Dynamics of dental morbidity in Armenian adults: A national examination survey during 2003-2018

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Original Article

Abstract

BACKGROUND AND AIM: Many researchers have stated that the quality of dental care, its accessibility, and insufficient provision of the preventive measures are worsening. The present study was conducted to analyze the epidemiological situation of the dental morbidity in the adult population of Armenia in order to improve the therapeutic and preventive measures.

METHODS: Analyses of 1493 World Health Organization (WHO) maps in the key adult age groups evaluated the intensity severity and prevalence of dental caries (682 in Yerevan, Armenia, and 811 in the regions). The condition of periodontal tissues was determined by the Community Periodontal Index (CPI). The state of oral hygiene was assessed by the Simplified Oral Hygiene Index (OHI-S). The data were analyzed in the Statistica software for Excel (version 6.0), using Kruskal-Wallis test, Pearson's chi-square test, and t-test. Statistical significant level was considered at P < 0.05.

RESULTS: The prevalence of caries among the adults and older people was within 100% both in Yerevan and its regions. The indicator of the decayed, missing, and filled teeth (DMFT) at the age of 35-44 years in Yerevan was 11.90 and in its regions was 11.02, while the component of "missing teeth" in Yerevan and its regions was 45.9% and 55.1%, respectively. The average severity index at the age of 65 years and older increased to 27.7. In adulthood, the signs of destructive processes in the periodontium were expressed, and the periodontal pockets of different depths were observed. In the elderly, the prevalence and severity of destructive changes progressed, and there were no significant differences compared in the baseline data.

CONCLUSION: According to the results of the present study, older people are at a relatively higher risk of developing oral diseases; therefore, this population group should be involved in preventive measures with an age consideration.

KEYWORDS: Oral Hygiene Index; Dental Caries; Prevalence; Periodontal Index; Dental Care

I n recent years, there has been an increase in the population's need for dental treatment, a reduction in the number of sanitized teeth, and an increase in the number of complications and removing permanent teeth. At the same time, many researchers have stated that the quality of dental care, its accessibility, and insufficient provision of the preventive measures are worsening, primarily due to the growth in the volume of medical care, which requires the finding of new reserves to raise its effectiveness.[1-3]

Recent national epidemiological studies have indicated a high prevalence of these diseases in young people in different regions of the world and a further increase in their severity in older age groups.[4-8] These results can be very useful for evaluating the effectiveness of stomatological preventive programs.

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Information obtained during epidemiological studies makes it possible to estimate the prevalence and severity of major dental diseases in each territorial region. For selecting an evidence-based prophylaxis method, a situational analysis is necessary, which enables identification of the risk factors for development of oral diseases.

Studies have shown that in a number of individuals, there were markedly high severity levels of caries characterized by a very high degree, according to the World Health Organization (WHO) data.[9-12]

However, there are no similar studies concerning the effectiveness and optimization of the stomatological prevention program and there is no corresponding scientific research in the Republic of Armenia on the importance of socio-hygienic risk factors of behavioral nature, especially regarding the role of knowledge, medical activity, and the lifestyle of people in maintaining the dental health.[13-15] There was a gap in the indicators of the dental health level in the population living in large cities and small urban and rural areas of the Republic of Armenia as a result of the accumulation of dental institutions and offices in the main cities.

In recent years, a few scientific research has been conducted on the monitoring of dental diseases in the Republic of Armenia.[16] At the same time, the creation of database is a unique opportunity for assessing the dental morbidity and the need for various types of dental care, including preventive care and constant monitoring of such data.

Therefore, the present study was conducted to analyze the epidemiological situation of the dental morbidity in the adult population of the Republic of Armenia in order to improve the therapeutic and preventive measures.

