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The effect of age and gender on tooth loss in different jaw areas and fixed prosthetic dental treatments

Murat Keçeci[1] , Mehmet Gökberkkaan Demirel[2]

[1] Karamanoğlu Mehmetbey University, Ahmet Keleşoğlu Faculty of Dentistry, Department of Prosthodontics, Karaman, Turkey
[2] Necmettin Erbakan University, Faculty of Dentistry, Department of Prosthodontics, Konya, Turkey

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Abstract

Aim: Rehabilitation of tooth losses with fixed prosthesis applications is still a highly preferred option today. Teeth are the most important components for chewing function, proper phonation, and aesthetics. The aim of the study is to examine the relationship between tooth loss and fixed prosthetic restorations in patients of different age groups and genders.

Methodology: In this study, a total of 300 patients were studied to examine the relationship between tooth deficiencies and the number of fixed restorations applied with gender and age. These patients were divided into two gender groups, male and female, and six age groups, with n = 25 in each group. Fixed prosthetic restorations in the missing teeth and mouths of the patients were recorded on dental panoramic radiographs. Statistical analysis was conducted with the one-way ANOVA test.

Results: Tooth loss and the number of prosthetic applications increased statistically with age, but no statistical difference was found with gender. The Independent samples t-test analysis of variances was used in this study ($p < 0.05$).

Conclusion: Tooth loss increases in patients with age due to many factors. This problem should be prevented by popularizing preventive dental practices. Female patients with poor dental hygiene and tooth loss associated with hormonal changes in specific age ranges have increased.

Keywords: Tooth loss, fixed dental prostheses, dental panoramic radiography, poor dental hygiene

Introduction

Teeth are the most critical elements in providing chewing function, correct phonation, and aesthetics. Tooth loss is shown as the most important factor in the deterioration of patients' oral functions and leads to functional, aesthetic, and social damage with impact on people's quality of life as well as elderly individuals. Previous research has shown that poor oral health might impede daily activities, as well as the effect of tooth loss and dental caries on Oral Health Related Quality of Life (OHRQoL) in working adults. (1). Not being to treat dental caries and periodontal diseases causes permanent tooth loss (2). It has been reported that systemic diseases such as hypercholesterolaemia, hypertension, heart diseases, and diabetes mellitus, incidence of cardiovascular disease and coronary heart disease contribute to tooth loss (3, 4). Hormonal changes in the body during menopause and pregnancy have also been associated with tooth loss (5).

Although the incidence of tooth loss tends to decrease worldwide, it is one of the first hundred factors that has the highest impact on the health of the world population (6). The World Health Organization aims to have a minimum of 20 teeth in patients over 80 (7). Local examination of factors such as socio-economic situation, inadequate oral hygiene, and disregard for dental health that may cause tooth loss will help the world health organization achieve its goal.

Dental panoramic radiographs (DPR) are routinely used in clinical examinations because of their easy application, the ability to visualize the entire dentition and previous restorations, and the low dose of radiation. The effective radiation dose of DPR (~9 μSv) is approximately six times lower than that of tomographic systems (~56 μSv) (8). Since DPR is easy to store, the intraoral states of the patients at different times could be compared. Although DPR is not the most effective visualization system in the diagnosis of caries, it is still used frequently because it provides information about the general condition of the mouth (9, 10).

Tooth deficiencies and treatment priorities of patients from different age groups and genders vary according to their socio-economic status, education, and social communication needs. This study aims to examine the relationship between tooth deficiencies and localization of fixed prosthetic restorations with age and gender with DPR.

Materials and Methods

Ethics committee approval was received for this study from Necmettin Erbakan University, Faculty of Dentistry, Research Ethics Committee (2022/20).) In this study, the DPR of 300 random patients who applied to Necmettin Erbakan University, Faculty of Dentistry for examination or treatment in the first nine months of 2022 were examined. The patients were divided into two gender groups, male and female, and six age groups: 18-29, 30-39, 40-49, 50-59, 60-69, and 70+ (n = 25).

In this study, common tooth deficiencies and fixed prosthetic restorations in the Konya region were examined. The methodology of the study was applied simultaneously by two experienced dentists to ensure standardization. During the radiographic evaluation, six sextants, three in each of the jaws, were evaluated and recorded in tooth loss and fixed prosthetic restorations. Incisional and canine teeth were included in the anterior sextant, and premolar, first molar, and second molar teeth were included in the right and left posterior sextants (Table 1). After evaluating the teeth one by one, the radiographic conditions were recorded in the determined areas. Third molar teeth were not evaluated in patients whose radiographs were examined, and patients who received implant treatment in any sextant were not included in the study.

Table 1 - Separation of jaws into sextants.

