Turkish Journal of Geriatrics
2016;19(2):87-94

Gökhan ÖZKAN[1]
Ali ARIKAN[2]
Filiz ABACIGİL[2]
Serhat PİRİNÇÇİ[2]
Pınar OKYAY[2]

RESEARCH

ORAL HEALTH STATUS OF ELDERLY RESIDENTS IN A NURSING HOME: CROSS-SECTIONAL, ANALYTICAL STUDY IN A WESTERN CITY IN TURKEY

ABSTRACT

Introduction: The aim of this study was to investigate the oral health status of elderly residents in the Nursing Home of Aydin Social Services, and to determine related risk factors.

Materials and Method: The assessment of oral health was performed by first-year dental students using a structured questionnaire and by clinical examinations performed by an experienced physician in an examination room. Mann–Whitney U and Kruskal–Wallis tests were performed for the comparison of non-parametric continuous variables in independent groups.

Results: A total of 114 (78.6%) elderly residents were included. Of these, 5 (4.4%) visited a dentist regularly, 7 (6.1%) had not visited a dentist yet, and 78 (68.4%) had presented to a dentist with a complaint. No significant difference was found in the dental status between genders, and community periodontal indices did not significantly differ between age groups or gender. Decayed crown ($p<0.002$), decayed root ($p<0.011$), and filled teeth ($p<0.006$) scores were significant in the ≤74-year-old age group than in the 75–84-year-old age group. In contrast, missing teeth ($p<0.001$) and decayed, missing, and filled teeth scores ($p<0.001$) were significant in the 75–84-year-old age group than in the ≤74-year-old age group. Dental and periodontal statuses did not increase with age.

Conclusion: The findings of the present study are important for the development of preventative and promotional dental health programs for the elderly. Oral health services may require better organization in nursing homes. The presence of a dental practitioner or access to regular dental visits to a specific dental unit will provide support in maintaining oral health in the elderly.

Key Words: Oral health; Aged; Nursing Homes.

ARAŞTIRMA

HUZUREVİNDE KALAN YAŞLILARIN AĞIZ SAĞLIĞI DURUMU: TÜRKİYE'NİN BATISINDAN KESİTSEL ANALİTİK BİR ÇALIŞMA

ÖZ

Giriş: Bu çalışmanın amacı, Aydın Sosyal Hizmetler Huzurevi'nde kalan yaşlıların ağız sağlığı durumunu araştırmak ve ilgili risk faktörlerini belirlemektir.

Gereç ve Yöntem: Değerlendirme, yapılandırılmış bir anket aracılığı ile birinci sınıf diş hekimliği öğrencileri tarafından, klinik inceleme ise bir muayene odasında, tecrübeli bir hekim tarafından uygulandı. Mann-Whitney U and Kruskal Wallis testleri de, bağımsız gruplarda parametrik olmayan devamlı değişkenleri karşılaştırmak için kullanıldı.

Bulgular: Toplamda 114 (%78.6) yaşlı çalışmaya dahil edildi. Bunlardan %4.4'ü (5) diş hekimine düzenli olarak giderken, %6.1'i (7) henüz bir diş hekimine gitmemişti ve %68.4'ü (78) ise sadece şikayet olduğunda diş hekimine gitmekteydi. Cinsiyet grupları arasında dental durum açısından, hem cinsiyet hem de yaş grupları arasında da CPI skorları açısından anlamlı bir fark bulunamadı. Çürük kron ($p<0.002$), çürük kök ($p<0.011$) ve dolgulu diş ($p<0.006$) skorları 74 yaş ve altı grubunda, 75-85yaş grubuna göre istatistiksel olarak anlamlı bulundu. Bunun aksine, eksik diş ($p<0.001$) ve DMFT skorları ($p<0.001$) ise 75-84 yaş grubunda, 74 yaş ve altı grubuna göre istatistiksel olarak anlamlı bulundu. Sunulan çalışma bulgularına göre, dental ve periodontal durum yaşla paralel olarak artış göstermedi.

