






■ Original Article

# Age and gender related tooth loss and partial edentulism among the adulthoods

## *Yetişkin bireylerde yaş ve cinsiyet ile ilişkili diş kaybı ve parsiyel dişsizlik*

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### Abstract

**Aim:** Despite the improvements in preventive measures and restorative techniques in dentistry, tooth loss still remains as a significant problem. The determination of the edentulism prevalence may provide a new perspective for the patient-oriented treatment alternatives. The aim of the study was to evaluate the influence of gender and age on the prevalence of tooth loss.

**Material and Methods:** The data were gathered from the randomly selected 722 diagnostic models obtained from the patients consulting to the Ankara University, Faculty of Dentistry, between 2015 and 2016. Models were evaluated under 6 groups as followings; full dentition, Kennedy Class I-IV and total edentulism. Each model was classified according to the gender and age. Statistical analysis were performed by using Chi-Square test and log-linear model analysis and odds ratios also calculated ( $p < 0,05$ ).

**Results:** Gender has no effect on the edentulism whereas age significantly affects the number of tooth loss and the prevalence of edentulism. The loss prevalence of teeth 34, 36 and 37 was higher in females, while the tooth 24 loss was more common in male patients ( $p < 0,05$ ).

**Conclusion:** The number of tooth loss and edentulism significantly increase with the age. However, there was no relation between gender and prevalence of tooth loss and edentulism. prevention measures for oral health should be increased in elderly people.

**Keywords:** tooth loss; partial edentulism; age; gender

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## Öz

**Amaç:** Koruyucu önlemler ve restoratif tekniklerdeki gelişmelere rağmen, diş kaybı günümüzde hala önemli bir sorun olarak karşımıza çıkmaktadır. Bir toplumdaki dişsizlik oranının belirlenmesi hastalara özgü tedavi alternatiflerinin ortaya konulmasında yeni bir bakış açısı sağlayabilir. Bu bakımdan, çalışmamızda cinsiyet ve yaş faktörlerinin diş kaybı ve dişsizlik üzerine etkisini değerlendirmek amaçlanmıştır.

**Gereç ve Yöntemler:** Ankara Üniversitesi, Dişhekimliği Fakültesi, Protetik Diş Tedavisi Anabilim Dalı'na 2015-2016 yılları arasında dişsizlik tedavisi için başvuran hastalardan (188 kadın, 173 erkek hasta; yaş aralığı 28-79) 722 adet maksiller ve mandibular teşhis modeli elde edilmiştir. Tüm modeller tam dişli, Kennedy Sınıf I-IV ve tam dişsiz olmak üzere 6 grup altında incelenmiştir. Her bir model hastanın yaş ve cinsiyetine göre sınıflandırılmıştır. Ki-kare testi ve log-lineer model analizi ile istatistiksel değerlendirmeler yapılmıştır ( $p < 0,05$ ). Ayrıca odds oranları da hesaplanmıştır.

**Bulgular:** Yaş, diş kaybı ve dişsizlik üzerinde etkili bir faktör olarak bulunurken ( $p < 0,05$ ), cinsiyet ile diş kaybı ve dişsizlik arasında önemli bir ilişki bulunmamıştır ( $p > 0,05$ ). Cinsiyet esas alındığında, 34, 36 ve 37 numaralı dişlerin kaybı bayanlarda daha yaygın görülürken ( $p < 0,05$ ), 24 numaralı diş kaybı oranı erkeklerde daha yüksek tespit edilmiştir ( $p < 0,05$ ).

**Sonuç:** Yaş ile birlikte diş kaybı ve dişsizlik önemli oranda artması ancak cinsiyet ile diş kaybı ve dişsizlik arasında önemli bir ilişki bulunmaması, ağız sağlığını koruyucu önlemlerin ileri yaşlardaki bireylerde artırılması gerektiğini ortaya koymuştur.

