

INFLUENCE OF XEROSTOMIA ON DIET AND NUTRITION AMONG INSTITUTIONALIZED ELDERLY

Mihajlo Petrovski^{1*}, Kiro Papakoca¹, Sofija Carceva-Salja¹,
Ljuica Proseva¹, Sandra Atanasova¹

¹Department of Dental Medicine, Faculty of Medical Sciences,
Goce Delcev University, Krste Misirkov bb, 2000 Stip, Macedonia

*e-mail: mihajlo.petrovski@ugd.edu.mk

Abstract

Adequate meals are very important for enhancing quality of life among institutionalized elderly. The function of saliva mainly is to maintain the integrity of the hard and soft tissues of the oral cavity, and also has influence on the speech, swallowing and tasting process. Also, saliva plays an important role as a solvent of taste substances, but the prevalence of dysgeusia and hypogeusia are increasing in patients with xerostomia. Reduced salivary secretion leads to dryness of oral mucosa and accelerates the damage on the taste receptor cells. Based on the above mentioned facts, the main aim of this study was determined - to assess whether the present xerostomia has an impact on food choice in institutionalized elderly.

Total number of 70 subjects older than 65 years institutionalized in one long-term care institution was evaluated. Adequate printed questionnaire for the subjective representation and expression of xerostomia was. Each of the groups in which there was a subjectively assessed xerostomia that was tested for satisfaction with their diet and nutrition intake. Data obtained from the questionnaire was appropriately statistically processed. For statistical analysis we have used special software for statistical analysis of data-Statistica 7.1.

62.8% from subjects had subjective feeling of xerostomia. After processing the data obtained from the questionnaire may be noticed that most of the examined population or 41.4% had mild (xerostomia 1), while 25.7% of subjects based on the answers to the questionnaire had severe xerostomia (xerostomia 3). Also, it must be noted that 64.7% from subjects with severe xerostomia indicated an unsatisfactory diet, versus 37.9% of subjects with mild xerostomia.

Based on the research, we can conclude that xerostomia is often present in institutionalized elderly and it has

a great impact on nutrition. Stronger xerostomia negatively affects the diet of these elderly people.

Key words: Institutionalized elderly, Xerostomia, Diet, Nutrition.

1. Introduction

The nutrition and diet of the elderly depends on various factors. Oral health, primarily the presence of xerostomia, can be an important risk factor for inadequate nutrition in this population. Elderly population institutionalized in long-term care institutions mainly has inadequate or insufficient oral health and this condition significantly affects the diet of these individuals. Satisfying meals are very important for enhancing quality of life.

A deficiency of some essential nutrients can compromise elderly health, leading to: loss of body weight and muscle mass, poor wound healing, depression, reduced memory and dementia, situations which are aggravated by the presence of malnutrition [1]. Also, inadequate consumption of calories and lipids can contribute to a higher occurrence of excess weight, as well as cardiovascular diseases, neoplasm and other disorders. Although the oral health is an important factor in general health, it also affects the quality of life, especially the ability of individuals to feed, laugh, and communicate [2].

Changes in socio-economic, physiological and psychological status are concomitant with aging are presumed to contribute to a living pattern which may result in malnutrition.

Loss of appetite and food intake can lead to malnutrition in elderly people. Taste alteration may contribute to reduced appetite and food intake in

older people. Deterioration of oral health, altered taste ability, and lack of competencies in socioeconomic and psychological factors have been observed in elderly people.

Preventing malnutrition is most crucial in this vulnerable group. Malnutrition among institutionalized elderly is in correlation with numerous factors and is associated with: lower activities, lower quality of life, longer hospital stay and rehabilitation, higher risk of falls, higher infection rates, poor wound healing and higher mortality rates. Oral health problems such as tooth loss, toothache and chewing complaints are mentioned as contributing factors to malnutrition, especially in institutionalized elderly [3, 4]. In this context it should be noted that the oral health of institutionalized elderly is generally poor, and that this poor oral health is usually present at the time of institutionalization.

Inadequate diet of iron, thiamin, vitamin C and fibers might worsen the taste sensitivity of elderly people. According to Jeon *et al.*, [5], different associated factors of taste changes and aid in preventing taste loss in elderly people by providing adequate nutrients and improving quality of life. Changes in taste acuity in elderly people could be, in part, due to the loss of taste receptors by aging-related physiology [6].

Poor oral conditions such as cavity infections, damage to the central or peripheral nerves, and decreased amounts of saliva have also been proposed to cause taste alterations [7]. Malnutrition can be the cause and result of alterations in saliva production. Aging had correlations to denture wearing, dry mouth and chewing ability [8].

