great sense and some elements of this membrane penetrate the appearance of liver flesh and lead to sensation in the liver. In addition to protecting the liver, this membrane connects it to the gastric, intestines, diaphragm, and posterior ribs (31). The flesh of the liver is red like solid blood. The liver is the source of the inelastic vessels that are called these vessels as veins. Two veins are separated from the liver, one by a convex side called the empty vein and the other by a

concave side called the port. The branches of the empty vein move towards the kidneys, causing food to reach the organs and excess water to escape, and the branches of the port, called mesenteric, move towards them to absorb ileus from the gastric and intestines (14). There are finger-like protrusions on the liver by which the liver is located around the stomach. These protrusions are two in someone and five in others (4). are attached to the larger appendages and protrusions called bile. On the concave side of the liver, which is located above the port, there is a hole towards gallbladder to expel bile and also a hole towards the spleen to expel soda (melancholy humor), and there is a vessel called an arterial vein between the liver and the heart.

The liver is located on the right side of the body and its convex part is connected with the dorsal rib and its concave part consists of the gastric and the head of the liver starts from the side of the breast diaphragm and the bottom of the liver reaches to the lower part of the antrum (14). Mesenteric vascular, which in Persian medicine are even referred to as an organ, are narrow, strong, hard, and without empty vessels containing eight branches of the port vein, which after leaving the liver, it branches from it and moves to the gastric, duodenum, small intestine and large intestine (32) .

Liver temperament

The liver is the warmest and most moist organ of the body because it acts as the most important factor in the growth and nutrition of the body and the growth and increment of the body is caused by sufficient heat and moisture (33).

The second digestion or liver digestion that takes place in the liver is the transformation of ileus into humors (22), which begins in mesenteric and comes to the liver and ends to the vascular from the liver, and in this digestion, the form of food is completely destroyed and becomes humor (4), in such a way that the pure, smooth and clean part of the gastric ileus moves to the mesenteric by the expulsive faculty of the gastric and is absorbed by the absorptive faculty of the liver towards the liver and thereby the existing faculties and in the same way as described in the first digestion in the liver (in the same way as the first digestion of the actions of the mentioned faculties (27) and the heat capture of the liver in it (4) are matured and the second

digestion is created, which is called chyme. In this digestion, food is transformed into four humors according to its elements (27). In this heating and maturity, the slightly clean elements are separated from dirty and medium heavy elements and four things are obtained: what is mild, clean and thin like the foam and yellow on the top, is called bile humor and what is heavy, dirty and thick like black sediment, is called soda humor and what is found in the middle and fully heated and matured and its concentration is moderate and its color is red, is called sanguine humor and what is not heated and matured and its color is white, is called phlegm (4).

Humor is fluid and moist thing that occurs as a result of changes made in food in the gastrointestinal tract and during the second digestion in the chyme function (13, 33). The balance of these four humors plays an important role in maintaining health and causing disease. If the created humors have a moderate amount and high quality, it causes the health of the body, and if they have a more than normal amount or poor quality, it causes diseases (34). When the liver temperament is moderate, the blood is clear and the bile and soda produced with it, are normal, and when the liver tends to warmness, it produces more bile, and when it is very hot, it produces burnt bile, which is called soda, and when the liver is cold, it produces phlegm, and when it is very cold, it produces pressed phlegm, which is also called soda (35).

Each of these humors is considered as one of the four elements and similar to its nature, so that bile as fire and its nature are hot and dry, sanguine as air and its nature are hot and wet, phlegm as water and its nature is cold and wet, and soda as earth and its nature is cold and dry. Each of these humors is natural and unnatural (4). To create each of these humors four causes are necessary: material cause (primary matter that the body comes into existence of it), active cause (a factor that affect matter and create the object), formal cause (body design and shape) and ultimate cause (application expected of objects) (33).

In the chief organs of the liver, there are three nourishing power, growing force and production force, of which the nourishing power has three roles. The first and most important is the conversion of food into humors, the second role is to make humors look like the

essence of the body and the third is to attach the humor to the relevant organ. The growing force causes growth and increment in the triple diameter of the body to the extent of natural proportion. The production force affects the humor created by the nourishing power and turns it into semen. It also transmits the ability to form organs in the form of a force to the semen (36). In this digestion, like the first digestion, there is something left that the changing force has not digested and it is obligatory to excrete it in order to maintain the health of the body, and this excretory matter in urine (29).

Third digestion (vascular digestion)

This digestion starts from the outflow vascular of the liver (14) and beginning in the convex vascular of the liver and its end is the secretion of secondary moisture in the minor vascular connected to the organs (4). The third digestion is in the vascular and involves the transformation of the humor into the organs according to temperament (22). In this digestion, the blood and any humor that enters the vessels with the blood is digested and heated there again (35). This digestion completes the process of producing humor (37). The third digestion is near the organs, where the blood is converted into food through the changing force of each organ (38). This digestion is the transformation of the preliminary moisture into the secondary moisture so that the clean and dirty elements of the secondary digestion, i.e. chyme, are separated from each other after the formation of blood and the dirty part is divided into 3 parts, a part enters gallbladder called bile, a part enters the spleen called soda and a part enters the kidney called the urine and the soft part enters the vascular and is called the preliminary moisture and matures inside the vascular so that its constituent elements according to the temperament of each organ to which it is attributed is susceptible and dependent and this is called secondary moisture (27).