Methods

In this study, 1493 maps provided by the WHO (1997) of 10 Armenia regions (811) and 12 administrative districts of the capital (682)

in key adult age groups (35-44, 65 years and older, Table 1) were analyzed. In the pathfinder sampling method, the number of subjects to be examined in each key age group ranged from a minimum of 25 to 50 for each sampling site.[17] The study protocols were approved by the Ethics Committee of Yerevan State Medical University, Yerevan, Armenia (ethical code: 1-92013). The exclusion criterion was refusal to participate in the study, regardless of the reason. Participation in this study was voluntary, and the participants signed the informed consent.

Table 1. Distribution of the examined people by age and place of residence

Age (year)	Yerevan	Regions	Total
35-44	318	424	742
65 and more	364	387	751
Total	682	811	1493

The severity [as per the decayed, missing, and filled teeth (DMFT) index] and the prevalence of dental caries were evaluated. The tooth decay severity was evaluated based on the criteria presented by the WHO for each age group.[17]

The condition of periodontal tissues was determined by the Community Periodontal Index (CPI) with three indices of the periodontal status including bleeding gums, tartar, and periodontal pockets, which were determined in 6 sextants. Interpretation of the index was based on the worst variant of the inflammatory process course.

The index evaluation codes were as follows:
0- No signs of defeat
1- Gum bleeding, spontaneous or after probing, visible when using a dental mirror
2- Calculus detected during probing
3- Pocket depth of 4-5 mm
4- Pocket depth of 6 mm and more
X- Excluded sextant (if there are less than 2 teeth in the sextant)
9- Not recorded

Oral hygiene state was assessed by the Greene-Vermillion Simplified Oral Hygiene Index (OHI-S).[17] The index allowed to separately assess the amount of plaque and

calculi to determine the index, the vestibular surfaces of the teeth 16, 11, 26, 31, and the lingual surfaces of the teeth 36 and 46, using only plaque index.

Codes and evaluation criteria for plaque were as follows:

0- Dental plaque is not detected

1- Soft plaque covering not more than 1/3 of the tooth surface, or the presence of any number of colored sediment

2- Soft plaque covering more than 1/3 but less than 2/3 of the tooth surface

3- Soft plaque covering more than 2/3 of the tooth surface

Accordingly, the oral hygiene levels were classified as:

Good level of oral hygiene: -0.1-0.6

Satisfactory level of oral hygiene: -0.7-1.8

Bad level of oral hygiene: -1.9-3.0[17]

Methodology of statistical processing: The data were analyzed in the Statistica software for Excel (version 6.0). Calculated medium indicators (M), standard deviation (σ), and Kruskal-Wallis test were used to check the normal distribution of the data. Independent sample student's t-test was used to measure differences between the age groups in Yerevan and the regions. To determine the differences between the qualitative indicators in this sociological study, the Pearson's chi-square test was used. Statistical significance level was considered at P < 0.05 (95% significance level).

Results

The overwhelming majority of the population (64.3%) were living in urban areas. Of the total number of people who participated in the study, 43.1% were men and 56.9% were women. The women's share was 25.8% in Yerevan and 31.0% in its regions, while the men's share was 23.6% in Yerevan and 19.5% in its regions.

Of the 761 examined people aged 65 years and over, 327 (43%) people were living in the specialized nursing homes. 95 people (12.5%) were working pensioners, of whom 40 (42.1%) people were workers, 33 (34.7%) were

office workers, and 22 (23.2%) were agricultural workers (χ^2 = 78.006, P < 0.001).

Analysis of the results of the study during 2003 to 2018 revealed an increase in the prevalence of diseases of the mucous membrane; in the age groups of 35 to 44 years, the increase was by 11.4 times, and in the elderly, it was by 3.7 times. Most often in people aged 35-44 years, various forms of cheilitis (meteorological, actinic, and atopic), aphthous stomatitis, cracks, desquamative glossitis, allergic lesions, and herpetic stomatitis on the lips or in the corners of the mouth were found. In the people aged 65 years and older, mainly traumatic, allergic, and candidomycotic stomatitis were identified, which can be increased due to improper manufacturing of dental prostheses.

The increase of non-carious lesions in the adult population in the form of a wedge-shaped defect was by 3%. A decrease in the frequency of detection of non-carious lesions with age does not mean an improvement in the dental status, but is explained by an increase in the number of missing teeth with ageing.

