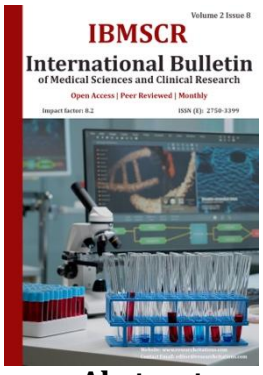

THE ROLE OF THE DIGESTIVE SYSTEM IN HUMAN LIFE

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Abstract:

This article scientifically analyzes the anatomical structure of the human digestive system, its components, and the mechanisms of physiological activity. It also covers the stages of the digestive process and their functional interrelationships.

Keywords: stomach, intestines, pancreas, liver, vitamins.

Аннотация: В данной статье проводится научный анализ анатомического строения пищеварительной системы человека, ее компонентов и механизмов физиологической активности. Также рассматриваются стадии пищеварительного процесса и их функциональные взаимосвязи.

Ключевые слова: желудок, кишечник, поджелудочная железа, печень, витамины.

Annotatsiya: Ushbu maqolada inson ovqat hazm qilish a'zolar tizimining anatomik tuzilishi, uning tarkibiy qismlari hamda fiziologik faoliyat mexanizmlari ilmiy jihatdan tahlil qilingan. Shuningdek, ovqat hazm qilish jarayonining bosqichlari va ularning o'zaro funksional bog'liqligi yoritilgan.

Kalit so'zlar: oshqozon, ichak, me'da osti bezi, jigar, vitamin.

Today, healthy nutrition, which is an inseparable part of a healthy lifestyle, directly affects the correct functioning of this very system. Nowadays, the wide spread of digestive system diseases is largely related to improper eating habits, and these factors are considered one of the important etiological causes of these pathologies. In particular, not consuming food at the specified time, not paying enough attention to its quantity and quality, not forming the diet on a scientific basis, and not following food hygiene leads to the development of diseases.

In order to ensure the vital activity of the human body, maintain work capacity, and support the processes of growth and development, the body is supplied with nutrients from the external environment. During the digestion process, nutrients are mechanically crushed in the digestive tract, undergo enzymatic breakdown, and are later absorbed. The average length of a person's digestive tract is 8-10 meters. Its wall consists of four layers: internal - mucous membrane (tunica mucosa), submucosa (tela submucosa), muscular layer (tunica muscularis), and external - serous layer (tunica serosa) or adventitia in some parts.

The digestive system includes the oral cavity and its auxiliary structures, pharynx, esophagus, stomach, small and large intestines. Also, large digestive glands - the liver and pancreas - are important components of this system.

The oral cavity (cavitas oris) anatomically consists of two parts - the vestibule (vestibulum oris) and the oral cavity proper (cavitas oris propria). In the oral cavity, food is initially mechanically crushed with the help of teeth, mixed with the help of the tongue, and undergoes partial enzymatic breakdown under the influence of saliva produced by the salivary glands. The excretory ducts of the glands in the oral cavity open into the oral cavity. These

glands are divided into large and small salivary glands. Small salivary glands are located in the mucous membrane or submucosa of the oral cavity, and their size usually ranges from 1-5 mm. According to their location, they are divided into labial glands (glandulae labiales), buccal glands (glandulae buccales), palatine glands (glandulae palatinae), and lingual glands (glandulae linguales). Large glands include the parotid, submandibular, and sublingual salivary glands. The ductus parotideus of the parotid salivary gland opens between the second large molar tooth of the upper jaw. The submandibular and sublingual salivary glands open into the caruncula sublingualis under the tongue.

In the process of ontogeny, milk teeth begin to form from approximately the 5th month of fetal development. In the postnatal period, milk teeth usually begin to appear starting from 6–8 months. Initially, the incisors appear, followed by the canines and molars. The total number of milk teeth is 20, and on the right and left sides of each jaw, there are 2 incisors, 1 canine, and 2 molars. Milk teeth begin to be replaced by permanent teeth from the age of 6-7. The sequence of permanent teeth eruption is as follows: the first molar at approximately 7 years, central incisors at 8 years, lateral incisors at 9 years, first premolars at 10 years, second premolars and molars between 11-15 years, second large molars at 13-16 years, and third molars (wisdom teeth) at 18-20 years.