Sonuç: Sunulan çalışmanın sonuçları yaşlılarda dental sağlığın korunması ve tanıtılması programları açısından oldukça önemlidir. Ağız sağlığı merkezleri huzurevlerinde daha iyi organize olmalıdır. Bu kurumlarda bir diş hekiminin varlığı ya da düzenli diş hekimine gidilmesi, yaşlıların ağız sağlığının gelişimine katkıda bulunacaktır.

Anahtar Sözcükler: Ağız Sağlığı; Yaşlı; Huzurevi.

Correspondance

Gökhan ÖZKAN
Adnan Menderes University, Faculty of Dentistry,
Department of Oral and Maxillofacial Radiology, AYDIN

Phone: 0506 500 94 70
e-mail: asgokhanozkanus@hotmail.com

Received: 23/03/2016

Accepted: 28/04/2016

[1] Adnan Menderes University, Faculty of Dentistry, Department of Oral and Maxillofacial Radiology, AYDIN
[2] Adnan Menderes University, Faculty of Medicine, Department of Public Health, AYDIN

Introduction

Aging is a complicated phenomenon that results in social and health problems worldwide. It is estimated that there will be 2 billion people aged ≥60 years worldwide by 2050, which will pose challenges in providing sufficient care (1). Elderly people have various physical disabilities and chronic diseases, which reduce their quality of life (2). These problems adversely affect the oral health of elderly people, and their general health is also influenced by their oral health status (3,4).

Residents of nursing homes are generally more affected by oral health problems due to individual limitations and the fact that maintaining good oral health is not a high priority in these institutions. Oral health-related quality of life is important for these residents to enable them to remain independent and be involved in the community (2,5).

The aim of the present study was to assess the oral health status of elderly residents of the Nursing Home of Aydin Social Servicesand to determine related risk factors and requirements in terms of oral health.

Materials and Method

This cross-sectional, analytical study was approved by the Ethics Committee of Adnan Menderes University, Aydin, Turkey (Protocol no. 2015/549). The Turkish Republic Ministry of Family and Social Policies also approved this study. Written informed consent was obtained from all residents prior to data collection. Data collection was performed between April and July 2015.

Study Population

Elderly residents (n=145) from the Nursing Home of Aydin Social Services were recruited. All residents were included, with no sample selection. The inclusion criteria were as follows: living in the Nursing Home, volunteering to participate, and not suffering from health disorders such as Alzheimer's disease, dementia, or any mental health, psychiatric, or speaking problems affecting communication with the elderly.

Assessment

Before commencement of the interview, dental students received training on the research and the questionnaire for 2 h. After informing the elderly residents about the study, they were interviewed in their own rooms prior to the clinical examination. First-year dental students asked questions to the residents, and a dental practitioner performed the clinical examination in an examination room.

Questionnaire and Clinical Examination Form

Assessments were made using a structured questionnaire with two parts and a clinical examination form. The first part was about the sociodemographic characteristics of the residents such as age, gender, education level, occupation, and social security. The second part was related to the self-reported oral health status of the elderly residents and associated oral hygiene practices. The clinical examination form used was standard, which was recommended by the World Health Organization (WHO) (WHO-2013). The form was used to determine the decayed, missing and filled teeth (DMFT) index, community periodontal index (CPI), and clinical attachment loss.

Clinical Examination

Following the questionnaire, the nursing home physician determined the medical conditions of the residents. The residents then underwent a clinical examination using a dental mirror and CPI probe (Martin, Solingen, WHO 973/80, Germany) by an experienced dental practitioner from the Faculty of Dentistry, Adnan Menderes University in accordance with the WHO criteria. The numbers of DMFT were recorded to calculate the DMFT index. CPI was used for evaluating the periodontal status of the teeth and was scored as follows: 0, no treatment needed; 1, bleeding on gentle probing; 2, presence of dental calculus; 3, presence of 4–5-mm periodontal pockets; and 4, 6 mm or deeper periodontal pockets. The relationship of the gingival margin to the cemento–enamel junction was detected, and attachment loss was measured as follows: score 0: attachment loss of ≤3 mm; score 1, attachment loss of 4–5 mm; score 2, attachment loss of 6–8 mm; score 3, attachment loss of 9–11 mm; and score 4, attachment loss of ≥12 mm. The highest scores in six sextants, in accordance with both methods used to measure the periodontal status, were recorded.

