ORIGINAL ARTICLE

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The effect of dental profile on daily functions of the elderly

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Abstract The aim of the study was to evaluate statistically dentition and its effect on daily functions for a group of elderly volunteers. The study was conducted on 144 elderly people (86 males, 58 females) living in different nursing homes in Ankara, Turkey. Their ages varied between 60 and 100 years. Data assessed as dentition variables were number of teeth remaining and prosthesis use. Nearly 55% of the residents were edentulous and removable prosthesis users. The mean number of remaining teeth in subjects aged 60-69 was highest for all age groups in both sexes. The level of education and dental insurance of these subjects were also correlated with the dentition of elderly subjects. We found a statistically significant increase in the number of removable prosthesis users among educated and insured subjects. Functional capacity was better when the subjects had more remaining teeth or a removable prostheses. It is revealed by this study that healthy and good dentition prevents the decline of daily function and improves the social interaction and general well being of the elderly.

Keywords Dentition · Elders · Daily functions

Introduction

Getting old is an inevitable reality of life. Medical health and functional capacity decline in the elderly compared

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with youngsters. Thus, there is unwanted limitation of their daily activity. Functional capacity is important to maintaining the daily routine of life and the social interactions of the elderly [10]. In addition, dentition is important for carrying on daily activity properly. Most of the major functions in life which might affect daily routine activities directly such as speaking and eating are performed with the support of dentition. Poor dental health has previously been reported to be associated with physical disability [4, 12], mental impairment [4, 12], rheumatoid arthritis [9], and cardiovascular diseases [8]. However, it is not yet certain whether dental health has direct effects on these associations or whether the associations are the indirect outcomes of other factors, for example lifestyle. Moreover, tooth loss as a risk factor in the occurrence of Alzheimer's disease was reported in an epidemiological study [11]. Thus, it was suggested that retention of teeth might result in greater brain activity, resulting in greater independence in expression ability and social interaction.

The objective of this study was to evaluate statistically the relationship between the dental profile and daily functions of a group of elderly Turkish volunteers. The educational level and dental insurance of these subjects were also correlated with their dentition.

Materials and methods

There are 14 nursing homes in Ankara, Turkey (four governmental and ten private). The study was carried out at governmental nursing homes because private homes have very limited capacity for only 10 to 15 elderly people who are mostly uncooperative, ill, and bedridden. We were, therefore, referred to governmental nursing homes with a higher number of cooperative elderly. One hundred and forty four elderly people (86 males, 58 females) participated in this study. Their age varied between 60 and 100 years (mean age 77.4). All the elderly living in the nursing homes joined our study except those not feeling well. The number of elderly who did not want to participate in our study was less than 2% of the number who participated. The

Table 1 Distribution of the subjects by age and sex (mean age)

Age group (years)	Male (mean age)	Female (mean age)
60–69	19 (64.95)	8 (66.25)
70–79	18 (73.94)	41 (74.07)
80 and above	21 (85.81)	37 (87.03)
Total	58	86

distribution of the participants by age and sex is given in Table 1. According to results from a population census in 1997, the proportion of Turkish females to males older than 60 was approximately 1.1. However, in this study, the actual proportion of Turkish female to male geriatrics living in nursing homes was not determined.

Oral examination was performed in accordance with WHO oral examination procedures (1997) [14]. The same researcher examined all the subjects. The variables of dentition were the number of remaining teeth and the use of prostheses. The number of remaining teeth was calculated as the number of sound teeth+the number of treated teeth +the number of decayed teeth. The use of prostheses was evaluated as removable prosthesis users and nonusers.

Evaluation of the daily functions of each elderly was performed using the functional independence measurement (FIM) method [2]. This method evaluates the ability of each elderly person to perform 18 daily routine activities in their lives. Only seven of these activities—eating, bladder management, locomotion, transfers, expression, social interaction, and sitting up—were used in this study. The FIM scores varied between 1 and 7 for each item. Descriptions of the FIM scores are: (1) total assistance, (2) maximum assistance, (3) moderate assistance, (4) minimum contact assistance, (5) supervision or setup, (6) modified independence, (7) complete independence.

