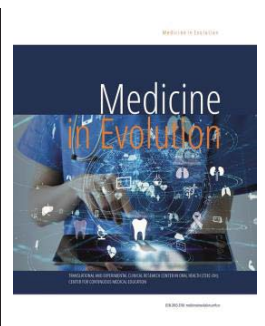


Anatomo-clinical correlations between canines edentation and their impact on protein metabolism



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Abstract

Proteins are a group of organic substances, that play multiple roles in the body. The body procures amino acids, indispensable for the biosynthesis of its own proteins.

Edentation is a pathological condition characterized by the absence of one or more teeth on the dental arch. This pathological condition occurs due to tooth loss. Patients suffering from impaired masticatory function, through edentulousness, can adapt the consistency of food to their dental status, or rely on the digestive system, to compensate for the lack of oral preparation of food. The lack of one or more teeth can lead to poor chewing, because larger pieces of food are swallowed, leading to digestive disorders. These circumstances lead to a poor intake of nutrients by decreasing intestinal absorption, or increase the likelihood of digestive diseases. Thus, dysfunction of masticatory efficiency may be detrimental to general health.

Keywords: edentation, proteins, amino acids, digestive disorders

INTRODUCTION

Proteins are polymers of amino acids linked by α -peptide bonds, which play multiple roles in the body: plastic role, entering the constitution of the body tissues; role of plasma transporter of hormones, lipids (lipoproteins), vitamins; role of biocatalyst (enzymes); role in specific (immunoglobulin) and nonspecific (complement) defense; role in maintaining the acid-base balance (through the amino and carboxyl groups); hydropexic role, water retention (generates oncotic pressure); detoxifying role (conjugation with aminoacids of the toxicant, at the liver level); energetic role, through the use of aminoacids in the energogenic sense and in the neoglucogenic or lipogenic sense [1,2].

The body procures amino acids, indispensable for the biosynthesis of its own proteins from two sources: food, which provides proteins, successively digested under the influence of proteolytic enzymes in juices: gastric (pepsin and gelatinase), pancreatic (trypsin, chymotrypsin, carboxypeptidase elastase) and intestinal (enterokinases, triaminopeptidases and dipeptidases) and biosynthesis in the body of non-essential aminoacids [1,3]. After hydrolysis, protein digestion products (amino acids and small peptides) are subjected to mucosal absorption by specific transport mechanisms [3,4].

Tooth loss leads to a deficit of masticatory function. The most common causes of tooth loss include cavities and their complications and periodontal disease, which can lead to tooth loss causing partial or complete edentation in patients. Teeth are responsible for various tasks, such as cutting, breaking and grinding food [5,6].

Patients with the affected masticatory function can adjust the consistency of food or swallow coarse particles. The lack of one or more teeth can lead to poor chewing, because larger pieces of food are swallowed (example: meat, high protein foods). Thus, food in the oral cavity will not be chewed properly which will hinder digestion and may involve stomach pain, bloating, epigastric pain, intestinal transit disorders, etc. At the same time, the absorption and secretion of nutrients will be diminished, resulting in insufficient resources for the body [7].

Canines have an important role in tearing food, in chewing and, at the same time, an aesthetic role. Canine edentation results in reduced consumption of meat, fresh fruits and vegetables, which leads to lower levels of Hb, vitamin C and increased gastrointestinal irritation [8]. There is a link between masticatory function affected by edentulousness and poor nutrition [7].

The first step in protein food digestion involves chewing. The teeth begin the mechanical breakdown of the large pieces into smaller pieces that can be swallowed. The salivary glands provide saliva to help swallow and pass the food bowl through the esophagus to the stomach. The stomach releases gastric juices containing hydrochloric acid and the enzyme, pepsin, which initiate the breakdown of the protein, into smaller chains of amino acids. They pass into the small intestine, where most protein digestion takes place. The pancreas secretes enzymes (trypsin, chymotrypsin and carboxypeptidase) that further break down the protein fragments. Protein absorption takes place in the small intestine. Amino acids are released into the bloodstream, which leads them to cells in other parts of the body so that they can begin to repair tissues and build muscle.