	Right posterior	Anterior	Left Posterior
Maxilla	17,16,15,14	13,12,11,21,22,23	24,25,26,27
Mandibula	47,46,45,44	43,42,41,31,32,33	34,35,36,37

Statistical analysis

Analyses were performed by using SPSS software (IBM SPSS Statistics version 21, IBM Inc., Armonk, NY, USA). The findings of 150 female and 150 male patients were evaluated within the scope of the study. Evaluations of 25 female and 25 male patients from each age group were included.

Average values for tooth deficiencies in the jaw regions determined in the patients evaluated within the scope of the study were presented in Table 2. For comparison, one-way ANOVA and co-sample T-tests were used. Correlation analysis was also performed to determine whether there was a significant relationship between prosthesis and tooth deficiencies in the sextants.

Results

In the study, the detailed comparison of tooth deficiencies divided into regions was shown in Table 2, the average number of fixed prostheses they have according to the regions was shown in Table 3, and the comparison of the total values of tooth losses and fixed prosthesis applications with age and gender as shown in Table 4.

In evaluating the tooth deficiencies of the patients according to the regions, it was observed that there was generally less tooth deficiency in the lower anterior region (Table 2). In general, the tooth loss of the patients in the anterior region is statistically less than the other regions ($p > 0.05$) (Table 2).

Table 2. Average tooth deficiency by region.

	M2	M3	M4	M5	M6	M7
URP	0.28±0.61^A	0.40±0.65^{A1}	*0.88±1.13^{A1}	1.80±1.47^{A12}	1.96±1.40^{B1}	*2.96±1.24^{C1}
UAnt	0^A	0.08±0.28^{A2}	0.40±1.26^{A2}	1.48±2.04^{B1}	*1.64±2.27^{B1}	*3.24±2.67^{C1}
ULP	0.16±0.47^A	0.40±0.7^{A1}	*0.44±0.96^{A2}	2.20±1.41^{B2}	2.04±1.37^{B1}	3.00±1.19^{B1}
LLP	0.16±0.37^A	0.52±0.59^{A1}	*0.72±0.79^{A1}	1.72±1.28^{B1}	1.64±1.47^{B1}	2.64±1.41^{C1}
LAnt	0^A	0.12±0.44 ^{A2}	0.56±1.50^{A12}	0.72±1.49^{AB3}	1.04±1.93^{B2}	*2.16±2.64^{C2}
LRP	0.20±0.50^A	0.40±0.65^{A1}	0.84±0.99^{A1}	1.60±1.32^{B1}	1.84±1.43^{B1}	*2.44±1.53^{B2}
	F2	F3	F4	F5	F6	F7
URP	0.16±0.47^A	0.28±0.54^{A1}	*1.44±1.19^{B1}	1.80±1.3^{B12}	2.00±1.41^{BC1}	*2.56±1.36^B
UAnt	0^A	0.08±0.28^{A1}	0.60±1.29^{B2}	1.48±2.18^{C1}	*0.84±1.55^{B2}	*2.68±2.04^D
ULP	0.16±0.37^A	0.80±1.04^{B2}	*1.44±1.39^{B1}	2.08±1.53^{C2}	2.32±1.35^{C1}	2.96±1.06^D
LLP	0.17±0.37^A	0.40±0.50^{A1}	*1.28±1.14^{B1}	1.72±1.57^{B12}	1.64±1.29^{B1}	2.64±1.41^C
LAnt	0.04±0.20^A	0.04±0.20^{A1}	0.92±1.53^{B12}	1.16±2.13^{B1}	1.12±1.76^{B2}	*2.68±2.39^C
LRP	0.04±0.20^A	0.64±0.81^{B2}	1.24±1.23^{B1}	1.76±1.59^{B12}	1.84±1.07^{B1}	*3.16±1.37^C

$p < 0.05$. n = 25. M2: Male patients in the range of 18-29, M3: Male patients in the range of 30-39, M4: Male patients in the range of 40-49, M5: Male patients in the range of 50-59, M6: Male patients in the range of 60-69, M7: Male patients in the range of 70+, F2: Female patients in the range of 18-29, F3: Female patients in the range of 30-39, F4: Female patients in the range of 40-49, F5: Female patients in the range of 50-59, F6: Female patients in the range of 60-69 and F7: Female patients in the range of 70+ was shown.

URP: Upper right posterior, UAnt: Upper anterior, ULP: Upper left posterior, LLP: Lower left posterior, LAnt: Lower anterior, LRP: Lower right posterior shows sextants.

There is no statistically significant difference between the same uppercase superscript letters on the same line by age. There is no statistically significant difference between the same superscript numbers in the same column according to the region where the deficiency is found. The * sign shows a statistically significant difference according to gender in terms of the region where missing teeth are found. Findings are given as mean ± standard deviation.