**Anahtar kelimeler:** diş kaybı; parsiyel dişsizlik; yaş; cinsiyet

## Introduction

Despite the advances in preventive dentistry, there is still an increase in the rate of edentulous patients [1,2]. Oral health, affects general health considerably, is directly related to quality of life. Until recently, the importance of general health status in terms of quality of life has been more important, but over time the relationship with oral health has gain popularity [3].

Tooth loss, one of the most important indicators of oral health, is in the relationship with specific diseases, age, sex, oral hygiene, socioeconomic factors, uncontrolled chewing forces, gingivitis, and periodontitis. Functional, phonation and aesthetic disorders resulting from tooth loss are the factors that affect the dental, general health and quality of life of the patient and should be treated [1]. According to the World Health Organization, an adult must have a minimum of 21 functional teeth in order to be able to function properly [4]. Despite the decreasing rate of toothloss in individuals aged 65-74 in our society, only 7.5% of individuals aged 70-74 have 21 functional teeth. In general, about 87.6% of elderly individuals still do not have a minimum of 21 teeth [1].

Partial edentulousim can be described clinically as the presence of any missing tooth in the upper or lower jaw. Generally, Kennedy classification was used to classify partial edentulousim. This classification is divided into four basic classes according to the position of the teeth and toothless area on the arches [5].

Kennedy Class I: Bilateral edentulous area located posterior to the remaining natural teeth.

Kennedy Class II: Unilateral edentulous area located posterior to the remaining natural teeth.

Kennedy Class III: Unilateral edentulous area with natural teeth both anterior and posterior to the area.

Kennedy Class IV: Single but bilateral (crossing the midline) edentulous area located to the anterior of the remaining natural teeth.

The Kennedy classification is subdivided into subclasses called modification for classes with additional toothless area with the modification classification of Applegate and this clasification is the most widely accepted classification in dentistry [6].

In 1920, Dr. E. Cummer reported that there were about 65,000 combinations between teeth and toothless area in a single jaw, in the classification of partial edentulousim and that the maxilla had more than 131.30 in this variety [7]. Some studies stated that tooth loss was more common for male than female, contrary to this; some studies stated that females lost more teeth than males and were more prone to toothloss than males. In addition, in some studies it has been determined that premolar and molar teeth are the most commonly missed teeth [10, 11, 12].

It was stated that the most common class in most countries was Kennedy Class III [13,14], whereas in Turkish pouplation

the most common partial edentulousim was Kennedy Class I and the least common partial edentulousim was Kennedy Class IV and the prevalence of tooth loss was high (73%) [15].

The aim of this study is to evaluate the effect of age and gender on the partial edentulism classification and tooth loss of the Turkish population in Ankara region. The nullhypothesis of this study is that age and gender have no effect on tooth loss and partial edentulism distribution, and no differences on the distribution rate of Kennedy classification in Ankara region.

### Material and Methods

This study was conducted in Ankara University, Faculty of Dentistry Department of Prosthodontics between 2015 and 2016. Randomly selected total number of 722 lower and upper

jaw diagnostic models, obtained from 361 individuals, 188 female (52.1%) and 173 male (47.9%) from 28 to 79 years ages, were examined in this study. Age distrubiton of the individuals were as, 5 (1.4%) under 35 ages; 53 (14.7%) between 36-45 ages; 150 (41.6%) between 46-55 ages; 120 (33.2%) between 56-65 ages; 30 (8.3%) between 66-75 ages and 3 (0.8%) 76 or greater. Upper and lower jaw models were divided into 6 different subgroups respectively; (0) full dentate, (1) Kennedy Class I,(2) Kennedy Class II, (3) Kennedy Class III, (4) Kennedy Class IV, (5) total edentulism. The groups were evaluated in terms of partial edentulism, tooth loss, Kennedy classification considering by age and gender (Table 1). This study has been provided local ethics committee and informed consents were obtained from all participants.

