

CORRELATION OF ORAL HEALTH AND DIET AMONG INSTITUTIONALIZED ELDERLY PEOPLE

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Abstract

Oral health problems such as tooth loss, toothache and chewing complaints are contributing factors to malnutrition, especially among institutionalized elderly. Presence of difficulties in diet, as well as the increased health needs and the impaired health of the institutionalized elderly, the purpose of this research was established - to access the effect of the oral health on diet of institutionalized elderly people.

This study was carried out in the period from April to August 2013, in the department "Mother Teresa", part of Gerontology Institute "Thirteen November" - Skopje, Macedonia. The study covered a total number of 73 respondents who were older than 65 years. Subjects involved in the examined population during the examination were answering questions to identify the risk factors that are responsible for the effects of the chewing on the diet. A clinical examination was conducted in order to objectively notice the changes of the oral health.

The average age of participants was 73.79 ± 6.92 years. Average time spent in the long-term care institution was 5 years and seven months. Most of the subjects has subjective filling that their own chewing do not satisfies adequate nutrition. Among one quarter of the subjects, the reason for not wearing prosthetic devices is inability to chew certain types of food. The average number of present (remaining) teeth was 5.81 ± 7.34 . The percentage of elderly people with optimal oral health (20 or more teeth) is 4.11%. Average number of retained tooth roots is 0.69 ± 1.66 per subject. Main arithmetic values were calculated for gained data.

This research has shown that the oral status of older people frequently affects their quality of life, and in particular, on the ability to eat several common types of foods.

Key words: Oral health, Chewing, Diet, Institutionalized elderly, Long-term oral care.

1. Introduction

Dominant influence on the oral health among institutionalized elderly people has social factors and factors of the environment in which they live. Low educational status and conditions of life, unhealthy lifestyle, nutrition rich with carbohydrates, poor knowledge of the importance and techniques for the maintenance of oral hygiene have a significant effect on the oral health of these individuals. The long-term exposure of the negative impact of tobacco use and the consumption of alcohol has an additional impact on the oral health among this population.

Oral health, in terms of quality of life, is conditioned by a number of factors such as: dental caries and its complications, untreated and unextracted dental roots, oral lesions and numerous oral infections, precancerous conditions, benign and malignant tumors, pain in the temporomandibular joint, xerostomy and partial and total toothless. Tooth loss also affects the mastication efficacy, as well on the selection of food and the nutritional status of older people [1].

In general, the elderly are at increased risk of malnutrition due to insufficient food intake (amount) and poor food selection (quality). This situation is aggravated when they are institutionalized. Occurrence of nutritional disorders in institutionalized elderly are ranging from 30% to 80%, with a consequent negative impact on their health [2].

A deficiency of such 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. In contrast, inadequate consumption of calories and lipids can contribute to a higher occurrence of excess weight, a condition also prevalent in this group, as well as cardiovascular diseases, neoplasm and other disorders [3].

The presence of at least twenty teeth, which are functionally capable of chewing and speaking, and which satisfy the aesthetic moment, is definition of optimal oral health. What may be a significant disadvantage of this definition is that the presence of twenty teeth, without certain criteria and quantifiers for their localization, can by themselves be a minimum for satisfactory chewing, while not guaranteeing satisfaction with the patient in relation to aesthetics and phonation. Also, the presence of this minimum tooth in the mouth can sometimes give satisfactory aesthetics and phonation, especially if the remaining teeth are from the frontal region, while the criterion satisfactory mechanical processing of food can be reduced to a minimum [4].

Candida spp. has the ability to attach to components of acrylate and oral epithelial cells. According to Ivanovski et al, [5], this feature is related with the presence of increased intake of carbohydrates in the diet and in conditions of inadequate oral hygiene. If both local predisposing factors for developing candidiasis are present- reduced local defense capabilities of the organism and if salivation is reduced, as it is in the case in the elderly, the possibility of candida infection is much greater.