While M5 was the group with the highest mean prosthesis in male patients, M2 showed the lowest values, and the difference between them was statistically significant ($p < 0.05$). The averages of prosthesis F4, F6, and F7 were the highest in patients, and there was no statistically significant difference between these groups. Again, the lowest value was observed in the F2 group (Table 3).

In the distribution of prostheses in the upper anterior region by gender, it was observed that the patients had statistically more prostheses in the F4, F7, and M5 groups (Table 3).

Table 2. Average of the fixed prosthesis by regions.

	M2	M3	M4	M5	M6	M7
URP	0.08±0.40 A	0 A	*0.28±0.84 A	*1.44±1.83 B1	0.92±1.47 B	0.48±0.82 A
UAnt	0.04±0.20 A	0.04±0.20 A	*0.40±1.04 A	*1.80±2.43 B2	0.96±1.67 C	*0.72±1.67 C
ULP	0.12±0.44 A	0.24±0.83 A	*0.32±0.99 A	1.28±1.72 B1	1.28±1.70 B	0.92±1.35 B
LLP	0.20±0.41 A	0.32±0.90 A	0.64±1.22 A	*1.44±1.76 B1	0.96±1.54 AB	0.60±1.26 AB
LAnt	0 A	0.36±1.32 A	0.60±1.73 B	*1.52±2.60 C12	*0.92±2.02 B	*0.96±1.99 B
LRP	0 A	0.28±0.74 A	0.68±1.25 B	1.16±1.52 C1	1.16±1.46 C	0.56±1.16 B
	F2	**F3**	**F4**	**F5**	**F6**	**F7**
URP	0.12±0.60 A	0.16±0.80 A	*1.44±1.66 B1	*0.72±1.28 C	0.76±1.39 C1	0.88±1.27 C1
UAnt	0.04±0.20 A	0.20±0.82 A	*1.56±2.12 B1	*1.12±2.01 B	1.36±1.87 B2	*2.36±2.50 C2
ULP	0 A	0.36±0.99 A	*1.36±1.70 B1	1.08±1.55 B	0.84±1.49 C1	0.68±1.22 C1
LLP	0.12±0.44 A	0.12±0.60 A	0.72±1.34 B2	*0.68±1.14 B	0.88±1.33 B1	0.92±1.32 B1
LAnt	0 A	0.08±0.40 A	1.00±2.24 B12	*0.64±1.68 B	*1.60±2.57 C2	*2.00±2.68 C2
LRP	0 A	0.40±1.19 A	0.84±1.40 B1	1.12±1.48 C	1.48±1.69 C2	0.36±0.86 A1

$p < 0.05$. n = 25. M2: Male patients in the range of 18-29, M3: Male patients in the range of 30-39, M4: Male patients in the range of 40-49, M5: Male patients in the range of 50-59, M6: Male patients in the range of 60-69, M7: Male patients in the range of 70+, F2: Female patients in the range of 18-29, F3: Female patients in the range of 30-39, F4: Female patients in the range of 40-49, F5: Female patients in the range of 50-59, F6: Female patients in the range of 60-69 and F7: Female patients in the range of 70+ was shown.

URP: Upper right posterior, UAnt: Upper anterior, ULP: Upper left posterior, LLP: Lower left posterior, LAnt: Lower anterior, LRP: Lower right posterior shows sextants.

There is no statistically significant difference between the same uppercase superscript letters on the same line by age. There is no statistically significant difference between the same superscript numbers in the same column according to the region where the deficiency is found. The * sign shows a statistically significant difference according to gender in terms of the region where tooth loss is found. Findings are given as mean ± standard deviation.

Table 3. Comparison of total values by age and gender.

	M2	M3	M4	M5	M6	M7
TL	0.80±1.32 Aa1	1.92±2.06 Ba1	3.84±5.17 Ca1	9.52±6.65 Da1	10.16±7.48 Da1	16.44±8.88 Ea1
PR	0.40±1.04 A1	1.24±3.13 B1	2.92±4.07 C1	8.64±7.20 D1	6.20±5.43 E2	4.24±6.06 F2
	F2	**F3**	**F4**	**F5**	**F6**	**F7**
TL	0.56±1.08 Aa1	2.24±1.92 Ba1	6.92±5.54 Cb1	10.00±8.13 Da1	9.76±6.08 Da1	16.68±5.85 Ea1
PR	0.28±1.06 A1	1.32±3.02 B1	6.92±6.55 C1	5.36±6.12 D2	6.92±6.95 C2	7.20±6.15 C2

$p < 0.05$. n = 25. M2: Male patients in the range of 18-29, M3: Male patients in the range of 30-39, M4: Male patients in the range of 40-49, M5: Male patients in the range of 50-59, M6: Male patients in the range of 60-69, M7: Male patients in the range of 70+, F2: Female patients in the range of 18-29, F3: Female patients in the range of 30-39, F4: Female patients in the range of 40-49, F5: Female patients in the range of 50-59, F6: Female patients in the range of 60-69 and F7: Female patients in the range of 70+ is shown.