Statistics

Research data were evaluated using the SPSS 15.0 statistical program (SPSS Inc., Chicago, IL). The suitability of each continuous variable to abnormal distribution was investigated using the Kolmogorov–Smirnov test. For the descriptive components, normally distributed data were expressed as the mean and standard deviation; for data that were not normally distributed, the median, minimum, and maximum values were indicated. Mann–Whitney U and Kruskal Wallis tests were used to compare non-parametric continuous variables in independent groups. The Mann–Whitney U test was performed

to determine the significance of pairwise differences using the Bonferroni correction to adjust for multiple comparisons. An overall 0.05 type 1 error level was used to infer statistical significance.

Results

Following the exclusion of 31 residents (16 due to Alzheimer's disease and dementia, 9 due to psychiatric and physiological problems, and 6 rejected the questionnaire or clinical examination), a total of 114 (78.6%) elderly residents participated.

In terms of the sociodemographic characteristics of the residents; 67 (58.8%) were females and 47 (41.2%) were males. The mean age of the residents was 78.49±8.59 years. Of the residents, 35 (30.7%) were aged ≤74 years, 47 (41.2%) were aged 75–84 years, and 32 (28.1%) were aged ≥85 years. As only 7 residents were aged <65 years, they were included in the ≤74-year-old age group for statistical analysis. In total, 94 (82.5%) residents were illiterate or received only primary school education.

Neuropsychological disorders were the most common diseases (n = 43), followed by hypertension (n = 39) and diabetes mellitus (n = 24). Kidney disease (n = 9) and cancer (n = 5) were rare, and only 5 residents were free from illness in the nursing home.

Table 1 displays the oral health-related habits and behavior of the elderly residents.

Only 5 (4.4%) residents visited a dentist regularly and 7 (6.1%) had not visited a dentist yet. Most residents (n=78, 68.4%) visited a dentist when symptomatic. Approximately half of the elderly residents (n=64, 56.1%) had no toothbrush, and 89 (78%) residents used no aids to assist with oral hygiene. Toothpicks (n=14, 12.3%) were the most commonly used aids, followed by mouthwash (n=6, 5.3%) and dental floss (n=2, 1.8%). A major portion of the residents (n=98, 86.0%) reported that they regularly ate three meals a day. The last visit to the nursing home by a dentist was more than two years ago (n=26, 22.8%) or never (n=88, 77.2%).

Table 2 displays the distribution of number of teeth and types of denture in the elderly residents.

Almost half the residents (n = 54) were edentate, and many other residents retained very few natural teeth. In the different age groups, 9 (25.7%) residents in the ≤74-year-old age group, 28 (59.6%) in the 75–84-year-old age group, and 17 (53.1%) in the ≥85-year-old age group were edentate. Of the 54 residents who had no teeth, only 26 had dentures.

Table 1— Oral Health-related Habits and Behavior of The Elderly Residents.

