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The Prevalence of Partial Edentulism and Associated Factors: A Cross-Sectional Study

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Abstract

Objective: The current study aimed to determine the prevalence of partial edentulism according to Kennedy's classification and its association to arch, age and gender.

Methods: Data were collected from 358 patients aged 18 to 80 years. Selected patients were grouped according to gender and age (<45, =>45). Intra oral examination for each patient was done. The pattern of partial edentulism according to Kennedy's classification was determined. Statistical analysis was done using the SPSS V26 statistical program. Chi-square test was used to test for differences in frequency at p-value<0.05.

Results and Conclusion: The rate of class III pattern in maxillary arch was significantly higher than that of mandibular arch. Class I pattern in mandibular arch was significantly higher than that of maxillary arch (25.1% vs 14%, P=0.001). No differences in frequency were found between class II and IV pattern and affected arch. Class IV was the least frequent in both dental arches. Frequency of class I and class II partial edentulism increased with age, while class III was more frequent at young age. Class IV pattern was more frequent among males than females.

Keywords: Partial edentulism, Kennedy classification, Gender differences, Sex differences, Dental arches.

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Introduction

The physiological, social, and psychological aspects of the quality of life associated to oral health are greatly affected by tooth loss. It causes a variety of anatomical, aesthetic, and biomechanical problems that compromise a person's general health and quality of life [1]. In several countries during the past few decades, the prevalence of tooth loss has significantly decreased [2-4]. The decrease in the number of edentulous people is an indicator that oral health in the population is improving [5,6], and it also indicates that the health care system's preventive measures were effective [2,7].

When some natural teeth are lost, but not all of them, then partial edentulism or a gap or space in the dental arch that can be replaced by one or more teeth is established. Caries, periodontal disease, trauma, impactions, supernumerary teeth, neoplastic and cystic lesions are the most common causes [8,9].

There are numerous classifications for partial edentulism, but the most popular ones are Cummer, Neurohr, Kennedy, Applegates, Skinner, and Bailyn [10,11]. Kennedy's classification for partially edentulous arches is currently regarded as the most frequently accepted classification. Kennedy's classification provides quick visualization, prosthesis support identification, and evaluation of removable partial denture design elements [12-14]. Kennedy classified all partially edentulous arches into four major types. They are: Class I, posterior

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to the remaining natural teeth, bilateral edentulous regions; Class II, a single edentulous region that is posterior to the natural teeth that are still present; Class III, an area that is unilaterally edentulous but still has natural teeth on each side of it and, Class IV, a single, bilateral (across the midline) edentulous area that is anterior to the remaining natural teeth [15]. Class III has been reported as the most common pattern in maxillary arch, while class IV the least common [16]. Also, Kennedy type III was the most common kind of classification in both the maxilla and the mandible, whereas Kennedy type IV was found to be the least common in the maxilla and in the mandible [17]. Class I and class II tend to increase with age while class III and class IV tend to decrease [16,18]. Most authors have concluded that there are no significant differences in partial edentulism by gender [19].

This study's objective was to establish the frequency of partially edentulous patients within Iraqi population by age, gender, and arches.

Material and Methods

This cross-sectional study was conducted at Dijlah University Dental Hospital, Iraq, Baghdad, where patients treated at the Prosthodontics Department to restore missing teeth with removable partial denture were selected.

This study extended from October 2021 to May 2022. Each adult patient having partially edentulous spaces was interviewed and data on age, gender, number of teeth, site of missing teeth, and pattern of partial edentulism according to Kennedy's classification were collected. The study excluded patients who had only missing third molars, unerupted or congenitally missing teeth, retained roots, and mobile teeth that needed to be extracted. In cases of patients having complete edentulism were also not included.

Ethical consideration

The Dijlah University Dentistry Department's ethics and research committee thoroughly evaluated and approved the project. Each patient was given a written consent after being fully informed of the study's objectives and receiving assurances regarding the confidentiality of the data that would be collected, which would be anonymous and utilized only for the current study.

Statistical analysis

The statistical program SPSS V26 was used to analyze data. Chi-square was used for all comparisons and a P-value < 0.05 was regarded as the discrimination point for significance.

Results

According to the exclusion criteria, a total of 400 patients were examined and only 358 included in the study. Among them, 38.5% were young adults (aged less than 45 years), 45% were males, 77.9% had maxillary involvement, 65.4% had mandibular involvement, and 43.3% had both arches were involved.

Totally dentate maxillary arches were found in 22.1% of cases, while 14%, 22.6%, 38%, and 3.4% of cases were class I, class II, class III and class IV partially edentulous, respectively. Regarding the mandibular arch, 34.6% of cases were totally dentate, while 25.1%, 22.6%, 15.1%, and 2.5 % of cases were class I, class II, class III and class IV partially edentulous, respectively.

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Table 1. Distribution of studied cases according to the studied characteristics.