**Table 1.** Percentage of groups according to age and gender

Groups	0				1				2				3				4				5			
	f		m		f		m		f		m		f		m		f		m		f		m	
Age	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
35 ≥	2	1.1	0	0	4	2.1	0	0	1	0.53	0	0	2	1.1	0	0	0	0	0	0	1	0.5	0	0
36-45	13	6.9	11	6.4	23	12	24	13.9	7	3.72	6	3.5	8	4.3	6	3.47	1	0.5	0	0	4	2.1	3	1.7
46-55	11	5.9	12	6.9	65	35	59	34.1	41	21.8	36	21	22	12	22	12.7	2	1.1	4	2.3	11	5.9	15	8.7
56-65	8	4.3	6	3.5	58	31	63	36.4	23	12.2	19	11	18	9.6	6	3.47	2	1.1	2	1.2	21	11	14	8.1
66 ≤	3	1.6	2	1.2	12	6.4	17	9.83	11	5.85	4	2.3	1	0.5	6	3.47	0	0	0	0	1	0.5	9	5.2

\*f = female  
\*m= male

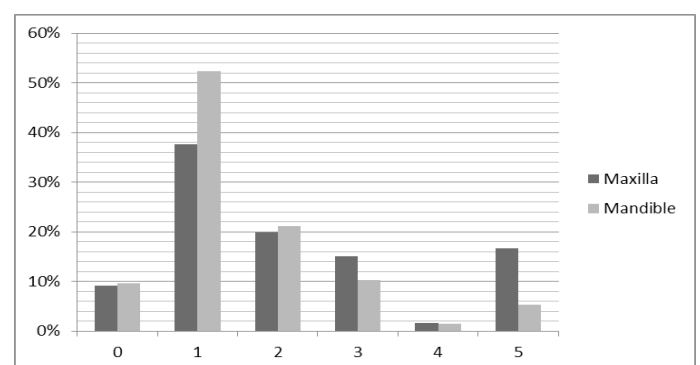
### Statistical Analysis

Chi-Square test and logarithmic linear model analysis were used to determine the statistical significance (p<0,05). Odds ratios between the variables were also calculated to confirm the statistical data.

### Results

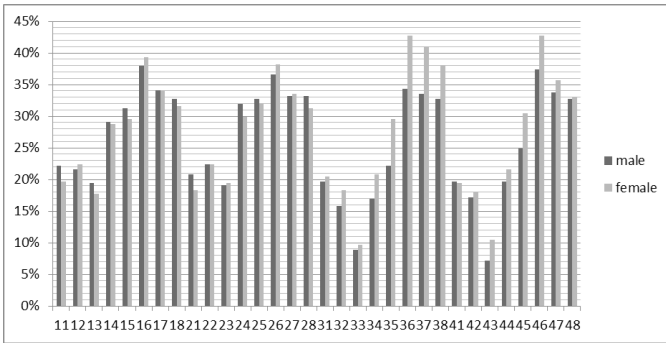
The percentage of Kennedy classification for maxilla and mandible from high to low is Kennedy I, II, III, full dentate, total edentulism and Kennedy IV respectively. According to results of the study, tooth loss and Kennedy classification differences observed between female and male individuals (sex) were not statistically significant.

The age factor was found to be statistically significant (p≤0.05). The Kennedy classifications showed statistically different percentage for both maxilla and mandible in age groups (Figure 1). Age factor also have significant effect on the tooth loss for both maxilla and mandible in age groups.



**Fig 1.** Distrubition of the edentulism according to groups for both maxilla and mandible

The highest prevalence of missing teeth according to sex factor was 46 (female 42.7% male 37.45%), 16 (f 39.3%, m 38%) and 36 (f 42.7%, m 34.3%), respectively and the lowest prevalence was 43 (f 10.5%, m 7.2%) and 33 (f 9.7%, m 8.9%), respectively, but these differences were not statistically significant (Figure 2). Females lost their 35, 36 and 37 (p ≤ 0.10) more than males, while the males lost their 24 (p ≤ 0.05) more than females.



The loosen teeth according to age groups are shown in Table 2. In our study, the lower premolar teeth loss (teeth with 34, 35, and 44) found to be highest percentage at the 46-55 aged, 56-65 aged, 66-75 aged and 76≤ aged groups ( $p \leq 0.05$ ). Similarly, the loss of upper teeth was found to be higher in individuals between the ages of 56-65 ( $p \leq 0.05$ ).