		n	%
Regularity of dental visits	Regular	5	4.4
	With a complaint	78	68.4
	Irregular	24	21.1
	Never	7	6.1
Time of last dental visit (n=107)	0–6 months	21	18.4
	6 months–1 year	13	11.4
	1–2 years	21	18.4
	+2 years	52	45.6
Reason for last dental visit (n=101)	Control check-ups	6	5.9
	Pain	28	27.7
	Gum problems: bleeding	7	6.9
	Trauma	1	1.0
	TMJ problems	4	4.0
	Denture	52	51.5
	Other*	3	3.0
Frequency of brushing teeth (n=50)	2-3 in a day	11	9.6
	1 in a day	15	13.2
	1 in a week	8	7.0
	Irregular	16	14.0
Frequency of toothbrush changing (n=50)	0-6 months	12	10.5
	1 year	17	14.9
	Never	21	18.4
The last visit to the institution by a dentist	+2 years	26	22.8
	1–2 years	0	0.0
	In 1 year	0	0.0
	Never	88	77.2
Tobacco products	Everyday	27	23.7
	Couple of days a week	4	3.5
	Never	83	72.8
Alcohol	Everyday	2	1.8
	2–3 times a week	3	2.6
	1 time a week	2	1.8
	1 time a month	9	7.9
	Never	98	86.0
Snacks**	Biscuits	57	
	Pastry	36	
	Candy/Chocolate	13	
	Tea/Coffee	69	
	Coke/Lemonade	5	
	Juice	49	
	Milk/Yoghurt	58	

* Oral lesions, tooth mobility.

**Percentages could not be calculated as more than one option was marked.

Table 2— Distribution of the Number of Teeth Present and Type of Denture in the Elderly Residents

	Types of Denture											
	No Denture		Fixed Dentures		Partial Removable Dentures		Complete Dentures		Complete + Partial Dentures		Total	
No of teeth	n	%	n	%	n	%	n	%	n	%	n	%
0	28	51.9	0	0.0	0	0.0	26	48.1	0	0.0	54	47.4
1-10	10	32.3	0	0.0	17	54.8	0	0.0	4	12.9	31	27.2
11-20	6	40.0	3	20.0	6	40.0	0	0.0	0	0.0	15	13.2
21+	7	50.0	6	42.9	1	7.1	0	0.0	0	0.0	14	12.3
Total	51	44.7	9	7.9	24	21.1	26	22.8	4	3.5	114	100.0

Considering the oral lesions of the residents examined, 25 had at least one oral lesion. The most frequently detected lesions were denture stomatitis (n=12), epulis fissuratum (n=7), and geographic tongue (n=3).

The dental status, DMFT number, and DMFT scores are displayed in Table 3.

The mean DMFT score of all residents was 25.80±7.47. No significant difference was found between genders in terms of oral health status. In the different age groups, the decayed crown ($p<0.002$), decayed root ($p<0.011$), and filled teeth ($p<0.006$) scores were significant in the ≤74-and 75–84-year-old age groups, with lower scores in the ≤74-year-old age group. The missing teeth ($p<0.001$) and DMFT scores ($p<0.001$) were also significantly different between these same groups, although the scores were higher in the 75–84-year-old age group.

The percentage distribution of periodontal status of the dentate residents (n=60) is shown in Table 4. The presence of calculus (n=23, 38.3%) on the CPI index and 6–8 mm (n=18, 30.0%) attachment loss were the most common periodontal status scores among the residents.

The periodontal statuses of the residents are presented in Table 5.

The overall CPI score of the dentate residents was 2.36±1.02, whereas the attachment loss score was 1.70±1.27. There were no significant differences in the CPI scores between the age groups and genders. Although there was a significant difference between the age groups in terms of attachment