Vascular dissection

From the perspective of Persian medicine, vascular are divided into two groups: jumping vascular which are called arteries, and non-jumping vascular, which are called veins. Arteries are double nerve bodies that grow from the heart and are hollow and lack sense and movement in their nature. In the space of the arteries, there is more energy carrier (roh) and less blood, and

the role of these arteries is to deliver the vital force from the heart to all the organs of the body. They also cause to promote (perfume) the heart and energy carrier (roh) and release smoke shaped steam due to their expansion and contraction. The arteries grow from the empty spaces on the left side of the heart because the empty spaces on the right side of the heart are close to the liver and are used to absorb food. The importance of hollow and empty arteries is that more energy carrier (roh) is included and reaches the organs. The benefit of having double and layered arteries is that the vital force, which is the principle and substance of life is more secure and the benefit of being none-sense is that the arteries are not exposed to the heat of energy carrier (roh) and blood and the movements of humors. Veins are nerve bodies that have a class and originate from the liver and have no sense or movement, in which there is more blood and less energy carrier (roh). Veins are not all blood-secreting ducts, and some veins are used to absorb food, such as mesenteric, and some are for defecation, such as a vein between the liver and kidneys (bladder). The role of the veins is to carry the blood produced in the liver to all the organs. Angry arteries and veins mean that, like nerves, they are soft to the touch and hard to rupture, not a branch of a nerve composed of them. The volume of the vein is much smaller than the volume of the artery. The veins are all one class except the arterial vein which comes from the liver to the heart or is nourishing to the heart and lungs (14).

Vascular temperament

The temperament of vascular and veins are hot and dry (33).

The method of third digestion or vascular digestion is such that after the second digestion, blood, along with other humors, enters the empty vein from the liver and then enters the vein which is separated from the liver, and then enters large venous-vascular bifurcations and then it enters medium vascular- venous branching, and following that, it enters small vascular-venous branches, and finally, it enters the capillaries, which is the end of the vascular and is spread in the skin and organs. Heating and digestion take place in all these vascular, and temperament similarities and proportions are created with each organ in this part and then it is secreted into the organs (17). The third digestion action

is to create secondary moisture. This moisture is either voyeuristic or non-voyeuristic. In case of voyeuristic, it is removed from the body and if it is non-voyeuristic, it plays four roles in the body, one is that there is in the capillary network for watering and hydration and blood supply to the organs. The second is that it is transformed according to the essence of each organ in terms of its temperament and is ready to become an organ, and the purpose of the third digestion is this stage. Third, it is spread in the organs as dew, and in the absence of food, it has the ability to nourish the organs, and fourth, it causes healing and adhesion of the organs (16, 27). In this digestion, like other digestions, there is something left that has not been removed by the changing force and it is obligatory to excrete it in order to maintain the health of the body (29), and the excrements of this digestion is the elements of moist phlegm with little bile, which are infected with pus and mucus through steam and sweat (4) and some through pus, some through ear and nose pores, and some become food for nails and hair, and some become semen, and some are absorbed into the organs and become inflamed, and some become milk and move towards the breast and some menstruate and excrete from the uterus (17).

Fourth digestion (organ digestion)

This type of digestion is in the organs and it means the conversion of moisture and matter distinctive in terms of shape and aspect into organs (22). When the material resulting from vascular digestion reaches the organs, digestion takes place in each organ again, and this type of digestion is called the fourth digestion(35). The onset of fourth digestion is from secretion of blood from the vascular opening (15).

Organs dissection

The organs of the objects resulting from the initial composition of the humors are suitable and are divided into two categories, singular and compound. A singular organ is a member whose element is common in its entirety in name and definition, and a compound organ is a member whose element is not common in its entirety in name and definition (25). The number of single organs has been stated by some physicians as 14, some as 16, some as 13, and some as 9, and in this regard, there is disagreement among physicians, for

