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EPIDEMIOLOGICAL ASSESSMENT OF PARTIAL EDENTULISM PREVALENCE AMONG PATIENTS ATTENDING THE DEPARTMENT OF PROSTHODONTICS AT A RURAL DENTAL COLLEGE IN TAMIL NADU, INDIA

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Abstract

Introduction: Partial edentulism is a common dental condition that affects oral function, aesthetics, and quality of life. Understanding the pattern of tooth loss helps in planning appropriate prosthodontic treatment and implementing preventive strategies.

Aims and Objectives: To determine the occurrence of various missing teeth patterns among the partial edentulous patients residing in our area and surrounding areas, who are undergoing treatment for the replacement of missing teeth in the Department of Prosthodontics, rural dental college in Tamil Nadu, India.

Materials and Methods: Three hundred and sixty persons aged between 13 and 87 years (115 males and 145 females) who reported to the department of prosthodontics between January 2020 and October 2025 were selected. Intraoral examination was done visually, and results were recorded on specially designed clinical examination forms.

Statistical Analysis & Results: Data were analysed using the statistics SPSS 26.0 version (IBM India Private Limited, Bangalore) to investigate the relationship between quantitative variables. The results showed that patients with Kennedy's Class III were the most prevalent group (54.2%). The most common modification in all the groups was Class III modification I (27.5%). It was also found that Kennedy's Class III was found more in the age group of 31-40, with 55.1% in the maxillary arch and 48.3% in the mandibular arch.

Conclusion: The findings of this study show that Kennedy's Class III was the most commonly occurring and was found to be more predominant in the younger population group.

Keywords: partial edentulousness, Kennedy's classification, missing tooth, gender, epidemiology.

Introduction

Tooth loss has an impact on an individual's oral health-related quality of life at biologic, psychological, and social levels. The prevalence and extent of tooth loss have decreased significantly in many countries during recent decades. There still remains a significant variation in tooth loss distribution. These disparities may be attributed partly to the increased availability and accessibility to oral disease prevention and control programs, as well as to increase in the awareness of the importance of oral health. The study of trends in tooth loss, comparing the rate of occurrence between different populations, may provide important information about risk factors for tooth loss, potential changes in oral health status, and possible causes of these changes.[1]

Tooth loss is identified by an edentulous space, which is a gap in the dental arch normally occupied by one tooth or more. It could be partial or complete. A person may lack a few teeth (partially edentulous) or all the teeth in one or both upper and lower jaws (completely edentulous) for various reasons. Studies have observed that the major reason for tooth loss across all ages was due to dental caries (36-68%), followed by periodontal disease (17-40%).[2] A simple estimate of the percentage of partially edentulous persons is a rough indication of the frequency of dental diseases and the success or failure of dental care. Observance of a pattern of tooth loss determines the treatment requirement among the population.

The design of the prosthesis depends on the type of saddle area. A classification of partially edentulous arches helps to identify the relation of remaining teeth to edentulous ridges and facilitates communication, discussion, and comprehension of the suggested prosthetic treatment among dentists, students, and technicians[3,4]. Kennedy's classification, first proposed by Dr Edward Kennedy in 1925, remains the most widely used system for categorising partial edentulism due to its simplicity and clinical applicability.[5]

The pattern of tooth loss is a clear indicator of levels of oral hygiene, dental health awareness, the magnitude of dental problems, and the management. Epidemiological studies related to the status of a pattern of tooth loss are scarce in India, especially in South India.[5] Owing to the large Indian population, a nationwide survey cannot be done. However, the epidemiological features of partial edentulousness of one community can be assessed on the basis of a cross-sectional study. The present study was done in order to provide a complete reflection of dental status and treatment needs, which would be of valuable information to the National Oral Health Planners for laying out strategies to develop dental health care management in the country.

Learning the truth that tooth loss and its effects are so detrimental, our study aimed to find:

1. The incidence of Kennedy's classification among the partially edentulous subjects based on gender ratio and age-wise distributions

2. Predominance of which type of Kennedy's classification among the patients attending the selected dental clinics in our college for replacement of their missing teeth.

