

Open Access Maced J Med Sci electronic publication ahead of print,  
published May 15, 2018 as <https://doi.org/10.3889/oamjms.2018.190>

ID Design Press, Skopje, Republic of Macedonia  
Open Access Macedonian Journal of Medical Sciences.  
<https://doi.org/10.3889/oamjms.2018.190>  
eISSN: 1857-9655  
**Dental Science**



# Prosthodontics Status and Treatment Needs among the Elderly in the Republic of Macedonia

Julijana Nikolovska<sup>1\*</sup>, Vesna Korunoska-Stevkovska<sup>1</sup>, Aneta Mijoska<sup>1</sup>, Lidija Popovska<sup>2</sup>

<sup>1</sup>Department of Prosthodontics, Faculty of Dental Medicine, Ss Cyril and Methodius University of Skopje, Skopje, Republic of Macedonia; <sup>2</sup>Department of Restorative Dentistry and Endodontics, Faculty of Dental Medicine, Ss Cyril and Methodius University of Skopje, Skopje, Republic of Macedonia

## Abstract

**Citation:** Nikolovska J, Korunoska-Stevkovska V, Mijoska A, Popovska L. Prosthodontics Status and Treatment Needs among the Elderly in the Republic of Macedonia. Open Access Maced J Med Sci. <https://doi.org/10.3889/oamjms.2018.190>

**Keywords:** Prosthodontics status; Elderly; Socio-economic factors; Individual factors

**\*Correspondence:** Julijana Nikolovska, Department of Prosthodontics, Faculty of Dental Medicine, Ss Cyril and Methodius University of Skopje, Skopje, Republic of Macedonia. E-mail: [julijananiolovska2@gmail.com](mailto:julijananiolovska2@gmail.com)

**Received:** 21-Feb-2018; **Revised:** 03-Apr-2018; **Accepted:** 05-Apr-2018; **Online first:** 15-May-2018

**Copyright:** © 2018 Julijana Nikolovska, Vesna Korunoska-Stevkovska, Aneta Mijoska, Lidija Popovska. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0)

**Funding:** This research did not receive any financial support

**Competing Interests:** The authors have declared that no competing interests exist

**BACKGROUND:** Oral health care management among the elderly differs from the rest of the population, due to some specific physiological changes and general health status related to age. We know very little about the oral health in elderly in the Republic of Macedonia, because there are only a few articles published about dental health status and edentulism of this population.

**AIM:** The study aimed to evaluate the prosthodontic status of older adults over 65 years in the Republic of Macedonia, about their socio-economic status and individual factors.

**MATERIAL AND METHODS:** A cross-sectional study was conducted in 8 regions, in rural and urban areas of Macedonia and a representative sample of 432 people (age > 65 years) was examined. Statistical analyses of the data were made by chi-square tests and the corresponding C-coefficient.

**RESULTS:** Only 6% of all participants had not any prosthetic appliance, 9.5% had more than one bridge, 28.7% of examinees had partial dentures, both bridge(s) and partial denture(s) had 10.7% participants, and 45.1% of examinees were toothless. There was a significant difference between patients who visited the dentist more than once a year and those who did not ( $\chi^2 = 14.2$ ;  $df = 4$ ,  $p < 0.01$ ). From all of the participants, 40.3% used public dental care organisations.

**CONCLUSIONS:** We found a high prevalence of edentulousness among older adults over 65 years in Macedonia. The study confirmed the necessity for establishing healthcare educational programs for the dental treatment of elderly in Macedonia.

## Introduction

Oral health care management among the elderly differs from the rest of the population due to some physiological and general health status changes related to age [1]. The most frequent oral diseases which affect older adults as dental caries and periodontal diseases could lead to teeth loss which is an important predictor for the oral health-related quality of life [2] [3] [4] [5]. DMFT is the most common index used for registration of dental health status in epidemiological studies, but it could not provide enough information about the functionality of remaining dentition [6]. Many epidemiological studies expressed oral functionality by a number of the

remaining teeth, but it was questioned whether just the number was adequate to describe the functional status of dentition. According to Locker and Slade, the occluding pairs of natural teeth are strongly correlated with oral function [7] [8]. The number of missing teeth is increased with age, and it was recommended for future reports to include, not only the number but the additional information regarding their location, for it is very important to describe the functionality too [6]. The number of "20 natural teeth" is the generally accepted World Health Organization (WHO) operative criterion for a functional natural dentition [9].