Table 3— Dental Status of the Elderly Residents

			Decayed Crown	Decayed Root	Missing Teeth	Filled Teeth	DMFT
Gender	Female	χ±SD	0.42±0.85	1.07±1.55	22.72±7.92	0.46±0.92	26.57±7.09
		Median (Min–Max)	0.0 (0.0–3.0)	0.0 (0.0–6.0)	0.0 (4.0–28.0)	0.0 (0.0–3.0)	32 (8.0–32.0)
	Male	χ±SD	0.76±1.36	0.82±1.35	21.10±8.59	0.59±1.11	25.26±7.73
		Median (Min–Max)	0.0 (0.0–6.0)	0.0 (0.0–7.0)	25.0 (2.0–28.0)	0.0 (0.0–4.0)	27 (5.0–32.0)
	U/Kw		1424.0/-	1453.5/-	1395.0/-	1506.5/-	1425.0/-
	p		0.273	0.429	0.274	0.608	0.362
Age Groups	≤74 years	χ±SD	1.22±1.68	1.28±1.38	17.74±9.02	0.97±1.33	22.25±7.81
		Median (Min–Max)	0.0 (0.0–6.0)	1.0 (0.0–5.0)	21.0 (2.0–28.0)	0.0 (0.0–4.0)	23.0 (5.0–32.0)
	75–84 years	χ±SD	0.27±0.64	0.61±1.13	24.46±6.55	0.21±0.50	27.95±6.39
		Median (Min–Max)	0.0 (0.0–2.0)	0.0 (0.0–4.0)	28.0 (2.0–28.0)	0.0 (0.0–2.0)	32.0 (7.0–32.0)
	≥85 years	χ±SD	0.46±0.87	1.15±1.88	22.21±8.38	0.56±1.10	26.53±7.34
		Median (Min–Max)	0.0 (0.0–3.0)	0.0 (0.0–7.0)	28.0 (4.0–28.0)	0.0 (0.0–3.0)	32.0 (5.0–32.0)
	U/Kw		-/10.200	-/6.241	-/13.569	-/7.606	-/13.436
	p		**0.006**	**0.044**	**0.001**	**0.022**	**0.001**

Table 4— Percentage Distribution of Periodontal Status

CPI		n	%
	Healthy	3	5.0
	Bleeding on probing	7	11.7
	Calculus	23	38.3
	Shallow pockets (4–5 mm)	19	31.7
	Deep pockets (6mm, +)	8	13.3
Attachment loss			
	0–3 mm	13	21.7
	4–5 mm	14	23.3
	6–8 mm	18	30.0
	9–11 mm	8	13.3
	12+ mm	7	11.7
Total		60	100.0

loss scores (p=0.036), on analyzing the difference between pairs, the Bonferroni correction revealed no significant differences. This situation was considered to have occurred due to an insufficient number of groups. To overcome this limitation, the groups were recombined into two instead of three. The group of elderly residents was divided into two groups: ≤74 and ≥75 years. The scores were significant between the two groups (p=0.015), with lower attachment loss scores in the ≤74-year-old age group.

Discussion

The current increasing population of elderly individuals is important worldwide (1). In Turkey, the elderly population is increasing at a rate higher than that of other age groups. According to population projections, the proportion of the elderly population will increase, and Turkey will be among the countries considered to have a population deemed "too old". Although the proportion of elderly individuals (≥65 years old) was 8% in 2014, it is expected to rise to 20.8% in 2050 and to 27.7% in 2075 (6). This indicates that the number of health service institutions and nursing homes will proportionally increase, in association with the increasing elderly population.

Nursing homes offer a normal quality of life and access to necessary facilities for elderly individuals (7). According to the elderly residents, the last visit to the nursing home by a dentist was "more than two years ago or never," which was the most striking outcome of the questionnaire. Majority of the residents had no toothbrush (n=64) and visited a dentist only when they had a complaint (n=78). These are indicators of poor oral health and lack of oral hygiene practice in the nursing home and are similar to the findings of previous studies performed on elderly institutionalized individuals (3,8,9,10). Only 14 residents had a functional tooth number (≥21 teeth). Of the 54 residents who required a complete denture, 28 had

Table 5— Periodontal Status of the Elderly Residents

Periodontal Status	Gender		Age Groups		
	Male (n=38)	Female (n=22)	≤74 years (n=26)	75–84 years (n=19)	≥85 years (n=15)
CPI					
Median	2.0	3.0	2.0	3.0	2.0
Min	0.0	0.0	0.0	0.0	1.0
Max	4.0	4.0	4.0	4.0	4.0
Mean	2.31	2.45	2.34	2.36	2.40
SD	0.93	1.18	1.16	0.95	0.91
p	0.430			0.980	
U/Kw	369.0/-			-/0.040	
Attachment loss					
Median	1.5	2.0	1.0	3.0	2.0
Min	0.0	0.0	0.0	0.0	0.0
Max	4.0	4.0	4.0	4.0	4.0
Mean	1.55	1.95	1.23	2.26	1.80
SD	1.17	1.43	1.06	1.52	1.01
p	0.266			0.036	
U/Kw	347.5/-			-/6.669	