SPSS 10 for Windows (SPSS, Chicago, IL, USA) was used for statistical analysis. Descriptive statistics for remaining teeth and prosthesis use by age and sex were given for three age groups—60 to 69, 70 to 79, and 80 and above (Tables 2 and 3). Distributions of remaining teeth in different age groups were compared by using the Kruskal– Wallis (KW) test. The Mann–Whitney *U*-test (U) was used to analyze differences between remaining teeth and biological and psychosocial functions that were classified into two groups, higher (5–7) and lower (1–4). The chi-square test was performed to analyze differences between the use of a prosthesis and biological and psychosocial functions. Significance level was taken as 0.05.

Table 3 Distribution of prosthesis by age and sex [number of subjects (%)]

x Prosthesis	Prosthesis			
Yes (%)	No (%)	Total		
8 (42.1)	11 (57.9)	19		
1 (12.5)	7 (87.5)	8		
12 (66.7)	6 (33.3)	18		
24 (58.5)	17 (41.5)	41		
10 (47.6)	11 (52.4)	21		
24 (64.9)	13 (35.1)	37		
79 (54.9)	65 (45.1)	144		
	x Prosthesis Yes (%) 8 (42.1) 1 (12.5) 12 (66.7) 24 (58.5) 10 (47.6) 24 (64.9) 79 (54.9)	Prosthesis Yes (%) No (%) 8 (42.1) 11 (57.9) 1 (12.5) 7 (87.5) 12 (66.7) 6 (33.3) 24 (58.5) 17 (41.5) 10 (47.6) 11 (52.4) 24 (64.9) 13 (35.1) 79 (54.9) 65 (45.1)		

For sex and use of a prosthesis, $\chi^2=0.386$, P=0.534For age and use of a prosthesis, $\chi^2=6.287$, P=0.043

Results

Distributions of subjects with regard to remaining teeth and prosthesis use, by age and sex, are shown in Tables 2 and 3. Edentulousness occurred in 54.86% (79 out of 144) of the subjects. Of these 54.86% edentate subjects, 33.7% were male and 86.2% were female. The other subjects had a minimum of one or a maximum of 29 remaining teeth. Descriptive statistics of remaining teeth by age and sex and Kruskal–Wallis statistical test results are given in Table 2. The mean number of remaining teeth in subjects aged 60-69 was highest for all age groups in both sexes (Table 2). whereas prosthesis use in subjects aged 60-69 was the lowest for all age groups in both sexes (Table 3). The number of male and female subjects was lowest for prosthesis use at age 60-69 (42.1 and 12.5%) in contrast with ages 70-79 (66.7 and 58.5%) and 80+ (47.6 and 64.9%). The number of female subjects for prosthesis use was higher at age 80 and above (64.9%). The distributions and test results for remaining teeth and prosthesis use by age and FIM scores are presented in Table 4. Subjects aged 60-79 had more remaining teeth than the older group (P=0.044).

Although there was no statistically significant difference for remaining teeth, it was noticed that the FIM scores of the residents who had more than ten remaining teeth were between 5 and 7 (Table 4). In addition, FIM scores were 5-7when prosthesis use increased (Table 4). There was a statistically significant increase in the use of prosthesis for two activities only, expression and social interaction.

Distributions of subjects by prosthesis use and educational level were shown in Table 5. There was a statistically significant difference between uneducated subjects who

Table 2Descriptive statistics ofremaining teeth, for dentatesubjects only, by age and sex

Age	Male					Female				
	Mean	Median	Min	Max	Number	Mean	Median	Min	Max	Number
60–69	7.63	5.0	0	19	19	7.38	5.5	0	20	8
70–79	4.11	0.0	0	29	18	5.32	0.0	0	24	41
80 and above	3.76	1.0	0	20	21	2.76	0.0	0	25	37
	KW=4.063, <i>P</i> =0.131				KW=8.085, <i>P</i> =0.018					

Table 4 Distribution of subjects by number of remaining teeth, prosthesis use, and FIM scores in each category (FIM scores: lower, 1-4 and higher, 5-7)