Among the adults, the prevalence of caries was 100% in both Yerevan and its regions. The DMFT in people aged 35-44 years in Yerevan and its regions was 11.90 and 11.02, respectively, which corresponded to the average level of the WHO classification. In this age group, in the severity index structure, the component of "missing teeth" was reported to be 55.1% and 45.9% in Yerevan and its regions, respectively.

In elderly people, the prevalence of caries was 100% in both Yerevan and its regions; and the average caries severity index increased to 27.7. In the structure of the index, the removing teeth were prevalent; in Yerevan and its regions, on average, 26 and 23 teeth were removed, respectively, and the total lack of teeth in this age group was reported to be 40% (Table 2).

As shown in table 2, the severity of DMFT and the average number of the extracted teeth were increased.

Table 2. The average prevalence and severity of caries of permanent teeth among the general population in the Armenia

Region	Prevalence (%)	Severity			
		Caries	Filling	Missing	DMFT (mean ± SD)
35-44 years old					
Regions	99.50	5.05	0.91	5.06	11.02 ± 5.79
Yerevan	100	3.04	3.45	6.53	11.85 ± 5.48
Confidence factor	-	P < 0.001	P < 0.001	P > 0.100	P < 0.050
65 years and older					
Regions	100	2.50	0.10	23.40	26.00 ± 8.10
Yerevan	100	1.70	0.10	25.90	27.70 ± 5.60
Confidence factor	-	P < 0.010	P > 0.100	P < 0.001	P < 0.001

DMFT: Decayed, missing, and filled teeth; SD: Standard deviation

In elderly people aged 65 years and older, the average prevalence of dental caries over a 15-year period did not change significantly and was 100%. The results of the dental studies of hard tissues of teeth showed a high level of caries severity. The average DMFT index was 24.8 ± 4.4; the "M" component (extracted teeth) in the structure of the DMFT index was about 88%. The analysis of the main indicators of dental morbidity in the urban and rural populations did not reveal significant differences; regardless of the residence place, the extracted teeth which prevailed in the structure of the DMFT index were reported on average 21-22 extracted teeth per person.

Among the teeth affected by caries, root caries showed a tendency to increase with age. As a result of atrophy of the gingival papillae and the gingival margin, the teeth roots were exposed; the examined patients complained of increased sensitivity of the necks of the teeth and the aesthetic discomfort. It should also be noted that the elderly and senile patients often complained

of increased tooth sensitivity which progressed with age due to pathological abrasion of teeth and dryness of mouth.

When examining adults and elderly people, all signs of pathological changes to periodontal tissue were identified. The prevalence of periodontal diseases among the adult population was increasing.

In adulthood (35-44 years), signs of destructive processes in the periodontium were already expressed, and periodontal pockets of different depths were observed. In the elderly, the prevalence and severity of destructive changes progressed; there were no significant differences compared to the baseline data (Tables 3 and 4).

Oral hygiene indicators were determined in the form of dental plaque, and in all regions, high values of the OHI-S ranging from 2.4 ± 0.9 to 2.8 ± 0.6 were recorded, which indicate an unsatisfactory (poor) level of oral hygiene. In Yerevan, the average OHI-S was also related to the poor level of hygiene; however, it was close to the lower limit of 2.0 ± 0.7.

Table 3. Prevalence of the symptoms of periodontal lesions among the adult population of Armenia

Region	Healthy	Bloody	Tartar	Pocket (4-5 mm)	Pocket (6 mm and more)	Excluded sextants
35-44 years old						
Regions	6.0	9.0	39.9	14.4	2.4	28.3
Yerevan	2.8	7.9	45.9	12.9	0.3	30.2
Confidence factor	P < 0.010	P < 0.050	P < 0.010	P < 0.001	P < 0.050	P < 0.010
65 years and older						
Regions	1.3	0.5	11.6	11.9	5.2	69.5
Yerevan	0.2	0.8	11.2	28.0	5.7	53.8
Confidence factor	P < 0.050	P < 0.050	P < 0.001	P < 0.001	P < 0.050	P < 0.050