Aim and objectives

The aim of this article is to describe the prevalence and risk indicators of edentulism and to demonstrate that there is a causal relationship between canine edentation and the occurrence of digestive disorders in patients over 45 years.

MATERIALS AND METHODS

During one year (September 2017- August 2018) we have consulted and treated 100 patients over 45 years, both male and female, who had canine edentation. In the patients included in the study, following the anamnesis and the clinical examination performed, we noticed that some of them have digestive pathology. Following the file completed by each patient (Figure 1), we noticed that they presented various digestive symptoms such as: bloating, intestinal transit disorders (constipation, diarrhea), epigastric pain. Also, after the anamnesis we found out that due to edentulousness, patients' chewing is defective.

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| <p>I. Identification data: Name/Surname..... Age..... Sex..... Environment: urban / rural</p> <p>II. Number of daily meals (check the correct answer): - 1 meal / day - 2 meals / day - 3 meals / day - more than 3 meals / day</p> <p>III. Have you had any of the following digestive symptoms? Answer with Yes/No - bloating - intestinal transit disorders: constipation diarrhea - epigastric pain</p> <p>IV. What is the period of time after ingestion of food in which the symptoms described above appear? (Check the correct answer) - immediately after ingestion of food - 2-3 hours after ingestion of food - more than 2-3 hours after ingestion of food</p> |
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Figure 1. Patient's medical file

Classification criteria:

- I. After patient's gender (female/male) (Figure 2)
- II. After environment of origin (urban/rural) (Figure 3)
- III. After locating canine edentulousness (Figures 4,5)
- IV. According to the digestive symptoms (Figure 6)

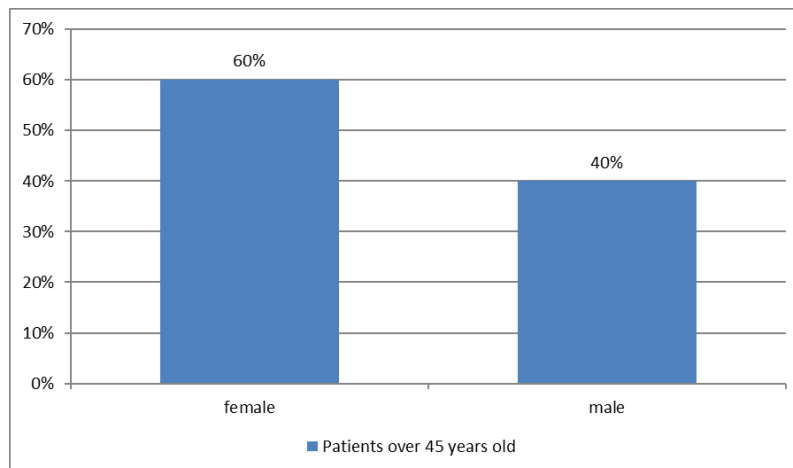


Figure 2. Gender of patients with canine edentation

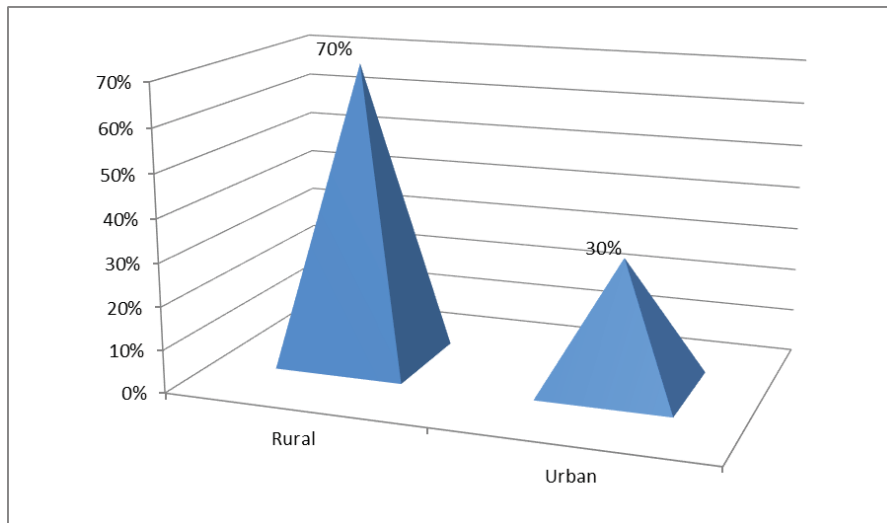


Figure 3. Environment of origin of the patients'