**Fig 2.** Distrubiton of tooth loss according to gender

<b>Table 2.</b> Percentage of tooth loss according to age groups										
Age	35 ≥ (n=5)		36-45 (n=53)		46-55 (n=150)		56-65 (n=120)		66 ≤ (n=33)	
Tooth Number	n	%	n	%	n	%	n	%	n	%
11	0	0	15	28.3	51	34.0	68	56.7	17	51.5
12	0	0	18	34.0	55	36.7	66	55.0	20	60.6
13	0	0	15	28.3	47	31.3	58	48.3	14	42.4
14	1	20	23	43.4	77	51.3	84	70.0	24	72.7
15	1	20	29	54.7	84	56.0	85	70.8	21	63.6
16	3	60	35	66.0	115	76.7	100	83.3	26	78.8
17	2	40	30	56.6	99	66.0	94	78.3	21	63.6
18	2	40	30	56.6	92	61.3	88	73.3	20	60.6
21	0	0	14	26.4	47	31.3	64	53.3	16	48.5
22	0	0	15	28.3	60	40.0	71	59.2	16	48.5
23	0	0	15	28.3	52	34.7	56	46.7	16	48.5
24	1	20	26	49.1	84	56.0	85	70.8	27	81.8
25	1	20	29	54.7	93	62.0	89	74.2	22	66.7
26	2	40	37	69.8	112	74.7	93	77.5	26	78.8
27	2	40	32	60.4	98	65.3	87	72.5	22	66.7
28	2	40	31	58.5	92	61.3	86	71.7	22	66.7
31	2	40	13	24.5	57	38.0	56	46.7	17	51.5
32	2	40	12	22.6	45	30.0	50	41.7	14	42.4
33	1	20	6	11.3	30	20.0	23	19.2	7	21.2
34	2	40	8	15.1	57	38.0	54	45.0	15	45.5
35	3	60	14	26.4	82	54.7	71	59.2	17	51.5
36	5	100	34	64.2	114	76.0	99	82.5	26	78.8
37	4	80	35	66.0	108	72.0	97	80.8	25	75.8
38	3	60	30	56.6	102	68.0	95	79.2	25	75.8
41	2	40	14	26.4	58	38.7	52	43.3	15	45.5
42	2	40	13	24.5	50	33.3	48	40.0	14	42.4
43	1	20	8	15.1	27	18.0	23	19.2	5	15.2
44	1	20	12	22.6	60	40.0	58	48.3	18	54.5
45	2	40	21	39.6	85	56.7	71	59.2	21	63.6
46	5	100	37	69.8	119	79.3	101	84.2	27	81.8
47	5	100	33	62.3	98	65.3	90	75.0	25	75.8
48	4	80	29	54.7	93	62.0	87	72.5	24	72.7



## Discussion

Null hypothesis of the study, age and gender have no effect on tooth loss and partial edentulism distribution, and no differences on the distribution rate of Kennedy classification in Ankara region, was mainly rejected. The findings confirmed that age have a significant effect on the prevalence of tooth loss and partial edentulism, but it was found that gender have no effect on the prevalence of tooth loss and partial edentulism. In addition, it was found that Kennedy Class I have the highest distribution rate.

The prevalence of tooth loss and partial edentulism may differ between countries and regions due to different factors such as socioeconomic status, education, gender and age. In our study, the effect of age and gender factors on the prevalence and classification of tooth loss and partial edentulism were investigated. Although the prevalence of partial edentulism showed differences between the male and female, these differences were not statistically significant. Doğan and Gökalp also reported similar results with our study [1]. In our study, it was found that women lost their 35, 36 and 37 number teeth more than males and males lost their 24 more than females, but these results are not statistically significant.