example, singular organs, according to *Hakim Arzani*, include bone, cartilage, nerve, chord, ligament, muscle, artery, vein, membrane, skin, hair and nails, while single organs according to Sheikh Al-Ra'is include: bone, cartilage, nerve, chord, ligament, muscle, artery, vein, parenchymal, visceral fat, membrane and skin, hair and nails, while the singular organs according to *Sheikh al-Ra'is* include: bone, cartilage, nerve, chord, ligament, artery, vein, membrane and parenchymal (14). Organs are divided into four groups based on accepting force (receiving) or sending force (sending), capable (receiving force) and mutilated (force sending) organs such as brain and liver, capable and non-mutilated organs such as flesh, non-capable and mutilated organs such as the heart, and non-capable and non-mutilated organs such as bone (25). The classification of organs in terms of functions includes two categories: chief organs and non- chief organs. Injuries to the chief organs cause damage to personal survival or type of survival and are therefore very vital and important. The chief organs include the heart, brain, and liver in terms of personal survival and the testes and ovaries in terms of type survival. The non-chief organs are divided into two categories: the servant chief and the non- servant chief. The servant chief organs include the arteries, veins, nerves, and ducts of the semen. The non- servant chief is also divided into two categories: the kidneys, gastric, spleen, lungs, and non-chief including bones and cartilage (33). Other organs are divided according to the type of matter, which is divided into two semen groups (composed of semen) such as singular organs except for flesh and tallow, and sanguine members (composed of blood) such as flesh and tallow (25).

Organs Temperament

Each organ has a temperament that is worthy and appropriate for that organ, some of these organs are hot, some are cold, some are dry, or wet (33). The temperament of some organs, such as flesh, is close to the temperament of sanguine humor, and because of the similarity between them, as a result, there is no need for any changes in the sanguine humor produced in the body to feed them; while the temperament of some organs such as bones is far from the temperament of sanguine humor and therefore due to the lack of similarity between them, as a result, it needs too many

changes in sanguine humor to be similar to the essence of that organ (25).

The method of the fourth digestion is such that the material resulting from the third digestion is secreted to the organs and there, it is matured and digested again and becomes like a target organ and similar to that organ (17). In this digestion, the secondary moisture resulting from the third digestion is transformed in the organs in terms of shape and aspect, that is, from the clean part of the third digestion, each part that fits any organ of the body reaches that part and then the shaping force make each element look like the same element. In this case, all the forces act in the same way as mentioned in the first digestion, and the dirty part is separated from the clean part, and the clean part is pulled by the production force to the hard area of the body (back and kidneys) to become semen and the dirty part becomes soluble (replaces the decomposed part) (27). In this digestion, like other digestions, some excrements are not digested by the changing force and it is necessary to excrete them in order to maintain the health of the body (29). The excrements of this digestion are a small amount of dilute moisture with a little bile and soda to smoke shaped steam (4) and like the third feces, some are infected with pus and mucus through pus, some through ear and nose pores, and some become food for nails and hair and some become semen, and some are absorbed into the organs and become inflamed, and some become milk and move towards the breast and some menstruate and excrete from the uterus (17).

Discussion and Conclusion

Traditional medicine is a set of knowledge, skills and practices based on the indigenous experiences of different cultures that are used to maintain health or treat physical and mental illnesses. Persian medicine is one of these types of medicine. Familiarity with important topics, which is called the (seven) naturals (*Omur-e-tabieieh*), is necessary to know Persian medicine, and the scientists will always need to know and recognize this theory at any time to diagnose and treat, as well as to provide health advice. The (seven) naturals are, temperament (*Mizaj*) (quality obtained from the composition of body organs), humors (*Akhlat*) (raw material obtained from the conversion of food in the human body), organs, (tissues and organs of the

body), Energy carrier (*Ruhe Tebbi*) (clean bodies resulting from the humor transformation), forces (*Gova*) (ability to perform the major functions) and functions (*Afaal*) (the state of the main functions of the body) (39).

According to the principles of Persian medicine, there are 4 digestions in the human body, which are gastric (*Mead*), liver (*Kabedi*), vascular (*Oroghi*) and organs (*Ozvi*) digestion(۴۰), and each of these digestions has the main role on the healths Disruption or elimination of any of these four digestions and failure to excrete their feces causes disease. Since digestion of food is effective in proper nutrition and health, disturbance in it leads to indigestion.

Persian medicine is one of the holistic medical schools that, with the support of millennial experiences, has special views on this issue and has extensively addressed both the role of nutrition in health and the factors affecting indigestion. *Hippocrates* stated that activity, eating, sleeping and waking should all be done with care and in a natural order. *Galen* also stated that Knowledge of the properties of foods is one of the most useful sciences, because the need for food is permanent, whether in health or illness because food is one of the most important necessities for living (41). Therefore, it is necessary to avoid all the factors that cause indigestion, such as hard movements after eating, simultaneous eating of several types of food, nutrition during satiety and in a bad mood, lack of attention to digestion and habit, consumption of food in excess of gastric capacity and drinking plenty of water.

Hippocrates states that if it is difficult for a doctor to diagnose the disease, it is enough to arrange the patient's four digestions and four excretions, and the patient will return to full health. The cause of most diseases found in people is that there is a defect in these four digestions or four excretions.

It is not possible to have direct access to correctly diagnose each stage of digestion, but it is possible to know the correctness and health of that stage by recognizing and examining the characteristics of the excrement of each stage. Therefore, the health of the digestive faculty is one of the necessities and principles of the health of the whole body.

Author contributions

SS and **MQ** contributed to the design and implementation of the research, **FK** and **MZ** contributed to the edited the manuscript comprehensively. All authors confirmed the final version of the paper.

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Conflict of interest

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