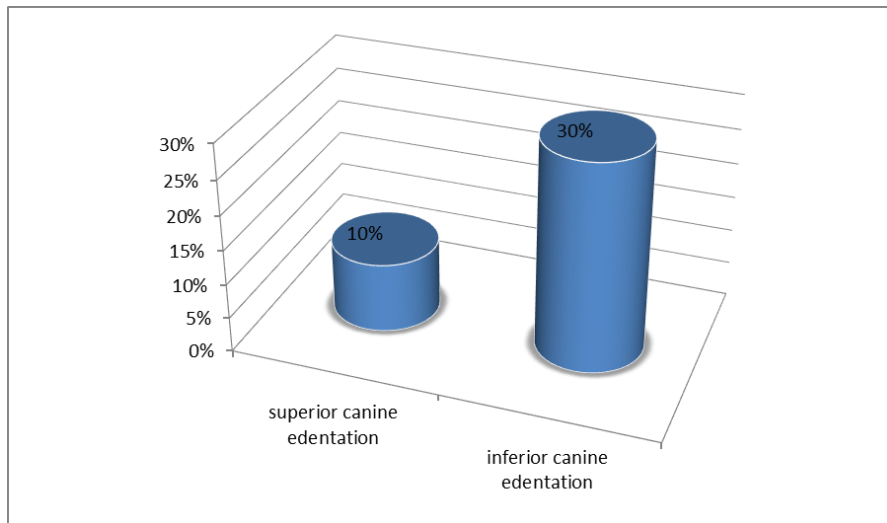


Figure 4. Canine edentulousness in men

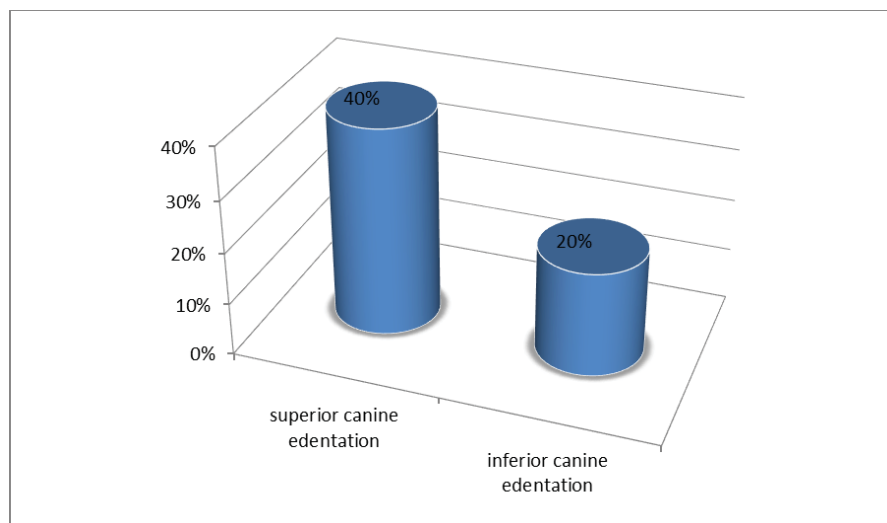


Figure 5. Canine edentulousness in women

RESULTS

We have noticed that 60% of female have canine edentation compared to men who only 40% of them have canine edentation. Out of the total number of canine edentulous patients, most come from rural areas, more precisely 70% compared to those from urban areas which are in a percentage of 30%.

Of the 40% of men with canine edentations, 30% had lower canine edentations and 10% upper canine edentations. Of the 60% of women with canine edentations, 40% had upper canine edentations and 20% lower canine edentations.

Of the total canine edentulous patients, most had intestinal transit disorders and epigastric pain (Figure 6).