no denture. These results showed that the elderly might not be aware of their need of a denture. In a previous study (2), the number of dentate patients was relatively large (94.1%) compared with that in present study (52.6%). This difference may be a result of different levels of education in the groups. The educational level of the residents in the present study (illiterate + primary school, 82.5%) was lower than that in the previous study (secondary + tertiary education, >60%). Low literacy levels have been found to be associated with low health literacy (11).

In a previous study (12) conducted in a nursing home between 2002 and 2012 in the Netherlands, the number of patients with remaining teeth increased significantly, between 7.9% and 28.7%. According to a previous study (9) on elderly individuals in a residential home in Ankara (Turkey) in 2007, only 32.6% of the individuals were dentate and 7.3% had functional teeth. In the present study, however, the dental status of the residents remained poor, but after 8 years, it was encouraging to find that these values were 52.6% and 12.3%, respectively, in the same country. Despite this, further studies are required to confirm whether there is also an increase in the number of remaining teeth among the elderly in Turkey. The previous study in Ankara (9) and the present study represent cross-sectional studies performed in different groups at different times. However, the study (12) performed in the Netherlands involved the same group and was a prospective study.

In a population-based Turkish study (13), 47.5% of the elderly individuals were dentate, 16.2% had not visited a dentist in the previous 10 years, and 3% visited a dentist for control check-ups. In the present study, 47.4% of the residents were edentate, 6.1% had not visited a dentist yet, and 5.9% visited a dentist for control check-ups. The DMFT index and periodontal status were not calculated in the previous study (13). Although the oral health status may be expected in a controlled population, there appears to be no difference in oral health practices between institutionalized and non-institutionalized elderly individuals in Turkey.

In the present study, denture stomatitis (n=12) and epulis fissuratum (n=7) were the most common oral lesions identified on clinical examination. In recent studies, oral lesions related to wearing a denture were also the most common type of lesion in the mouth (3,8,14).

When the dental status was considered, the proportion of missing teeth was higher than the proportions of decayed and filled teeth and comprised majority of the DMFT score. In a recent study (10) on elderly individuals in Cameroon, the proportion of decayed teeth was higher than that of missing teeth. A small proportion of the subjects were edentate (1.1% maxilla and 1.6% mandible) in this previous study, whereas the proportion of edentate subjects in the present study was 47.4% (in both jaws), and this may be the reason for the differences in the proportion of missing and decayed teeth between these studies. The mean DMFT score of residents in the present study was 25.80±7.47. This was similar to previous studies conducted in Austria (DMFT, 25.6) (15), Spain (DMFT, 25.1) (16), and Chile (DMFT, 25.7) (17); lower than in studies conducted in Slovenia (DMFT, 30.75) (18), Ankara, Turkey (DMFT, 29.3) (9), and Piracicaba, Brazil (DMFT, 28.5) (19); and higher than in studies conducted in Belgium (DMFT, 20.3) (8), Valencia, Spain (DMFT, 16.83) (20), Barcelona, Spain (DMFT, 22.8) (21), Mexico (DMFT, 17.2) (22), and Hong Kong (DMFT, 21.35) (5). In a study in Hong Kong (5), the DMFT score was higher (21.35) in institutionalized elderly individuals than in non-institutionalized (17.67) individuals. The mean DMFT score was 22.25±7.81 in the ≤74-year-old age group, 27.95±6.39 in the 74–85-year-old age group, and 26.53±7.34 in the ≥85-year-old age group. Although the highest score was in the 74–85-year-old age group, a statistically significant difference was only found between this group and the ≤74-year-old age group. Of the total number of residents in the present study, 9 in the ≤74-year-old age group, 28 in the 74–85-year-old age group, and 17 in the ≥85-year-old age group were edentate. Therefore, higher numbers of edentate residents may be the reason for the highest DMFT score in the 74–85-year-old age group.