In most worldwide countries including the developing, life expectancy is continuously increasing. It is expected that by 2030 almost one billion people will be 65 years and older, accounting for 13 percent

of the total population [10]. Population ageing is a progressive trend in the Republic of Macedonia also. The proportion of elderly at age over 65 years had increased from 11.2% in 2006 to 13.3% in 2016 [11].

There are numerous studies reporting the dental prosthetic status in edentulous elderly population and their need for prosthodontics treatment [12] [13] [14] [15]. Sometimes, there is a discrepancy between the real need for treatment and actual complaints by this group of patients [14] [16]. The need for prosthodontics appliances may be assessed by comparing the need perceived subjectively by a patient (self-perception), with that assessed by an examiner according to the (WHO) diagnostic criteria [14] [17], or through the use of the Geriatric Oral Health Assessment Index (GOHAI) [8] [14].

We have not enough information about the oral health in elderly in the Republic of Macedonia because there are only a few articles published about edentulism of this population. The last national oral health survey was conducted in 2007, but there is not any official data about oral health and prosthodontics status of the population over 65 years. To improve the oral health and quality of life among older adults, besides the prevalence of dental caries, it is necessary to know their prosthodontics status and needs for prosthodontics treatment.

This study aimed to evaluate the prosthodontics status of older adults over 65 years in the Republic of Macedonia about some socio-economic and individual factors.

## Material and Methods

A cross-sectional study was conducted in 8 regions (Skopje, Vardar, Eastern, Northeastern, Southeastern, Southwestern, Pelagonia and Polog region) in rural and urban areas of Macedonia in 2015/16 study year. A representative sample of 432 people (age > 65 years) was examined with a questionnaire, by calibrated postgraduate students following the procedures and diagnostic criteria recommended by the WHO Oral Health Assessment Form [19]. The patients excluded from the study were those without any prosthodontics appliances or those with the presence of dental crowns (without missing tooth). The patients included in the study had dental bridges, dentures, removable partial dentures or both bridges and partial dentures. There were 243 (56.3%) male and 189 (43.7%) female patients participated in the study. The average age was 74 years. According to the main demographic variables (ethnicity, sex, education and marital status), the sample represented the population well (Table 1, Table 2).

**Table 1: Demographic variable – Ethnicity**

Nationality	Frequency	Percent
Macedonians	274	63.7
Albanians	133	30.5
Roma	10	2.3
Others	15	3.5
Total	432	100.0

The participants in the study were asked to self-report their dentistry scaring experience from childhood, education, oral hygiene habits, habits in visiting a dentist, approximate last year expenditures for dental care and type of dental organisation (public/private).

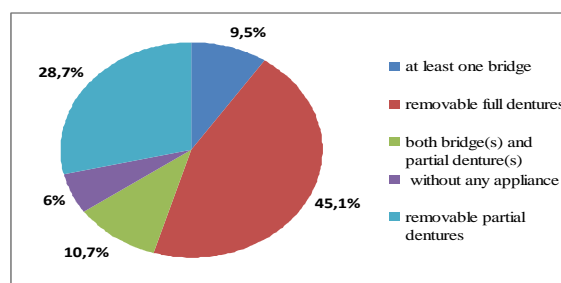
The information we gathered was used to assess the relationship of the variables with the prosthodontics status. The data were analysed using the SPSS 13 statistical package. The analyses were made by chi-square tests and the corresponding C-coefficient.

**Table 2: Demographic variable - Education**

Education	Frequency	Percent
Without elementary education	56	13.0
Elementary education	167	38.7
Secondary education	114	26.3
Higher education	95	22.0
Total	432	100.0

## Results

Twenty-six of all participants (6%) had not any prosthetic appliance in mouth, so they were excluded from the study, forty-one (9.5%) had more than one bridge, 124 of examinees (28.7%) were wearer of partial dentures, both bridge(s) and partial denture(s) had 46 participants (10.7%) and 195 of examinees (45.1%) were without any tooth in the mouth (Figure 1).



*Figure 1: Prosthodontic status*

There was a significant difference between patients who visited a dentist more than once a year and those who did not ( $\chi^2 = 14.2$ ;  $df = 4$ ,  $p < 0.01$ ).

The correlation between the prosthodontic appliance and oral hygiene showed that the patients with removable dentures had poorest hygiene habits, while most patients with both bridge and denture,

brushed regularly, twice a day ( $\chi^2 = 17.53$ ;  $df = 8$ ,  $p < 0.05$ ) (Table 3, Table 4).