The function of saliva is to maintain the integrity of the hard and soft tissues of the oral cavity, as well as to support the speech, swallowing, and tasting process. Saliva plays an important role as a solvent of taste substances, but the prevalence of dysgeusia and hypogeusia are increasing in patients with a decreasing salivary gland function. Reduced salivary secretion leads to dryness of oral mucosa and accelerates damage on the taste receptor cells [9].

In patients with chronic xerostomia presence in patients with Sjögren syndrome or after head and neck radiotherapy, a decrease of the ability to recognize the tasting stimulation was discovered [10].

According to Rhodus [11], problems in lubricating, masticating, tolerating, tasting, and swallowing food contribute notably to the complex physiological and psychological manifestations of aging. Dry and atrophic oral mucosa and soft tissues are usual results

of the xerostomic condition along with accompanying ulcers and desquamation, opportunistic bacterial infections, inflamed and edematous tongue, and periodontal disease.

Decreases in the quantity of saliva as well as the composition elicit a multitude of problems for the institutionalized elderly individuals.

Association of xerostomia with common pharmacological therapies, autoimmune diseases, radiation and chemotherapy, as well as many other medical problems and treatments, suggest that xerostomia is indeed a very common problem among the elderly. It is a significant finding in medical diagnosis because of its association with a number of general diseases and disorders [12].

More than 400 different drugs can cause xerostomia as a side effect. Gupta *et al.*, [13], and Liu *et al.*, [14] have noted in their research papers that more than 80 percent of the medications which are most commonly prescribed to the institutionalized elderly may cause xerostomia. Some of medicaments from this group are the following: analgesics, antipsychotics, antihypertensives, anticholinergics, antihistamines, diuretics, narcotics, and chemotherapy drugs. The most frequently used drugs in the institutionalized elderly that cause xerostomia are shown in the Table 1.

Table 1. The group of most commonly used drugs by institutionalized elderly people that can cause xerostomia

Drugs that cause xerostomia*	
➤	Anticholinergic drugs
➤	Antagonist of alpha - receptors
➤	Antipsiholitics
➤	Diuretics
➤	Antihistamines
➤	Simpaticomimetic drugs
➤	Antihypertensive
➤	Antidepressants
➤	Bronchodilators
➤	Muscle relaxants
➤	Benzodiazepines, hypnotics and opioids
➤	Decongestants
➤	Anticonvulsants
➤	Antidiarrhoeal medication
➤	Anti-inflammatory analgesics
➤	Antiparkinsonic medicaments
➤	Medications for Alzheimer's disease

*Adapted and modified according to: Shetty *et al.*, [32], van der Putten *et al.*, [33], and Sreebny and Schwartz [34].

According to Urache *et al.*, [15], the prevalence of xerostomia is around 60 percent in the institutionalized elderly, with an equal prevalence in both sexes.

Based on the above mentioned facts, the main aim of this study was determined - to assess whether the present xerostomia has an impact on food choice in institutionalized elderly.

2. Materials and Methods

The presented data originates from an examination being conducted at the "Mother Teresa" Department, within the PHI Gerontology Institute "13th November" in Skopje, from May to July 2018.

The examination included a total number of 70 subjects older than 65 years. In these institutions, most of the institutionalized persons are functionally-dependent individuals and have numerous chronic diseases. This multimorbidity leads to serious disability or dependency on other person's assistance, while most of these people have a need for long-term care.

When performing this research, all persons who are in the terminal stage of the disease, subjects with dementia, individuals who have cognitive disorders, patients with a nasogastric tube and patients placed on artificial ventilation were excluded. Also, all individuals who do not cooperate because of different behavioral disorders, such as aggression, or do not permit to be subjects of this examination, were not included in the studied group. People who do not understand the Macedonian language were also excluded from this examination.

To evaluate the subjective presence of xerostomia, we had used one simple question: "Do you have a feeling of dryness in the mouth?" In the other part of the investigation, the focus was put on questions about the use of drugs, particularly those that may have side-effects, and especially those which cause xerostomia.

To determine the level of expressiveness of xerostomia, a questionnaire recommended by Carda *et al.*, [16], was used. This questionnaire consisted of four questions that should be responded by the participants. These questions were:

Question code	Question	Answer
A	Have you had the feeling of dryness in the mouth in the last 6 months?	Yes/No
B	How much saliva do you have in your mouth?	Little/ Enough/ A lot
C	Do you have swallowing difficulty?	Yes/No
D	Do you need to take liquid to facilitate swallowing food?	Yes/No

Based on the answers to these questions, we determined the level of expressiveness of xerostomia:

- Mild xerostomia or Xerostomia 1: when there was a positive answer only to the question A.
- Medium xerostomia or Xerostomia 2: when there was a positive answer to the question A and an additional positive answer to one of the remaining questions (B, C, or D).
- Severe xerostomia or Xerostomia 3: when, besides a positive answer to the question A, there were another two positive answers (to questions B, C, or D).