Strict adherence to oral hygiene is of great importance during the period when milk teeth are replaced by permanent teeth. In particular, it is recommended to clean the teeth regularly (at least twice a day) using a toothbrush and hygienic products, and to rinse the mouth after eating. Also, it is necessary to prevent harmful habits in children, such as consuming very cold or very hot foods, as well as crushing hard objects with teeth.

The stomach (gaster, ventriculus) is the expanded part of the digestive system and usually has a pear-like shape in adults. In its anatomical structure, the entrance part (cardiac part), exit part (pyloric part), fundus, as well as greater and lesser curvatures (curvatura major et minor) are distinguished. The circular muscle fibers located in the entrance and exit parts of the stomach form sphincters (cardiac and pyloric sphincters) and ensure the movement of the food mass in one direction. The stomach wall, like other digestive tubes, consists of three layers: the inner mucous membrane (tunica mucosa), the middle muscular layer (tunica muscularis), and the outer serous layer (tunica serosa). Under the mucous membrane, there are many gastric glands, the total number of which reaches approximately 14 million. These glands produce gastric juice. As a result of the rhythmic contraction of the stomach muscles, the food is mechanically mixed and favorable conditions are created for its chemical processing.

In adults, the volume of the stomach is on average 2.5-3 dm^3. Approximately 1.5-2 dm^3 of gastric juice is secreted in one day. The main part of the gastric juice composition (approximately 99%) is water, and the remaining 0.3-0.4% corresponds to organic substances and mineral salts. Gastric juice has a strong acidic environment, containing 0.3-0.4% hydrochloric acid (HCl), and its pH value is approximately 2.5. In addition, mucus (mucin) is also produced by the gastric glands. This substance protects the mucous membrane from mechanical, chemical, and enzymatic influences. During ontogeny, the volume and shape of the stomach change with age. While the stomach volume in newborns is approximately 30-45 cm^3, it reaches up to 1500 cm^3 by 10-12 years. Also, the shape of the stomach changes evolutionarily; while it is more pear-shaped until the age of 2, it approaches a retort (flask) shape around the age of 7.

The small intestine (intestinum tenue) is the main section of the digestion process, where nutrients—proteins, fats, and carbohydrates—undergo almost complete enzymatic breakdown. Bile fluid synthesized by the liver emulsifies fats, significantly facilitating their breakdown under the influence of enzymes. Pancreatic enzymes (proteases, lipases, and amylases) secreted by the pancreas play an important role in breaking down complex nutrients into simple molecules. As a result, the formed monomers (amino acids, monosaccharides, fatty acids, and glycerin) are absorbed into the blood and lymph flow through the intestinal mucosa.

The next stage of the digestion process continues in the large intestine (intestinum crassum). In this section, mainly water and some mineral substances are reabsorbed, as a result of which undigested residual masses thicken and feces are formed. Symbiotic microorganisms in the large intestine microbiota participate in the synthesis of certain vitamins (for example, vitamin K and B group vitamins) and support the functioning of the immune system.

The digestive system is of great importance in maintaining the overall health of the organism. Disruption of the activity of this system can lead to the development of various pathological conditions. In particular, diseases such as Gastritis and Stomach Ulcers manifest with pain syndrome in the epigastric region. Furthermore, in severe cases, Stomach Cancer may also develop. Pathologies related to the intestine include intestinal polyps, chronic inflammatory diseases (for example, Crohn's disease and Ulcerative colitis), and other functional and organic disorders.

These diseases have a negative impact on digestion, absorption processes, and general metabolism.

Metabolism in the organism is a complex set of physiological processes related to the intake of nutrients from the external environment, their digestion, absorption, biochemical changes in cells, and the excretion of waste products resulting from metabolism. During this process, energy necessary for the vital activity of the organism is generated. Due to the released energy, various organs and systems perform their functions, the division and renewal of cells are ensured, the growth and development of the growing organism take place, and the constancy of body temperature is maintained. Therefore, metabolism is considered the main mechanism providing all vital processes of the organism with energy. Metabolism is carried out through two main interrelated processes - assimilation (anabolism) and dissimilation (catabolism).