**Table 3: Prosthodontics status and Oral Hygiene**

Prosthetics appliance	Brushing teeth/ not every day	Brushing teeth/ once a day	Brushing teeth/ twice a day	Total
Without any appliance	5	9	12	26
At least one bridge	15	15	11	41
Denture	44	52	28	124
Both bridge and partial denture	7	22	17	46
Removable partial dentures	66	90	39	195
Total	137	188	107	432

Last year, 317 (73.4%) of the examinees didn't visit a dentist. There was no correlation between prosthodontic status and scaring experience from childhood dentistry ( $\chi^2 = 9.4$ ;  $df = 4$ ,  $p > 0.05$ ) (Table 5).

**Table 4: Prosthodontics status and dentist visits**

Prosthetics appliance	Once a year or none	More than once a year	Total
Without any appliance	12	14	26
At least one bridge	29	12	41
Removable partial dentures	98	26	124
Both bridge and partial denture	30	16	46
Denture	148	47	195
Total	317	115	432

There was no correlation between the cost of a dental care ( $\chi^2 = 5.6$ ;  $df = 4$ ,  $p > 0.05$ ) (Table 6) and dental organization used ( $\chi^2 = 4.9$ ;  $df = 4$ ,  $p > 0.05$ ). From all participants, 40.3% (174) used public dental care organizations.

**Table 5: Prosthodontics status and frightening experience(s) from childhood dentistry**

Prosthetics appliance	Afraid	Not afraid	Total
Without any appliance	5	21	26
At least one bridge	17	24	41
Removable partial dentures	40	84	124
Both bridge and partial denture	15	31	46
Denture	46	149	195
Total	123	309	432

The proportion of elderly over 65 years with 20 or more natural teeth was 24.1% (104 of examinees).

**Table 6: Prosthodontics status and cost of dental care**

Prosthetics appliance	< 50 euro per year	>50 euro per year	Total
Without any appliance	21	5	26
At least one bridge	30	11	41
Removable partial dentures	101	23	124
Both bridge and partial denture	40	6	46
Denture	175	20	195
Total	367	65	432

## Discussion

The present findings demonstrated a high prevalence of edentulousness (45.1%), removable partial dentures wearer were 27.7%, and only 6% of the patients were without any prosthetics appliance. The data about edentulous in patients over 65 years

in Macedonia is almost same with Belgium old population, 45% (2007). Belgium is the country with the highest percent of edentulousness among the population over 65 years old in EU countries, and Malta has lowest 8% (2002) [20].

Differences in the prosthodontics status were associated with gender, educational background, dental attendance patterns, tooth brushing frequency, scaring experience from childhood dentistry, cost of a dental care and care organisation used. These were objective findings which could not be about the subjective patients' needs or complains.

Mac Entee et al. reported that about two-thirds of the elderly population has poor oral health, but that only about one-third complained of a problem. In their investigation, about half (54%) of the sample identified a problem, and 83% of the subjects were either using a denture with a major fault or were missing a denture [16].

The professional criteria based on WHO guidelines also differed from the self-perceived need. The analysis is given by Colussi et al. showed that the variables age, gender, residential area and form of service, most significantly associated with a better self-perception of oral health [17]. The number of "20 natural teeth" is the generally accepted WHO operative criterion for a functional natural dentition [9] which is very important for the masticatory efficiency. Akifusa et al. revealed that 85-year-old participants with  $>$  or  $=$  20 teeth had better subjective physical health than those with  $<$  or  $=$  19 teeth [21]. In a systematic review conducted by Zhang et al., it was reported that an average of 20 teeth was present at the age of 65 among the Chinese population [22]. The number of remaining teeth in the elderly in Japan tends to increase year by year, and an average of 14 teeth remained in the mouth even by the age of 80 [23]. The Findings in our study showed that there was a high prevalence of elderly with less than 20 teeth (75.9%) in Macedonian population, which might lead to weaker masticatory efficiency, malnutrition and other health issues.

Most of the samples examined in this study brushed their teeth once a day, but 137 (31.7%) of the examinees revealed that they did not brush their teeth or dentures every day. Kulak-Ozkan et al. have found a statistically significant relationship between denture stomatitis, yeasts' presence and denture cleanliness in their study [24]. Sometimes teeth brushing may be in a relationship with the limitation of manual dexterity resulting from arthritis and/or stroke and special oral hygiene measures might be required for the elderly [25].

Regarding the visits to dentists, most of the examined elderly in our study revealed that they visited a dentist less than once a year (73.4%). The most common major barriers which were identified included poor general health, cost and the physical aspect of being unable to travel to a dentist. These barriers are

also most common for elderly worldwide [26]. Improving access to dental health care involves actions at individual, societal and system levels [27]. People's perception of dentists is influenced by some factors that depend on the professional, mass media and the overall health system [28]. Around 71.5% of the examined samples in our study revealed that they are not afraid of the dentist.