Adequate printed questionnaire for the subjective representation and expression of xerostomia was used. Each of the groups in which there was a subjectively assessed xerostomia that was tested for satisfaction with their diet and nutrition intake.

Collected and systematized data were statistically processed. For this purpose we used special software for statistical data processing - Statistica 7.1. The obtained results are presented in the tables and figures.

3. Results and Discussion

3.1 Results

From the total number of examined subjects, 62.8% had subjective feeling of the existence of xerostomia. These results are presented on Figure 1.

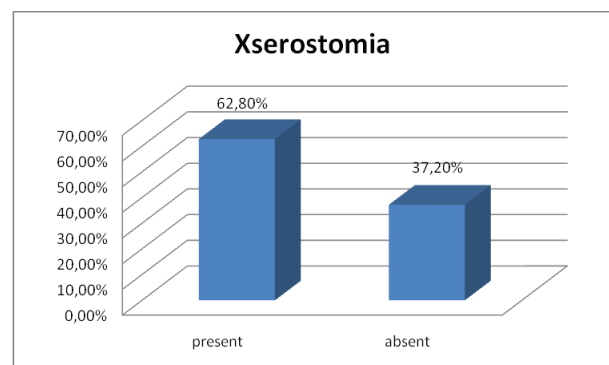


Figure 1. Presence of xerostomia among the institutionalized elderly

Most of the examined subjects take drugs that have a potential xerostomic effects according to the Table 1. It was found that 92.85% of the institutionalized elderly individuals take at least one of the medications that are among the drugs which have side effects of their use cause xerostomia (Table 2).

Table 2. Commonly used medications among the examined institutionalized elderly

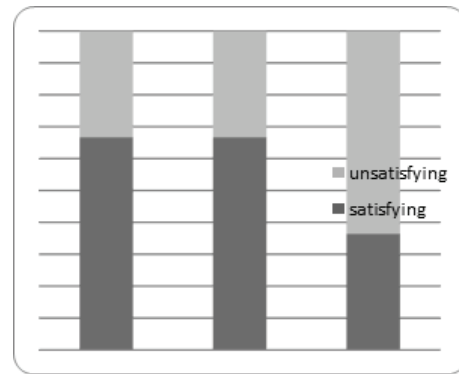
Type of medications	Number	Percent
Antidepressants / antipsychotics	33	47.14 %
Antihypertensives	31	44.29 %
Drugs for rheumatoid pains	29	41.43 %
Drugs for cardiovascular diseases	25	35.71 %
Diuretics	15	21.43%
Antidiabetic drugs	13	18.57 %
Drugs to the gastrointestinal tract	12	17.14 %
Antibiotic drugs	11	15.71 %
Medicines for diseases of the prostate	10	14.26 %
Neurological drugs	10	14.26 %
Minerals	9	12.86 %
Vasodilators	7	10.00 %
Antiepileptics	4	5.71 %
Medicaments anti allergic conditions	3	4.29 %
Antifungal drugs	2	2,86 %

After processing the data obtained from the questionnaire recommended by Carda *et al.*, [16], may be noticed that most of the examined population or around 40% had mild (xerostomia1), while 25% of subjects on the basis of the answers to the questionnaire had severe xerostomia (xerostomia 3) (Table 3).

Table 3. Subjective evaluation about the presence of the types of xerostomia in institutionalized elderly

Subjective assessment of the severity of xerostomia	Number	Percent
Mild xerostomia (xerostomia 1)	18	40 %
Moderate xerostomia (xerostomia 2)	15	35 %
Severe xerostomia (xerostomia 3)	11	25 %

Regarding the part that refers to the satisfaction of the institutionalized persons in terms of their diet, it was noted that most of the people who have advanced xerostomia (more precisely 64.71%) indicated that xerostomia, i.e. the existence of a dry mouth has a negative impact on the process of diet and food choice. People who have a mild or moderate form of xerostomia in a significantly lower percentage indicate that xerostomia adversely affects their diet and food choices (Figure 2, and Table 4).


Figure 2. Influence of xerostomia on diet among the institutionalized elderly
Table 4. Influence of xerostomia on diet among the institutionalized elderly

Xerostomia type	Diet	
	Satisfying	Unsatisfying
Mild xerostomia (xerostomia 1)	12	6
Moderate xerostomia (xerostomia 2)	10	5
Severe xerostomia (xerostomia 3)	4	7

3.2 Discussion

As previously mentioned, the role of saliva in the oral cavity is extremely important. Any reduction in its quantity leads to significant disturbances in oral homeostasis.