Previous studies, conducted on patients using partial prosthesis in Turkey, have reported that about 87.6% of individuals aged 65-74 still do not have minimum functional teeth. Our study was performed on patients who referred to Ankara University Faculty of Dentistry, Department of Prosthodontics and the number of missing teeth was found to 21-25. It was determined that the molars and premolars were the highest lost rate respectively for both maxilla and mandible. In our study, the lower premolar teeth loss (teeth with 34, 35 and 44) found to be highest percentage at the 46-55, 56-65, 66-75 aged and  $66 \leq$  aged groups ( $p \leq 0.05$ ). Similarly, the loss of upper teeth was found to be higher in individuals between the ages of 56-65 ( $p \leq 0.05$ ). Görgün et al. reported that premolars were the least lost between the ages of 55-64 [16] and Bocutoğlu et al. reported that the most lost teeth were molars [17]. These results suggest that the molar teeth are the earliest lost and it may be associated with earliest eruption and rotten. Our study was performed on randomly selected diagnostic models of the patients who were randomly referred to Ankara University Faculty of Dentistry Department of Prosthodontic, thus socio-demographic characteristics of

the study is below a certain limit. Other studies, conducted in different countries and state hospitals, also have certain socio-demographic characteristics which parallel to our study [18, 19]. Kennedy Class I was the most commonly partial edentulism in for both maxilla and mandible and Kennedy Class IV was observed in the lowest commonly partial edentulism. Our findings are similar with studies conducted in Japan [15, 21]. In addition some studies show that Kennedy Class III is more prevalent partial edentulism in developing countries (Jordan, Kazakhstan, Saudi Arabia) [14, 15, 22].

Sadig and Idowu reported that prevalence of Kennedy Class I and II were the highest in female aged 45-64 due to increasing tooth loss with increasing age [14]. In parallel to our study, Ergun et al. & Polychronakis et al. found that Kennedy Class I has the highest prevalence and Kennedy Class IV has the lowest [23, 24]. Ergun also found that Kennedy I has the highest prevalence for mandible and Kennedy Class II has the highest prevalence for maxilla [23]. In a study on the individuals who used the partial removable prosthesis, Curtis et al. reported that Kennedy Class II was the most common class for the maxilla and Kennedy I for the mandible and the distribution of Kennedy classification was Kennedy Class I (40%), II (33%), III (18%) and IV (9%), respectively [25]. The Kennedy Class I was the most common in people aged 40-60, but the Kennedy Class III was seen most frequently in people aged 41-50 [25]. According to these results, it can be concluded that the distribution of tooth loss shows different characteristics in different regions and ages. In previous studies, conducted in different years and clinics in Ankara region, it was stated that Kennedy Class I is the most common class and Kennedy Class IV is the least most common class, and these studies obtain similar results to our studies [15, 23, 26, 27, 28]. According to these results, it can be concluded that there was no difference in the distribution of Kennedy classification over a period of 35 years in Ankara region.

Many factors such as age, gender, oral hygiene, socioeconomic factors, uncontrolled chewing forces, oral hygiene habits, regular dental control, gingivitis and periodontitis affect the prevalence of tooth loss and partial edentulism, but in our study only the effects of the gender and age on tooth loss and partial edentulism were evaluated. Thus, the effects of other factors on tooth loss and partial edentulism should be investigated with further studies. Additionally, our study was conducted on a certain number of patients who referred to the Ankara University,

Faculty of Dentistry. Further investigations in different regions are needed to assess the prevalence of tooth loss and partial edentulism and changes in the Turkish population.

## Conclusion

With the limitation of the study it can be concluded that; Age has a significant effect on the partial edentulism distribution and tooth loss for both maxilla and mandible ( $p \leq 0.05$ ). Gender has no significant effect on partial edentulism distribution and tooth loss. The most common partial edentulism is Kennedy I and the least common partial edentulism is Kennedy IV. Premolar teeth were lost in mandible more than maxilla for over 46 years age people. Incisors have been lost more for 56-65 age range and molar teeth are the most common lost teeth. Women lost their lower premolar teeth more than men. Health care maintenance and preventive measures should be encouraged in the elderly.

## Declaration of conflict of interest

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