Dental health expenditures could be a problem for the elderly in Macedonia to visit a dentist. 85% of the patients involved in our study spent less than 50 euro per year on the dentist, and most of them were in private dental practices (69.7%). Edentulous is highly associated with socioeconomic status. Poor oral health among older adults is an important public health issue and a growing burden to countries worldwide [29]. Among elderly world population, 20-80% is edentulous, and 60-80% has immediate dental needs [30]. It is necessary to improve elders' quality of life, by minimising the risk factors and ameliorating the protective factors [31]. According to the samples that had been chosen for our study (patient's wearers of the prosthodontics devices) the treatment needs were covered with the prosthodontics status.

In conclusion, after statistical analysis of the data from our study, it can be concluded that there is a high prevalence of edentulousness in older adults (over 65 years) in Macedonia. Unfortunately, analyses showed that this population has no habit to visit a dentist regularly, but only when the dental problem appears. The anticipated connection between frequency of visiting a dentist and the prosthodontic status was also confirmed, as well as between this status and the oral hygiene habits.

This study also confirmed the necessity of establishing dental care educational programs in Macedonia which has already been done through involving the new programs and subjects at the Faculties of Dental medicine (Gerontostomatology) for doctors and oral hygienist too. Education and continuous training of dental staff towards special needs of the elderly patients should provide those particular skills and knowledge of medical, psychological and social aspects of this particular age group.

## References

- Nikolovska J, Gjorgievska E, Grcev A. A preliminary study of the oral health status of the geriatric patients in the Republic of Macedonia. *Macedonian Dental Review*. 2010; 34(1-2):49-55.
- Nikolovska J, Mindova S, Dirjanska K, Aleksova P, Kostadinova M, Bojkovska S. Prosthodontics status and treatment need among elderly living in public institution. *Macedonian Dental Review*. 2010; 35(1-2):36-42.
- Nikolovska J, Petrovski D. Oral Health-Related Quality of Life (OHRQoL) Before and After Prosthodontic Treatment with Full Removable Dentures. *Balk J Stom*. 2012; 16:169-172.
- Nikolovska J, Kenig N. Oral Health Related Quality of Life (OHRQoL) in Patients Wearing Fixed Prosthodontic Dentures. *Coll Antropol*. 2014; 38(3): 987- 992. PMID:25420384
- Gerritsen AE, Allen PF, Witter DJ, Bronkhorst EM, Creugers NHJ. Tooth loss and oral health-related quality of life: a systematic review and metaanalysis. *Health and Quality of Life Outcomes*. 2010; 8:126. <https://doi.org/10.1186/1477-7525-8-126> PMID:21050499 PMCID:PMC2992503
- Zhang Q, Witter DJ, Bronkhorst EM, Creugers NH. Dental and prosthodontic status of an over 40 year-old population in Shandong Province, China. *BMC Public Health*. 2011; 11(1):420. <https://doi.org/10.1186/1471-2458-11-420> PMID:21631917 PMCID:PMC3129312
- Zhang Q, Witter DJ, Bronkhorst EM, Jia M, Creugers NH. Dental functional status with and without tooth replacement in a Chinese adult population. *Clinical oral investigations*. 2012; 16(4):1251-9. <https://doi.org/10.1007/s00784-011-0616-x> PMID:21960301 PMCID:PMC3400026
- Locker D, Slade G. Association between clinical and subjective indices of oral health status in an older adult population. *Gerodontology*. 1994; 11:108-114. <https://doi.org/10.1111/j.1741-2358.1994.tb00116.x> PMID:7750964
- World Health Organization. Recent advances in oral health. Report of a WHO Expert Committee. *World Health Organ Tech Rep Ser*. 1992; 826:16-17.
- National Institute on Aging/National Institutes of Health/U.S. Department of Health and Human Services. Rising numbers of the oldest old. In: *Why Population Aging Matters: A Global Perspective* (10-15). Bethesda, MD: NIA/NIH, 2007.
- Macedonia in figures. Statistical Office of the Republic of Macedonia, 2017.
- Peeran SA, Al Sanabani F, Al-Makramani BM, Elamin EI. Dental prosthetic status and treatment needs of adult population in Jizan, Saudi Arabia: A survey report. *Eur J Dent*. 2016; 10(4):459-463. <https://doi.org/10.4103/1305-7456.195173> PMID:28042258 PMCID:PMC5166299
- Shigli K, Hebbal M, Angadi GS. Prosthetic status and treatment needs among patients attending the prosthodontics department in a dental institute in India. *Eur J Prosthodont Restor Dent*. 2009; 17(2):85-9. PMID:19645310
- Moldoveanu L, Dima C, Vasile M. A Pilot Study of the Assessment of Fixed and Removable Oral Prosthetic Needs of Over 55-Year-Olds who attended the Social Centre for Dentistry in Constanta, Romania. *Oral Health and Dental Management in the Black Sea Countries*. 2010; 9(4):199-206.
- Damyantov N, Witter D, Bronkhorst E, Creugers N. Dental Status and Associated Factors in a Dentate Adult Population in Bulgaria: A Cross-Sectional Survey. *International Journal of Dentistry*. 2012; (11) 578- 401.
- MacEntee MI, Mojon P. Discrepancy between need for prosthodontic treatment and complaints in an elderly edentulous population. *Community Dentistry and Oral Epidemiology* 1992; 20: 48-52. <https://doi.org/10.1111/j.1600-0528.1992.tb00673.x>
- Colussi CF, De Freitas SF, Calvo MC. The prosthetic need WHO index: a comparison between self-perception and professional assessment in an elderly population. *Gerodontology*. 2009; 26(3):187-92. <https://doi.org/10.1111/j.1741-2358.2008.00271.x> PMID:19040428
- Murariu A, Hanganu C, Bobu L. Evaluation of the reliability of the Geriatric Oral Health Assessment Index (GOHAI) in institutionalized elderly in Romania. *Oral Health and Dental Management in the Black Sea Countries*. 2010; 9: 11-15.
- World Health Organization. *Oral health surveys: basic methods*, 4th edn. World Health Organization, Geneva, 1997.
- Kravitz A et al. *Manual of Dental Practice*. Council of European