The role of saliva is extremely important for the nutrition process itself. The reception of taste stimuli occurs due to the dissolution of food and the uptake of chemical stimuli by the gustatory bodies of the tongue.

When salivary function is diminished, patients are at a greater risk of developing caries, discomfort in wearing denture and opportunistic diseases, such as candidiasis. The psychosocial aspects of xerostomia can range from a mild effect on self-rated oral health to frustration, embarrassment, unhappiness, or substantial disruptions in quality of life [17]. Such side effects are even more significant in institutionalized individuals who are functionally dependent and even in maintaining oral hygiene.

Due to the presence of multimorbidity in institutionalized elderly, most of them take one or more medications daily. Some drugs (particularly psychotropic and cardio - medicaments, which are most used among institutionalized elderly) have a negative effect on the oral cavity of subjects

especially causing xerostomia. Because of its presence, xerostomia increases the risk of oral diseases such as: caries, periodontal disease and oral infections (like glossitis, stomatitis and infection caused by *Candida albicans*), fissures and rhagades at the corners of the lips, difficulty in chewing, swallowing and speaking. Other drugs such as calcium antagonists and antiepileptic drugs can negatively affect the periodontium especially gingival tissues, which can lead to its increase gingival hyperplasia. This condition further aggravates the poor oral health of these people due to the inability to maintain proper oral hygiene [18].

Patients with dry mouth will also complain of food sticking to the teeth, taste alterations, foods burning the oral tissues, and a burning tongue. According to one study from Stack and Papas [19], the deficiency of saliva may lead to such complications as fungal infections (e.g., *candidiasis*), atrophy of the filiform papillae of the tongue, mucosal ulcerations and lesions, salivary gland enlargement, an increase in the number of cariogenic, aerobic organisms as *Streptococcus* spp. and *Lactobacillus*, spp., and rapidly progressing caries, and progression and initiation of the periodontal diseases.

The high usage of medications that cause xerostomia, as side effect except in this study was found by Sfeatcu *et al.*, [20], and Locker [21].

The data, about the presence of xerostomia presented in this study coincide with the data for the presence of xerostomia in studies published by Avcu *et al.*, [22], and Petelin *et al.*, [23]. Higher presence of subjective feeling of dryness of the mouth have presented Glažar *et al.*, [24], unlike Marchini *et al.*, [25], Kossioni *et al.*, [26], Mozafari *et al.*, [27], and Triantos [28], that published lower presence of this subjective sensation. Glazar *et al.*, [24], found a higher prevalence of xerostomia among institutionalized in comparison with non-institutionalized elderly.

Locker [29], in one study about xerostomia had collected data from 907 randomly-selected community dwelling adults aged 50 years and over about the presence of the xerostomia. Three years later, 71% of subjects were followed-up and data on xerostomia collected again. At baseline, 15.5% of these subjects reported xerostomia, while at follow-up this number had risen to 29.5%. The majority of the population was incident cases, reporting xerostomia only at follow-up, while the remainders were chronic cases, reporting xerostomia at both baseline and follow-up.

According to Loesche *et al.*, [30], xerostomia leads to avoidance of certain foods, which raises the possibility

that xerostomia could contribute to under nutrition in older persons. According to the same authors topically applied ipratropium and triamcinolone and the systemic agents' amitriptyline, oxybutynin and triazolam could be statistically associated with one or more complaints of xerostomia.

Based on the data from our research it can be noted that that xerostomia has an important influence on the well-being and quality of life of this population. This result of ours is confirmed by Locker [21], in his research from 2003.

Compromised chewing ability and xerostomia in the elderly may also cause poor food choice and unbalanced nutrient intake. In addition to chewing function and xerostomia, other oral conditions such as mucosal disorders or the pain that can be connected to advanced periodontal disease or caries are linked to decreased masticatory function and nutrition. In addition, xerostomia and dysphasia may prevent adequate nutritional intake in the elderly. In many cases denture wearers are not aware of the modification of their food choice and methods of food preparation. These conditions cause a reduction in nutritional intake lower levels of calories, proteins, fat, non-starch polysaccharides and vitamins. Frequently the individual replaces the missing calories with a higher intake of sugar and fat, especially in edentulous persons with a lower educational level. Further contributing to the problem, the elder consumes decreased amounts of fruit and vegetables as a result of fewer occlusal contacts in the posterior teeth [31].

Because of the high prevalence of xerostomia among institutionalized elderly all professionals responsible for their care must be familiar with impact of xerostomia on oral health, nutrition and the general health. Due to high prevalence of xerostomia continuous oral hydration is very important [18].

4. Conclusions

- Based on this research, it can be concluded that xerostomia is often present in institutionalized elderly and it has a great impact on nutrition.
- Stronger xerostomia negatively affects the diet of these elderly people.

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