Data are reported as percent

Table 4. Severity of periodontal lesions among the adult population of Armenia

Region	Healthy	Bloody	Tartar	Pocket (4-5 mm)	Pocket (6 mm and more)	Excluded sextants
35-44 years old						
Regions	0.87 ± 1.80	0.91 ± 1.80	2.83 ± 2.50	0.72 ± 1.60	0.12 ± 0.70	0.55 ± 1.10
Yerevan	0.76 ± 1.60	1.89 ± 2.30	2.22 ± 1.90	0.36 ± 0.90	0.02 ± 0.03	0.74 ± 0.20
	-	P < 0.001	P < 0.001	P < 0.001	P < 0.010	P < 0.050
65 years and older						
Regions	0.11 ± 0.70	0.12 ± 0.66	0.82 ± 1.64	0.42 ± 1.10	0.13 ± 0.60	4.40 ± 2.20
Yerevan	0.03 ± 0.20	0.04 ± 0.40	0.48 ± 1.10	0.58 ± 1.10	0.08 ± 0.40	4.79 ± 1.70
	P < 0.050	P < 0.050	P < 0.001	P < 0.050	P > 0.100	P < 0.010

Data are reported as mean ± standard deviation (SD)

An important role in the maintenance of stomatological health is provided by the personal responsibility of the individual, especially providing oral cavity care. The number of toothless people among the elderly was 40% of the examined patients, while according to the WHO report, the number of toothless people should not exceed 1%.

Discussion

The index of severity of dental caries increases along with age in the age group of 35-44 years. Comparing the current prevalence and severity of dental caries with the results of studies that were conducted 15 years ago, the researchers found that the number of people with healthy teeth in the Republic of Armenia, unfortunately, did not increase, and there was a steady growth in the prevalence of dental caries.

A component of the DMFT index was different for the population living in Yerevan and the regions of Republic of Armenia. The extracted teeth indicator was 4.75% lower in the city residents, and the filling indicator in the residents of Yerevan was 3.9 times higher than that in residents of the regions. This indicates that the residents of the regions, in contrast to the residents of Yerevan, often do not treat their teeth, but remove them. It is presumably related to the lack of required accessibility of stomatological care in the regions, which in turn, is a result of deficiency of dentists there. At the same time, the number of dentists in the city is significantly more than that in the regions, making up 69.3% acceding the data of 2017 in Armenia.[18]

Due to the condition of periodontal tissues, CPI was reported unsatisfactory for the majority of the population in Armenia, regardless of the age and place of residence. The situation worsened significantly by the age of 35-44 years and older, when almost all the examined patients had severe periodontal lesions, especially tartar and periodontal pockets of different depth. This condition can be the result of the exposure of the periodontal tissues to unfavorable factors throughout life, as well as the age-related manifestations of periodontal diseases. Beyond this, many complications related to the periodontal diseases occur more frequently and in more severe conditions in the middle-aged people cohort. More than half of the sextants (4.595) were excluded amongst the oldest study group. In the examination of the elderly people, it was not often possible to register the periodontal diseases because of the absence of the most teeth.

At the age of 65 years and older, periodontal diseases are becoming the cause of tooth loss, resulting in various changes in the temporomandibular joints (TMJ), chewing disorders, and speech problems. Unfortunately, more than half of the examined people at the age of 65 years and more had deep periodontal pockets (up to 29%). When examining the elderly, the researchers could not register periodontal diseases due to the absence of the most teeth.

The hygienic condition of the oral cavity of the examined aged and elderly people was mainly assessed to be unsatisfactory.

The values of the OHI-S were not significant in all the regions of the Republic of Armenia in the age group of 65 years due

to the complete absence of teeth and high levels of contamination of prosthetic structures used in this study. It is noteworthy that the absence of teeth did not serve as a limitation in the study process.