		N	%
Age	<45 year	138	38.5%
	≥45 year	220	61.5%
Sex	Male	161	45%
	Female	197	55%
Maxilla	Dentate	79	22.1%
	Class I	50	14%
	Class II	81	22.6%
	Class III	136	38%
	Class IV	12	3.4%
Mandible	Dentate	124	34.6%
	Class I	90	25.1%
	Class II	81	22.6%
	Class III	54	15.1%
	Class IV	9	2.5%
Jaw	Maxilla	279	77.9%
	Mandible	234	65.4%
	Both	155	43.3%
At least class	Class I	50	14%
	Class II	112	31.3%
	Class III	175	48.9%
	Class IV	21	5.9%

Table 2 displays the frequency of Kennedy's classes in the maxillary and mandibular arches. Frequency of class I pattern in the mandible was significantly higher than that on the maxillary arch (25.1% vs 14%, P=0.001), while the rate of class III pattern in the maxillary arch was significantly higher than that of the mandibular arch (38% vs 15.1%, P=0.001). No differences were found between class II and IV patterns and affected arches (p>0.05).

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Table 2. Frequency of various Kennedy's classes in the maxillary and mandibular arches.

	Mandible		Maxilla		P-value
	N	%	N	%	
Class I	90	25.1%	50	14%	0.001
Class II	81	22.6%	81	22.6%	1
Class III	54	15.1%	136	38%	0.001
Class IV	9	2.5%	12	3.4%	0.506

Class III was more prevalent among younger people (51.4%), which is significantly higher than the frequency found at the old age group (48.6%) (Table 3). Classes I and II had the highest incidence among older people (78% and 77.7%, respectively), and both were significantly higher than the frequency found in younger people (22% and 22.3%, respectively). It was found that bounded saddles changed into free end saddles as people aged. Class IV was the least frequent pattern, but more cases were found among younger people (57.1%) in comparison to the old age group (42.9%).

Table 3. Frequency of Kennedy's classes according to age.

		<45 year		=>45 year		P-value
		N	%	N	%	
Class	Class I	11	22%	39	78%	0.01
	Class II	25	22.3%	87	77.7%	0.001
	Class III	90	51.4%	85	48.6%	0.001
	Class IV	12	57.1%	9	42.9%	0.071

Frequency of various Kennedy classes according to gender is shown in Table 4. No significant differences were noticed between class I, II or III by gender (P>0.05), but the rate of class IV among males (76.2%) was significantly higher than that of females (23.8%) (P=0.033).

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Table 4. Frequency of Kennedy classes according to gender.

		Male		Female		P-value
		N	%	N	%	
class	Class I	23	46%	27	54%	0.875
	Class II	43	38.4%	69	61.6%	0.091
	Class III	79	45.1%	96	54.9%	0.949
	Class IV	16	76.2%	5	23.8%	0.033

Discussion

Removable partial dentures (RPDs) should be classified in order to facilitate identification and enhance training. Kennedy's classification was employed in this study because it provides a simple method to visualize the partially edentulous arch, enables a logical approach to design problems, and is therefore a logical method of classification [18,20].

In the present study, the high percentage of class III partial edentulism was in accordance with various studies that found Kennedy class III is the most prevalent pattern of partial edentulism [15,21-25]. The result can be explained by the higher involvement of the maxillary arch, which recorded higher frequency of class III partial edentulism compared with the mandibular arch, due to the relative early loss of premolars and molars [26-28].

The low prevalence of Kennedy class IV can be attributed to the lower chance of tooth loss in the anterior region compared to the molar region. Fixed restorations are preferred for the treatment of such edentulism. Patients probably give more care and attention to anterior teeth [15,29,30].

In this study, class III partial edentulism and maxillary arch were significantly correlated. Previous work [18,22,31] found that Kennedy's class III was common in the maxillary arch. This study showed no association between class II and maxillary arch, and this is in disagreement with previous reported data [32], which showed a higher incidence of class II in the maxillary arch, and this may reflect differences in personal habits of oral hygiene. In this study, there was a significant correlation between Kennedy's class I and mandibular arch. This result is in line with previous studies [29,33], in which the mandible was the arch with the highest prevalence of Kennedy's class I occurrence. Kennedy class I seems to be more commonly treated by RPDs [22,24]. The early eruption of mandibular teeth in the oral cavity, which predisposes them to greater caries rates and increased chances of tooth extraction, may be the cause of the higher incidence of class I in the mandibular arch [18].

The study found that young group had more class III partial edentulism. Older age groups had more distal extension (class I, followed by class II). Higher rates of class III in younger age groups may be attributed to early first molar loss caused by caries. Age-related tooth loss causes the preexisting saddle to be extended, which results in classes I and II

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[16]. These results were in accordance with previous data from Saudi Arabia [23,24], which showed higher occurrence of free extended spaces among older people. These studies reported a higher frequency of class III and class I partial edentulism among younger and older people, respectively.

Several studies showed a high tendency for class I and class II increases with age [15,16,18,25,34].

The data showed no evidence of a significant relationship between Kennedy classes and gender. Regarding class IV, it was more common among males and this may be due to maxillary central incisors trauma caused by physical injuries, such as car and bike accidents, or due to male violent behavior compared with females.

Conclusion

Kennedy's class III is the most common pattern in the maxillary arch, whereas Kennedy's class I is more common in the mandibular arch. Age had a significant influence on different frequencies of Kennedy classes, while gender had a significant effect on the prevalence of Kennedy class IV only. It was clear that as people aged, their saddles would change from being bounded to being free.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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