When the elderly become totally toothless, at the same time several oral activities are disrupted, such as diet, talking and social appearance of the persons. This appearance occurs not only because of the loss of teeth, but also because of the loss of surrounding tissues that provide the support of facial tissues that lie above natural tooth. With the loss of teeth comes the loss of bone tissue, above all because of the processes of resorption of the alveolar bone. In the patient with long-term absence of dental prostheses, chewing can be impaired. Cheewing normalisation is due to the highly developed adaptive abilities of the surrounding oral muscles, lips and tongue. After adequate prosthetic rehabilitation these individuals have initial resistance to wearing prosthetic appliances due to the difficulties in chewing certain types of food. These elderly people need a longer period to normalize their chewing [6].

Although the structural and functional health of the mouth and teeth is an important factor in general health, it also affects the quality of life, especially the ability of individuals to feed, laugh, and communicate. Oral health is reflected on the overall social and psychological life of the elderly [7]. According to McEntee *et al.*, [8], in the case of untreated oral diseases,

especially in older individuals with severe disabilities, serious discomfort and significant physiological and psychological problems can occur. This can occur in the case of untreated oral diseases, especially in older individuals who are institutionalized.

It has been suggested that people who suffer from reduced masticatory function may adapt food consistency to their oral status (which may lead to deficient nutrient intake) or on the digestive system to compensate for the lack of oral preparation of food (which may increase the possibility of digestive diseases).

Preventing malnutrition is crucial in this vulnerable group. Malnutrition is associated with: lower activities of daily living, 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 [9, 10]. 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.

Extraction, even on one tooth, leads to difficulty in chewing, and after a certain period of time leads to the movement of teeth, which disrupts the articulation balance.

Taking into consideration the aforementioned facts about oral health, the presence of difficult chewing, as well as the increased health needs and the impaired health of the institutionalized elderly, the purpose of this research was established - to assess the effect of the oral health on diet of institutionalized elderly people. In an elderly population, poor oral status might be a contributing factor to the development of undernutrition and might be associated with less eating pleasure, more subjective eating difficulty and increased mashed food consumption.

2. Materials and Methods

For realization of the established goal, this study was carried out in the period from April to August 2013, in the department "Mother Teresa", which operates within the Gerontology Institute "Thirteen November" - Skopje. The study covered a total number of 73 respondents who are older than 65 years. In this institution for long-term care, most of the institutionalized individuals are functionally dependent individuals, in which chronic diseases are dominating.

During the examination, all persons who are in the terminal phase of the disease, dementia and all individuals with cognitive disorders, patients with a nasogastric probe and patients placed on artificial ventilation

were excluded. Also, all individuals who do not cooperate due to various behavioral disorders, aggression or do not allow them to undergo clinical examination are not counted in the examined group. People who do not understand the Macedonian language were also excluded from the examination.

Subjects involved in the study during the examination were answering questions to identify the risk factors that are responsible for the effects of the chewing in the diet of the examined subjects. A clinical examination was conducted in order to objectively notice the changes of the oral health.

Prior to the interview was conducted, appropriate adaptation of the vocabulary to the required level was made. By using the appropriate terminology the details regarding the examination and the purposes of this research were explained. The interviews were performed after the received written agreement for participation of the patient in the examination. Interviews were performed in the rooms of the patients, in a room designated for it or in the office, always respecting the basic postulates for maintaining the privacy and dignity of the patient.

Before conducting the clinical examination, in order to obtain a complete picture of oral health in the institutionalized persons accommodated in this institution, an interview was conducted with the examined subjects.

From the interview, these data were obtained:

1. Demographic characteristics of the examined population.
 - 1.1. Sex.
 - 1.2. Age.
2. General health of the examined population.
 - 2.1. Duration of institutionalization.
 - 2.2. The main reason for institutionalization.
 - 2.3. List of dominant general diseases.

In cases where there was an inability to obtain relevant data from the patient by themselves, data were obtained in cooperation with the doctors or other persons responsible for them, after a study of the medical histories and medical notes of the treated patients.

In order to make an objective assessment of the state of the oral health of the institutionalized elderly, an oral examination has been performed covering several segments - visual detection of the number of remaining teeth and residual roots. The dental clinical examination was performed at the facility, in the office or in the rooms of the institutionalized elderly persons or in a room designated for that purpose. The examination of the subjects was performed on a patient sitting on a chair, lying in bed or sitting in wheelchairs. During the examination, a dental probe and dental mirror for single use and disposable gloves were used, and a portable illumination lamp for adequate illumination was used.