In terms of the periodontal status of the residents, calculus had the highest percentage distribution (38.3%) of the CPI index and the most common attachment loss score was 6–8 mm (30.0%). These results differed from those of an Australian study (2) conducted in Chinese migrants (calculus, 4.2%; 6–8 mm attachment loss, 24.2%), with only 6.3% of those migrants requiring complex periodontal treatment and the dental status being better than that observed in the present study. In a different study, the calculus percentage was higher (68.4%) than that in the present study, whereas the attachment loss percentage (6–8 mm attachment loss, 33.2%) was similar to that in the present study. The calculus (16.6%) and shallow pocket (21.8%) percentages were lower and the deep pocket percentage (19.7%) was higher in a Polish study (23) than those in the present study. On comparing the age groups and genders in the present study, there were no significant differences between CPI scores among the residents.

When the residents were divided into two age groups, ≤74and ≥75years, the attachment loss score was lower in the ≤74-year-old age group.

In the present study, the dental and periodontal statuses did not increase with age. There were no difference between the ≥85-year-old age group and other age groups. According to a recent study (8), the oral health status is declining with age because of malnutrition and dementia. These changes may be due to the mental status of the elderly residents in the current study or the catering facilities in the nursing home. Therefore, in the present study, residents with dementia were excluded, and the elderly in the nursing home were regularly provided with three proper meals under the supervision of a dietician.

The Nursing Home of Aydin Social Services is the only state-owned nursing home in Aydin city. No sampling was performed, and all residents meeting the inclusion criteria were included. Therefore, the results of the present study provide an institutional representation for structuring oral health services in Turkey; they may also be used to structure a systematic program across the country as a whole.

There are a few limitations in the present study. Clinical examination was performed in daylight without radiographs, which can result in hidden caries being undetected. Additionally, due to the nature of cross-sectional studies, the causality remains unclear and prospective studies are needed.

In conclusion, general dental health services are heavily focused on curative treatment, whereas the focus on preventive treatment and health promotion activities are low. However, due to the aging population, the costs of dental treatment are becoming a serious issue in health system. Additionally, low literacy levels are common in the elderly population, which results in poor health literacy. Poor health literacy increases the cost of treatments. In nursing homes, there is an opportunity for direct supervision and guided schedules for oral hygiene practices, if the presence of a dental practitioner can be obtained. The presence of a dental practitioner will support the oral health of elderly individuals and also improve their quality of life. In situations where a dental practitioner cannot be present, regular dental visits to a specific dental clinic are necessary.