Assimilation (anabolism) is the process where the breakdown products of nutrients enter the cells and the synthesis of complex organic compounds necessary for the organism takes place. As a result of this process, cell structures are renewed, new cells are formed, and tissue growth is ensured. Especially in young organisms, the assimilation process occurs at a high level of activity, which forms the physiological basis for the intensive growth and development of the organism. Dissimilation (catabolism) is a process occurring with the breakdown of complex organic substances into simple compounds, during which energy is released. This energy is used to ensure all vital functions of the organism.

The digestive system develops in the early stages of embryogenesis in the form of a primary intestinal tube (intestinum primitivum). Later, this tube differentiates into the oral cavity, pharynx, esophagus, stomach, and intestinal sections. Functionally, the digestive system begins to operate from approximately the 4th month of fetal development. During this period, meconium (meconium) accumulates in the fetal intestine. Meconium is a green-colored mass,

containing desquamated epithelial cells, mucus, bile pigments, and components of the amniotic fluid swallowed by the fetus. By the final stages of fetal development, the digestive system becomes morphologically and functionally ready to perform the vital functions of the newborn organism.

The anterior part of the digestive system develops from the embryonic ectoderm. As a result of the intensive growth of the anterior part of the brain (prosencephalon), the frontal prominence (prominentia frontalis) is formed and the oral pit (stomodeum) is created beneath it. The stomodeum deepens and approaches the anterior end of the primary intestinal tube developed from the entoderm. These two layers - ectoderm and entoderm - join to form the epithelial pharyngeal membrane (membrana pharyngea). Approximately in the 3rd week of fetal development, this membrane undergoes resorption, and communication occurs between the oral pit and the primary intestinal cavity. The oral pit is bounded on the side and bottom by the derivatives of the first visceral (or branchial) arch. From the maxillary process of this arch, the upper jaw bone, hard palate, outer part of the upper lip, cheek area, and lateral walls of the nasal cavity are formed.

During the process of embryonic development, the mandible bone (mandibula), lower lip, and the floor of the oral cavity are formed as a result of the mutual joining of the paired mandibular processes (processus mandibulares). The medial nasal process (processus nasalis medialis), developed from the frontal prominence, enters between the maxillary processes. This structure forms the anterior (incisor) part of the hard palate and the central part of the upper lip. If the medial nasal process does not fully join with the maxillary processes during embryonic development, a congenital cleft of the upper lip - "harelip" (labium leporinum) - occurs.

Also, as a result of the non-joining of the palate plates of the maxillary processes, a congenital defect of the hard palate - "wolf mouth" (palatum fissum) - develops.

Nutrients are the main source of energy and plastic (building) material for the organism. For this reason, the diet must be full-valued, meaning it must be sufficiently provided with proteins, fats, carbohydrates, vitamins, and mineral substances. Especially, children's nutrition should be balanced, including products of plant and animal origin, be high quality, and energetically sufficient. Such nutrition increases the normal growth, development of children, as well as their resistance to infectious and non-infectious diseases. Correct organization of nutrition has important hygienic significance. For middle school-age children, eating 4 times a day is recommended, and for children who are physically weak or lagging behind in development, it is appropriate to increase the number of meals. During the eating process, it is necessary to follow personal hygiene rules, maintain correct behavior at the table, and comply with the hygienic-aesthetic requirements of the dining environment.

In conclusion, it can be noted that the digestive system (systema digestorium) is one of the most important functional systems ensuring the vital activity of the organism. Through this system, the intake of nutrients necessary for the organism, their digestion, absorption, and the provision of energy and plastic substrates necessary for metabolic processes are carried out. For this reason, the digestive system has a decisive role in maintaining the normal functional state of tissues and organs. Rational nutrition is one of the main factors in ensuring the homeostasis of the organism. Each individual should approach their health responsibly and strictly follow the hygiene and culture of nutrition. It is recommended to limit fast food

products and highly processed non-traditional food products, and to use a balanced diet instead. Having a sufficient amount of fruits and vegetables in the diet improves the provision of vitamins, mineral substances, and biologically active compounds, and supports the physiological activity of the gastrointestinal system. Regular and balanced nutrition is an important preventive factor in the prevention of digestive system diseases.

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