After the inspection, the used instruments and medical disposable gloves were stored in appropriate places for storing medical waste. The data obtained from the anamnesis and the clinical examination after they were collected, were appropriately statistically processed.

Statistical processing will be done with special software for statistical data processing - Statistic 7.1. For descriptive statistics in the data analysis following statistical methods were applied:

1. With series of numerical characters were determined \pm Stand.dev., \pm 95.00% CI, the minimum and maximum value of the analyzed parameters,

2. With series with attributive percentages of the structure were determined; In the series with attributive characters, the intersection of certain analyzed parameters and the testing of the significance of the differences was made using the Crosstabulation Tables (χ^2).

3. Results and Discussion

3.1 Results

The average age of participants in the survey was 73.79 ± 6.92 years (range 65 - 93 years with confidence interval from 73.18 to 75.41 years) (Figure 1). The average age of male respondents was 74.14 ± 6.76 years, while for women was 73.58 ± 7.08 years.

Female respondents in the experimental group were more numerous compared to those of males (61.64% vs. 38.36%) (Figure 2).

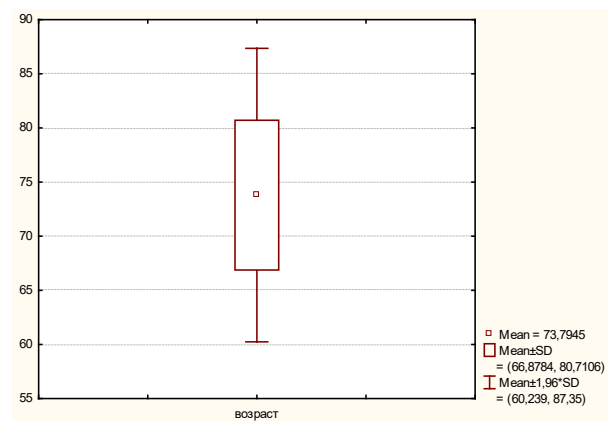


Figure 1. Mean age of the study population

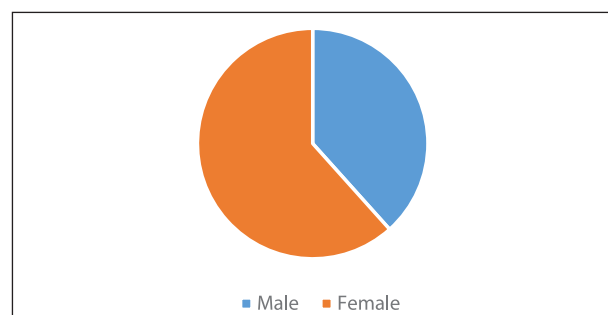


Figure 2. Gender distribution of the test population

After processing gained data, it was found that the average time spent in the long-term care institution of the examined elderly is 5 years and seven months (5.64 ± 6.92 years, range 0.06 - 24 years with confidence interval from 4.19 to 7.10 years).

Institutionalizing the elderly may be advisable and in some cases even necessary. The first-ranked and probably the most common reason for institutionalizing the elderly and found in half of the respondents is the inability of the family members to take care of the elderly, especially if the elderly are immobile or cognitive and mentally incapacitated (52.05%). Other reasons for the institutionalization of the elderly persons discovered in the survey are: inadequate material situation (12.33%), unsolved housing issue (16.44%) and the domestic violence against the elderly (2.74%). As a very important reason for the institutionalization of the elderly, is the social service, which due to the need for their social protection, takes care of the vulnerable groups of elderly people in the respective institutions (in 13.69% of the respondents). The elderly are very rarely institutionalized on their own request (only in 2.74% of the respondents).

The proper chewing function is of great importance because it affects digestion and quality of life. After processing the data indicating the subjective perception of patients for the effect of chewing, it is observed that approximately half of the subjects have subjective filling that their own chewing satisfies those who think they do not possess a satisfactory chewing effect (45.2 - 54.8%) (Figure 3).

After processing data on the representation of prosthetic devices, it was found that less than half of the examinees wear prosthetic devices (42.7%). In the majority of cases, prosthetic wears (64.5%) complained about subjective difficulties associated with wearing prostheses (Figure 4).