References

1. Petersen PE, Yamamoto T. Improving the oral health of older people: the approach of the WHO Global Oral Health Programme. Community Dent Oral Epidemiol 2005;33(2):81-92. (PMID:15725170).
2. Mariño R, Morgan M, Kiyak A, Schwarz E, Naqvi S. Oral health in a convenience sample of Chinese older adults living in Melbourne, Australia. Int J Public Health 2012;57(2):383-90. (PMID:21468640).
3. Peltola P, Vehkalahti MM, Wuolijoki-Saaristo K. Oral health and treatment needs of the long-term hospitalised elderly. Gerodontology 2004;21(2):93-9. (PMID:15185989).
4. Moynihan PJ. The relationship between nutrition and systemic and oral well-being in older people. J Am Dent Assoc 2007;138(4):493-7. (PMID:17403739).
5. McMillan AS, Wong MC, Lo EC, Allen PF. The impact of oral disease among the institutionalized and non-institutionalized elderly in Hong Kong. J Oral Rehabil 2003;30(1):46-54. (PMID:12485383).
6. TUIK. Turkish Statistical Institute. Elderly Statistics 2014. Turkish Statistical Institute. [Internet] Available at: http://www.tuik.gov.tr/IcerikGetir.do?istab_id=265. Accessed: 24.8.2015.
7. Wardh I, Anderson L, Sorensen S. Staff attitudes to oral health care. A comparative study of registered nurses, nursing assistants and home care aides. Gerodontology 1997;14(1):28-32. (PMID:9610300).
8. De Visschere L, Janssens B, De Reu G, Duyck J, Vanobbergen J. An oral health survey of vulnerable older people in Belgium. Clin Oral Investig 2015; doi:10.1007/s00784-015-1652-8. [Internet] Available from: http://link.springer.com/article/10.1007/s00784-015-1652-8. Accessed: 29.7.2015.
9. Unlüer S, Gökalp S, Doğan BG. Oral health status of the elderly in a residential home in Turkey. Gerodontology 2007;24(1):22-9. (PMID:17302927).
10. Michele Lolita Y, Ashu Michael A, Hubert N, Florence D, Jacques B. Oral Health Status of the Elderly at Tonga, West Region, Cameroon. Int J Dent 2015; doi:10.1155/2015/820416. [Internet] Available from: http://www.hindawi.com/journals/ijd/2015/820416/. Accessed: 09.5.2015.
11. Dewalt DA, Berkman ND, Sheridan S, Lohr KN, Pignone MP. Literacy and health outcomes: a systematic review of the literature. J Gen Intern Med 2004;19(12):1228-39. (PMID:15610334).
12. Hoeksema AR, Vissink A, Raghoebar GM, et al. [Oral health in care-dependent elderly: an inventory in a nursing home in the north of the Netherlands]. Ned Tijdschr Tandheelkd 2014;121(12):627-33. (PMID:26188487).
13. Nazliel HE, Hersek N, Ozbek M, Karaagaoglu E. Oral health status in a group of the elderly population residing at home. Gerodontology 2012;29(2):761-7. (PMID:21916957).
14. Vigild M. Oral mucosal lesions among institutionalized elderly in Denmark. Community Dent Oral Epidemol 1987;15(6):309-13. (PMID:3121246).
15. Gluhak C, Arnetzl GV, Kirmeier R, Jakse N, Arnetzl G. Oral status among seniors in nine nursing homes in Styria, Austria. Gerodontology 2010;27(1):47-52. (PMID:19371391).

16. Spanish Geriatric Oral Health Research Group. Oral health issues of Spanish adults aged 65 and over. The Spanish Geriatric Oral Health Research Group. Int Dent J 2001;51(3 Suppl):228-34. (PMID:11561883).
17. Mariño R, Giacaman RA. Factors related to unmet oral health needs in older adults living in Chile. Arch Gerontol Geriatr 2014;58(3):454-9. (PMID:24556393).
18. Petelin M, Cotiã J, Perkiã K, Pavliã A. Oral health of the elderly living in residential homes in Slovenia. Gerodontology 2012;29(2):e447-57. (PMID:21615469).
19. Esmeriz CE, Meneghim MC, Ambrosano GM. Self-perception of oral health in non-institutionalised elderly of Piracicaba city, Brazil. Gerodontology 2012;29(2):e281-9. (PMID:21507055).
20. Eustaquio MV, Montiel JM, Almerich JM. Oral health survey of the adult population of the Valencia region (Spain). Med Oral Patol Oral Cir Bucal 2010;15(3):e538-44. (PMID:20038887).
21. Cornejo M, Pérez G, de Lima KC, Casals-Peidro E, Borrell C. Oral Health-Related Quality of Life in institutionalized elderly in Barcelona (Spain). Med Oral Patol Oral Cir Bucal 2013;18(2):e285-92. (PMID:23385501).
22. Sánchez-García S, Heredia-Ponce E, Cruz-Hervert P, Juárez-Cedillo T, Cárdenas-Bahena A, García-Peña C. Oral health status in older adults with social security in Mexico City: Latent class analysis. J Clin Exp Dent 2014;6(1):e29-35. (PMID:24596632).
23. Konopka T, Dembowska E, Pietruska M, Dymalski P, Górska R. Periodontal status and selected parameters of oral condition of Poles aged 65 to 74 years. Przegl Epidemiol 2015;69(3):537-42. (PMID:26519852).