TL: Tooth loss PR: Fixed prosthesis is shown.

There is no significant difference by age between the same uppercase superscript letters on the same line. There is no significant difference between the same lowercase superscript letters in the same column regarding tooth loss by gender. There is no significant difference between the same superscript numbers in the same column regarding the number of tooth loss and prostheses. Findings are given as mean ± standard deviation.

Discussion

Evaluation of the tooth loss of patients according to the regions is considered an essential factor to examine the effects of preventive dentistry in that society. In a retrospective study, it was found that tooth loss and fixed prostheses increase with age in all genders. Periodontal diseases and the incidence of caries with advancing age cause tooth loss (11). Russell et al. concluded in their study that different genders show similar tooth losses (12).

It is known that systemic diseases are seen more frequently with advancing age. A relationship has been found between the prevalence of systemic diseases such as hypertension, diabetes mellitus and tooth loss. Cohort studies have linked dental status to specifically atherosclerotic cardiovascular and cerebrovascular diseases, cerebral and ischaemic stroke and oropharyngeal cancers (3, 4, 13, 14). Steele et al. showed that age and tooth loss are related (15). Based on these results, it could be express that tooth loss is associated with systemic diseases and advancing age. It is thought that the number of fixed prostheses performed increases with advancing age (16).

Since the rehabilitation of the patients with removable prosthesis was not examined in this study, it is thought that there was a statistically significant difference in the correlation between tooth loss and fixed restoration at later ages. According to the study results, there is a difference between the tooth loss and the fixed prosthesis in the M6, M7, F5, F6, and F7 groups. As a reason for this situation; in Turkish societies, it can be shown that tooth loss increases with the menopause period of women in their 50s (17). Ricardo Alvez et al. reported in their study that there was a difference between pre-menopausal and post-menopausal tooth loss (18). Major hormonal changes that occur in women with menopause are a risk factor for oral health. Dry mouth and destructive periodontal diseases are risk factors associated with menopause (19).

Within the scope of the study, gender differences in the same age groups were examined, and it was observed that females in their 40s showed a statistically higher value than males regarding both tooth loss and the presence of prosthesis. It could be thought that female patients prefer fixed prosthesis for the rehabilitation of teeth lost during pregnancy in their 30s. This situation could explain that female patients in their 40s mostly receive fixed prosthesis treatment. Again, it is thought that tooth loss increases with female patients entering the menopause period towards the end of their 40s. This is probably why statistically significantly more tooth loss in the F4 group than in the M4 group (20).

Prostheses in the F6 and F7 groups were statistically higher in the M6 and M7 groups. This situation could be explained by female patients' higher social aesthetic expectations than males (21).

In the study, it was observed that anterior teeth were generally less lost in the evaluation of tooth loss compared to sextants. It could be thought that patients want to keep their anterior teeth in the mouth for aesthetic reasons instead of pulling them out. A study also confirms that patients experience less tooth loss in the anterior region until a certain age (22). Anterior tooth losses are thought to be caused by caries in young individuals and by periodontal factors in adult individuals (23).

According to the results of this study, the anterior region was the group with the least tooth deficiency for all genders. Many studies investigating the combination syndrome, have stated that maxillary and mandibular posterior partial edentulism is a widespread clinical condition (24-27). It has been reported in many studies that the anterior teeth are the most frequently involved teeth in the mouth and the Kennedy IV group in the partial edentulism classification is the least common type (28-30). Kennedy IV, partial edentulism describes the loss of teeth in the anterior sextant whose distal part is not lost.

According to the results of this study, it could be expressed that with the advancement of age, tooth loss experiences of patients are compatible with Kennedy I. This result is similar to the results of previous studies (31, 32).

This study was carried out using the panoramic radiographs of randomly selected patients who applied to Necmettin Erbakan University. The limitations of this study are that the time frame is limited, and the patients presenting to a single institution are present. The study should be supported by doing it in the broader population and in a wider time frame.

Conclusion

In this study, in which dental panoramic radiographs were evaluated, it was concluded that the loss of teeth and the number of fixed prostheses made increased with the advancing age of the patients. Especially in female patients with poor oral hygiene, it has been observed that the loss of teeth experienced with hormonal changes in specific age ranges has increased. With the oral hygiene training to be given to the patients, it should be aimed to minimize the factors that cause tooth loss.

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