The causes of discomfort when wearing prosthetic devices include: moving or slipping of prosthetic devices (40.63%), inability to chew on certain types of food (25%), the appearance of painful conditions in the oral cavity (15.62%), difficulty in speaking (9.38%), inability to put the prosthetic devices in the mouth (6.25%), as well as tooth deficit in the prosthetic devices (3.12%) (Table 1).

The average number of present (remaining) teeth in among whole population is 5.81 ± 7.34 (range from 0 - 24, with a confidence interval from 4.09 to 5.52).

Average number of teeth in male subjects is greater and average number is 9.07 ± 7.34 (range from 0 - 24, with Confidence interval from 6.01 to 12.13), while average number of teeth among female subject is 3.78 ± 7.89 (range 0 - 23, with Confidence interval from 1.90 to 5.65). Statistical data processing revealed that the number of teeth in the male sex is significantly higher in relation to the number of remaining teeth in female subjects (for $p < 0.001$). The average number of present

teeth among the subjects who possess at least one natural tooth is 11.16 ± 6.6 . The percentage of elderly people with 20 or more teeth (satisfying the criterion of optimal oral health) is 4.11%. Total toothless is seen in 47.95% of the institutionalized elderly (Figure 5).

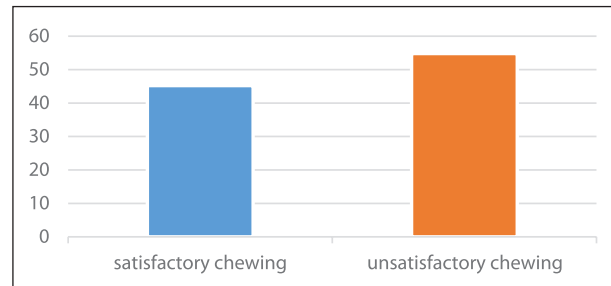


Figure 3. Subjective assessment of the chewing effectiveness among institutionalized elderly

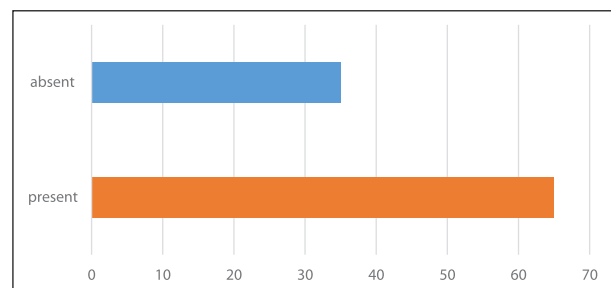


Figure 4. Presence of subjective difficulties by wearing prosthetic devices

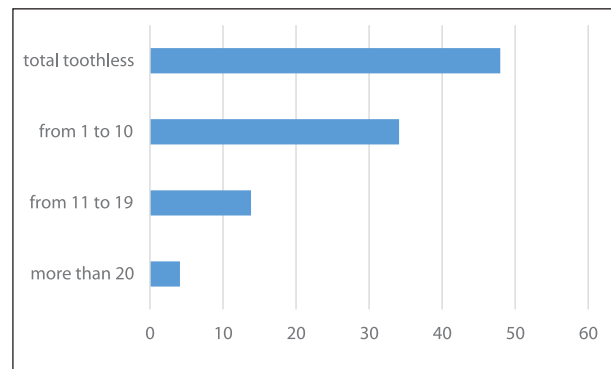


Figure 5. Number of remaining teeth among institutionalized elderly

Table 1. Subjective assessment of the presence of difficulties associated with the wearing of prosthetic devices among institutionalized elderly

Characteristic of issues	Number	Percentage
<i>Moving or slipping of prosthetic devices</i>	13	40.63
<i>Inability to chew on certain types of food</i>	8	25
<i>Occurrence of painful conditions in the oral cavity caused by wearing prosthetic devices</i>	5	16.2
<i>Difficulties in speaking</i>	3	9.38
<i>Difficulty in placing prosthetic devices</i>	2	6.25
<i>Absence of artificial tooth</i>	1	3.12

The number of retained tooth roots that accumulate food and bacteria and represent a real infectious focus and compromised general and oral health of institutionalized elderly people is quite high. For the entire examined population, average number of retained tooth roots is 0.69 ± 1.66 per subject.