Dentists, 2015.

21. Akifusa S, Soh I, Ansai T, Hamasaki T, Takata Y, Yohida A, Fukuhara M, Sonoki K, Takehara T. Relationship of number of remaining teeth to health-related quality of life in community-dwelling elderly. *Gerodontology*. 2005; 22(2):91-7. <https://doi.org/10.1111/j.1741-2358.2005.00059.x> PMID:15934350
22. Zhang Q, Kreulen CM, Witter DJ, Creugers NHJ. Oral health status and prosthodontic conditions of Chinese adults: a systematic review. *Int J Prosthodont*. 2007; 20:567–572. PMID:18069362
23. Kambara M, Kawasaki K. Oral health and aging. Oral disease, tooth number, oral tissue and dietary habit, and aging. The current evidence of dental care and oral health for achieving healthy longevity in an aging society. Japan Dental Association, 2015.
24. Kulak-Ozkan Y, Kazazoglu E, Arikan A. Oral hygiene habits, denture cleanliness, presence of yeasts and stomatitis in elderly people. *Journal of Oral Rehabilitation*. 2002; 29(3):300–304. <https://doi.org/10.1046/j.1365-2842.2002.00816.x> PMID:11896849
25. Yeh C, Katz M, Saunders M. Geriatric Dentistry: Integral Component to Geriatric Patient Care. *Taiwan Geriatrics & Gerontology*. 2008; 3(3):182-192.
26. Derblom C, Hagman-Gustafsson M, Gabre P. Older people's description of factors that facilitate and impede regular dental care - a qualitative interview study. *International Journal of Dental Hygiene* 2017; 15(4):313-320. <https://doi.org/10.1111/idh.12263> PMID:27868346
27. Borreani E, Wright D, Scambler S, Gallagher J. Minimising barriers to dental care in older people. *BMC Oral Health*. 2008; 8: 7. <https://doi.org/10.1186/1472-6831-8-7> PMID:18366785 PMCid:PMC2335092
28. Tejo H, Belén R, Velásquez C, Andrés R. Patients' perceptions about dentists: A literature review. *Odontostomatología*. 2016; 18(27): 15-22.
29. Petersen P. The World Oral Health Report 2003: continuous improvement of oral health in the 21st century the approach of the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol*. 2003; (31):3-24. <https://doi.org/10.1046/j.2003.com122.x> PMID:15015736
30. Barysenka L. Oral health of the elderly people living under different conditions. *OHDMBSC*. 2006; 5(2): 16-20.
31. Ursache M, Grădinaru I, Dascălu C. Aspects of oral health evaluation in elderly. *OHDMBSC*. 2006; 5 (2):8-15.