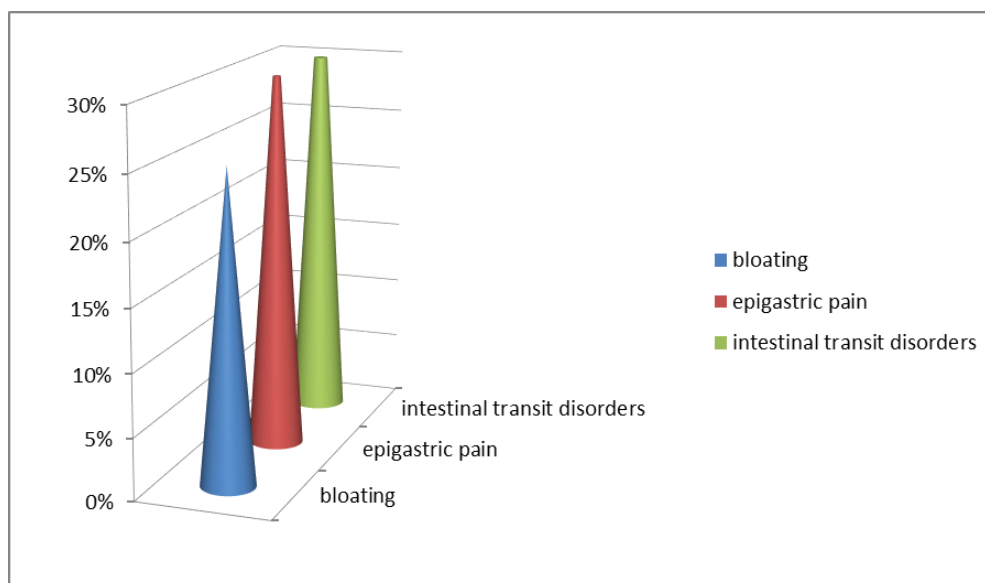


Figure 6. Classification according to digestive symptoms

DISCUSSIONS

Studies have reported correlation between poor oral health, and particularly tooth loss and chewing deficiency, with nutritional impairment, mainly in vitamins and dietary fibre [7,9-14].

Proper dentition is important for health and quality of life [15]. Dental treatment is important for edentulous people. Impaired masticatory function leads to nutritional imbalances and increased load on the digestive tract, causing more health disorders [16].

Lack of teeth can lead to decreased consumption of fibre and micronutrients and increased consumption of softer foods, easy to chew, rich in saturated fats and cholesterol. These eating habits can be associated with cognitive impairment either through micronutrient deficiencies (i.e., vitamin B12, thiamine) or by adopting unhealthy diets, increasing the risk of stroke and dementia [17]. Mastication might be a protective factor for cognitive decline, as it is related to increased blood flow in specific brain areas (cerebral cortex, cerebellum, thalamus, and hippocampus) [18,19].

Rémond et al have shown that the use of meat proteins for protein synthesis can be affected by a decrease in masticatory efficiency [20].

Malnutrition can adversely affect the health of oral tissues. Deficiencies in vitamins A, C, E, copper, iron, zinc and non-nutritive antioxidants decrease the anti-inflammatory and immune response of oral soft tissues. Limited protein intake can compromise infection response and wound healing [21].

CONCLUSIONS

Protein is a vital nutrient for almost every part of the body. They are digested in the mouth, stomach and small intestine before being released into the bloodstream as individual amino acids. Edentulous people prefer to use semi-solid and fluid foods that are poor in essential nutrients. The preference is due to ease of chewing, swallowing, preparation and accessibility.

Canine participates in the canine or anterior-lateral guide, so it has great value in the functional occlusal relations, during mastication.

The loss of teeth leads to an increase in the number of masticatory cycles, a decrease in viscosity and an increase in the volume of the food bowl.

Lack of teeth causes damage to mastication, which can lead to improper choice of food, which alters nutrient intake. Based on the existing evidence, many oral health parameters, including extensive tooth loss without prosthetic rehabilitation, hyposalivation, swallowing disorders, and impaired tongue movements, may impair masticatory function.

Recovery of masticatory function in edentulous patients should be combined with adequate health guidance according to patients' condition and individualization of nutrition for complete nutrient intake.

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