3.2 Discussion

Chewing effect, and the masticatory forces created during the chewing process depends to a large extent on whether it is natural teeth or prosthetic devices. The chewing effect of artificial devices depends on neuro-muscle control and muscle strength [11]. In natural dentition chewing depends predominantly on the number of teeth and the preservation of the occlusal surface. Hence the loss of teeth prevents mastication and hence affects the very mood of the elderly, where the number of natural teeth is the lowest [12].

The xerostomy in the old institutionalized persons is associated with the appearance of a burning mouth syndrome, problems associated with speech, chewing and swallowing. Also, some drugs (especially the psychotropic ones most commonly used) have a negative effect on the oral cavity of the subjects, especially causing xerostomia (60.27% of patients complain of xerostomy), which in turn increases the risk of oral diseases: increased risk of cavities, periodontal disease, and oral infections (such as glossitis, stomatitis and *Candida albicans* infections), fissures at the corners of the lips, difficulty in chewing, swallowing, and talking [13,14].

Chewing problems are common in institutionalized individuals, and it has been found that this condition is characteristic of about half of the respondents, not only in this research, but also in the studies of Kossioni and Karkazis, [15], Marin-Zaluaga *et al.*, [16], Gift *et al.*, [17], and Ekeleund [18]. Baran and Nalcaci, [19], published a lower prevalence of chewing problems among institutionalized elderly people, unlike Lo *et al.*, [20], who presented lower representation of such issues.

Increased number of persons who are in their seventies and eighties is related to a loss of teeth and using prosthetic devices [21]. The number of remaining teeth not only has the effect of mastication, but also influence on the diet and affects the aesthetics and phonation of the elderly.

The average number of residual teeth in institutionalized elderly people presented by Morales-Suarez-Varela *et al.*, [22], was 17.1, according Eustaquio-Raga *et al.*, [23] was 14.29, according Samson *et al.*, [24], and Arpin *et al.*, [25], was 12.91, which is greater than the average number of remaining teeth determined in our research (5.81 ± 7.34). In this number area were the results published by Marin-Zaluaga *et al.*, [6], where the number of remaining teeth was 8.2, was similar to that of Petelin *et al.*, [26], where the number of present teeth was 6.76

± 7.47 . Also, minor number of residual teeth among institutionalized elderly people is presented in a study by Piuvezam and de Lima, [27], from Brazil where the average number of residual teeth among institutionalized elderly people is set at 4 ± 6.6 .

Al-Habouri *et al.*, [28], found in the studies that the number of remaining teeth in elderly people with an independent life is 21.4 ± 6.2 , which is greater than the number of remaining teeth obtained in our and previous studies [29, 30]. Locker, [31], in one study found that two-thirds of the institutionalized elderly examiners own at least 16 teeth. In our research, the number of people who own at least 16 natural teeth is about one third.

Residual roots in the oral cavity represent places where dental plaque accumulation, a potential cause of halitosis, and a bacterial penetration into the periapical space occur. The presence of unextracted roots in this study is done only visually and with the help of a probe, i.e. the radiograph is not used as an auxiliary diagnostic method, causing a number of retained dental roots that are covered with soft tissue could not be observed.

The average root number found during this research is 0.69 ± 1.60 coincides with the average number of untreated roots published by Jokstad *et al.*, [32], and Marino *et al.*, [33], and opposed to the study done by Saintrain *et al.*, [34], where a significantly higher number of residual roots has been detected - 6. A smaller number of retained dental roots was observed in Henriksen *et al.*, [35], in Norway and it was 0.11 per subject.

Over 5 percents of dentate persons and over 10 percents of edentulous persons reported impacts such as difficulty in chewing, discomfort during eating and avoidance of foods 'fairly often' or 'very often' during the previous 12 months [36].

4. Conclusions

- This research has shown that the oral status of older people frequently affects the quality of life of older people, and in particular, the ability to eat several common types of foods.

- The small number of remaining natural teeth, the absence of prosthetic devices and the presence of general diseases that can affect oral health greatly affect the choice of food, and hence the diet of this population. Improving oral health can greatly improve the diet of the old institutionalized people.

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