Conclusion

The study population was characterized by the lack of previous dental care, high treatment needs, high prevalence of periodontal diseases, and poor oral hygiene. According to the results of the present study, it can be concluded that older people are at a relatively higher risk of developing oral diseases; therefore, this population group should be involved in preventive measures with age consideration. Hence, the older the age, the less important the secondary

prevention and the more important the tertiary prevention for planning the treatment and prevention work in order to improve the dental health and optimize the quality of life of the adult population in the Republic of Armenia.

Conflict of Interests

Authors have no conflict of interest.

Acknowledgments

References

1. Lauritano D, Moreo G, Della Vella F, Di Stasio D, Carinci F, Lucchese A, et al. Oral health status and need for oral care in an aging population: A systematic review. Int J Environ Res Public Health 2019; 16(22): 4558.
2. Batista MJ, Lawrence HP, Sousa MDLR. Oral health literacy and oral health outcomes in an adult population in Brazil. BMC Public Health 2017; 18(1): 60.
3. Gil-Montoya JA, de Mello AL, Barrios R, Gonzalez-Moles MA, Bravo M. Oral health in the elderly patient and its impact on general well-being: A nonsystematic review. Clin Interv Aging 2015; 10: 461-7.
4. Eke PI, Thornton-Evans GO, Wei L, Borgnakke WS, Dye BA, Genco RJ. Periodontitis in US adults: National health and nutrition examination survey 2009-2014. J Am Dent Assoc 2018; 149(7): 576-88.
5. Watson S, McMullan J, Brocklehurst P, Tsakos G, Watt RG, Wassall RR, et al. Development of a core outcome set for oral health services research involving dependent older adults (DECADE): A study protocol. Trials 2020; 21(1): 599.
6. Murray Thomson W. Epidemiology of oral health conditions in older people. Gerodontology 2014; 31(Suppl 1): 9-16.
7. Maru AM, Narendran S. Epidemiology of dental caries among adults in a rural area in India. J Contemp Dent Pract 2012; 13(3): 382-8.
8. Nazir MA. Prevalence of periodontal disease, its association with systemic diseases and prevention. Int J Health Sci (Qassim) 2017; 11(2): 72-80.
9. Petersen PE. Improvement of global oral health-the leadership role of the World Health Organization. Community Dent Health 2010; 27(4): 194-8.
10. Kidd E, Fejerskov O. Dental caries: The disease and its clinical management. Hoboken, NJ: Wiley; 2003.
11. Bokhari SA, Suhail AM, Malik AR, Imran MF. Periodontal disease status and associated risk factors in patients attending a Dental Teaching Hospital in Rawalpindi, Pakistan. J Indian Soc Periodontol 2015; 19(6): 678-82.
12. Shewale AH, Gattani DR, Bhatia N, Mahajan R, Saravanan SP. Prevalence of periodontal disease in the general population of India-a systematic review. J Clin Diagn Res 2016; 10(6): ZE04-ZE09.
13. Baiju RM, Peter E, Varghese NO, Sivaram R. Oral health and quality of life: Current concepts. J Clin Diagn Res 2017; 11(6): ZE21-ZE26.
14. Singla N, Acharya S, Prabhakar RV, Chakravarthy K, Singhal D, Singla R. The impact of lifestyles on the periodontal health of adults in Udupi district: A cross sectional study. J Indian Soc Periodontol 2016; 20(3): 330-5.
15. AlJehani YA. Risk factors of periodontal disease: Review of the literature. Int J Dent 2014; 2014: 182513.
16. Manrikyan ME. The dental morbidity assesment of Republic of Armenia with record of medico-social viewpoints (aspects) and effectiveness of primary prevention programs [PhD Thesis]; Yerevan, Armenia: Yerevan State Medical University; 2014.
17. World Health Organization. Oral health surveys: Basic methods. Geneva, Switzerland: WHO; 2013.
18. National Institutes of Health. Rheumatoid arthritis [Online]. [cited 2019]; Available from: URL: https://www.niams.nih.gov/health-topics/rheumatoid-arthritis