Categories	FIM	Remaining teeth					Prosthesis		
	scores	0	1–	10-	20-	Р	Users	Non-	Р
			9	19	29	Value ^a		users	Value ^b
1. Eating	5–7	73	32	20	11	0.382	73	63	0.294
	1–4	6	_	2	_		6	2	
2. Bladder	5–7	57	19	20	10	0.267	61	45	0.372
management	1–4	22	13	2	1		18	20	
3. Locomotion	5–7	56	16	19	10	0.502	60	41	0.134
	1–4	23	16	3	1		19	24	
4. Transfers	5–7	38	11	16	9	0.071	46	28	0.070
	1–4	41	21	6	2		33	37	
5. Expression	5–7	54	12	18	10	0.743	59	35	0.015
	1–4	25	20	4	1		20	30	
6. Social	5–7	46	13	18	9	0.220	53	33	0.047
interaction	1–4	33	19	4	2		26	32	
7. Sitting up	5–7	64	21	20	10	0.815	68	47	0.066
	1–4	15	11	2	1		11	18	

^aResult of Mann–Whitney U-test

^bResult of chi-square test

Table 5Distribution of subjects by education level and the pros-
thesis use [number of subjects (%)]

Education level	Prosthesis				
	Yes (%)	No (%)	Total		
Non-educated (illiterate)	23 (38.3)	37 (61.7)	60		
Educated (primary and above)	56 (66.7)	28 (33.3)	84		
2					

 χ^2 =11.34, *P*=0.001

were illiterate and educated subjects with at least primary school education in respect of prosthesis use (P=0.001). Distributions of subjects by prosthesis use and dental insurance are given in Table 6. Private insurance does not cover the cost of dental treatment in Turkey. Thus, dental insurance is only given by the government to their employees, workers, or retired people. As a result, prosthesis use by those with dental insurance was found to be statistically significant (P=0.047). Prosthesis use increased when the educational level was higher among residents with dental insurance.

 Table 6
 Distribution of subjects by social security and prosthesis use

 [number of subjects (%)]

Social security	Prosthesis						
	Yes (%)	No (%)	Total				
Yes	41 (64.1)	23 (35.9)	64				
No	38 (47.5)	42 (52.5)	80				
Total	79 (54.9)	65 (45.1)	144				

 χ^2 =3.939, *P*=0.047

Discussion

The number of remaining teeth was quite low in this study (n=7.5) compared with previous reports [1, 3, 5]. Unfortunately, the low number of remaining teeth may be related to the acceptance of edentulousness as a part of the ageing process, which may also be the cause of increases prosthesis use at age 70 and above in this study. There were 54.86% edentulous subjects among 144 subjects. During the dental examination the researcher was able to chat with the participants. Most of the subjects confirmed they had lost their teeth in their 40s or 50s because they did not pay enough attention to their dental care for some reason. Thus, we cannot really state that their tooth loss was a normal result of getting older.

The number of remaining teeth and use of removable prostheses are important factors affecting the daily functions of the elderly. In this study, only seven daily routine activities as part of life—eating, bladder management, locomotion, transfers, expression, social interaction, and sitting up—were used, because they were thought to be the most important activities in the daily life of the elderly. It was observed that when the number of remaining teeth was higher (between 10 and 29), the score for these seven daily routine activities was better (between 5 and 7). Similarly, Hanada and Tada [6] reported that Japanese bedridden elderly people with higher independence in bladder management, locomotion, and transfers have a significantly higher number of remaining teeth.

Use of removable prostheses was correlated significantly with expression and social interaction of subjects. This particular result may support the opinion that "the improvement of masticatory function by prosthesis may prevent the decline of physical function in elders" [6].

Dental health care may not be a priority for some people because of economic problems. In this study, dental status was correlated with the status of dental insurance, because dental insurance covers most of the expenses for dental treatment. It was observed that removable prosthesis use was significantly higher in residents with dental insurance. However, there was no statistically significant difference between the number of remaining teeth for residents with dental insurance. In addition, the educational level of the subjects was correlated with their dental status, including the number of remaining teeth and removable prosthesis use. The number of remaining teeth was not significantly higher among the educated elderly, in contrast with results from previous studies [7, 13]. The reason for the insignificant correlation between remaining teeth and educational level might be the participation of few educated elderly in this study.

Conclusions

It is revealed by this study that dental profile has a positive influence on the daily functions, especially expression and social interactions, of the elderly. We found a statistically significant increase in the number of removable prosthesis users among educated and insured subjects. Functional capacity was better when the subjects have more remaining teeth or a removable prosthesis. It is therefore concluded that a good dentition prevents the decline of daily functions and improves the social interactions and general well being of the elderly. In addition, dental insurance and educational level help to improve the dental profile of the elderly.

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