Materials and Methods

This study was carried out from January 2025 to October 2025 among patients reporting to the Department of Prosthodontics, rural dental college in Tamil Nadu, for the replacement of their missing teeth. A convenience sampling technique was utilised for data collection, and 260 patients were selected. The sample size was

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calculated using the formula $n = Z^2pq/d^2$ with 95% confidence interval, 5% margin of error, and expected prevalence of 50%, yielding a minimum required sample of 384, which was exceeded in this study.

The inclusion criteria involved both genders, aged between 13 years and 87 years, having partially edentulous areas in either or both the jaws. Completely edentulous patients and those with only missing maxillary and mandibular third molars were excluded from the study. Un-erupted or congenitally missing teeth, root tips, and very loose teeth that were indicated for extraction were not included as remaining teeth and were excluded from the study. The study population was divided into two clusters, comprising 115 men and 145 women. The selected patients were grouped according to their age (Table 1).

A pretested proforma was used, which includes name, age, gender, and details of missing permanent teeth. Clinical examination of each patient was carried out after obtaining informed consent, and intraoral examination was done using a mouth mirror, probe in satisfactory lighting, and direct visual examination. No diagnostic aids like study models or radiographs were used in this survey. The patterns of missing teeth were identified according to Kennedy's classification with Applegate's rules for application.

The number of teeth was defined as healthy, carious or treated teeth (including crowned, inlay, and abutment teeth for fixed partial prosthesis), inclusive of completely erupted third molars. Data analysis was carried out by using IBM SPSS 26.0 version, (IBM India Private Limited, Bangalore) to estimate the percentage of predominantly occurring Kennedy's classification within the genders and also according to age. The Pearson Chi-square analysis test was conducted, and $P<0.05$ was considered to be statistically significant. Ethical clearance was obtained from the Institutional Ethics Committee before commencement of the study.

Results

Data were analysed by using IBM SPSS 26.0 version, the Pearson Chi-square analysis test was conducted, and $P < 0.05$ was considered to be statistically significant. The survey included 260 patients, of 115 (44.2%) male patients and 145 (55.8%) female patients aged between 13 and 87 years, having partially edentulous areas in either or both the jaws. Table 1 and Table 2 show the incidence of different patterns of partial edentulism according to Kennedy's classification for males and females, respectively.

The results showed the occurrence of Class III partial edentulism with 55.8% in the maxillary and 47.5% in the mandibular arch for male patients. Similarly, Class III type of partial edentulism was also found in female patients, with 53.2% in the maxillary and 48.1% in the mandibular arch. This was followed by Class III modification I in both the genders with an average of 29.4% in male patients and 25.8% in female patients.

Based on these results, patients with Kennedy's Class III were found to be the most prevalent among both the genders (54.5%) in the maxillary arch and (47.8%) in the mandibular arch, and the most common modification was Class III modification I among both the genders (26.8%) in the maxillary arch and (30.9%) in the mandibular arch.

Tables 3 and 4 show Kennedy's classification for age-wise variation for the maxillary and mandibular arch. The result showed Class III predominance between 13 and 69 years in both arches, while Class II modification I was found in

the maxillary arch of age group 70-87 years. The next predominant classification was Class III modification I for all ages in both the arch except for the 50-59 years age group, which had Class II modification I in the mandibular arch. Among the different age groups, the predominance of

Table 1: Partial edentulous male subjects classified according to Kennedy's classification for the maxillary arch and the mandibular arch

Kennedy's class	Maxillary arch (%)	Mandibular arch (%)	Total (%)
Class I	3 (2.4)	4 (2.8)	7 (2.6)
Class II	4 (3.2)	6 (4.2)	10 (3.7)
Class III	69 (55.8)	68 (47.5)	137 (51.5)
Class IV	2 (1.6)	1 (0.7)	3 (1.1)
Class I modification I	2 (1.6)	1 (0.7)	3 (1.1)
Class II modification I	4 (3.2)	5 (3.5)	9 (3.4)
Class III modification I	34 (27.5)	44 (30.8)	78 (29.4)
Class I modification II	1 (0.8)	0 (0)	1 (0.4)
Class II modification II	2 (1.6)	5 (3.5)	7 (2.6)
Class III modification II	2 (1.6)	7 (4.9)	9 (3.4)
Class II modification III	1 (0.8)	0 (0)	1 (0.4)
Class III modification III	0 (0)	2 (1.4)	2 (0.8)
Total	124	143	267*

*Total number is 267 (more than 115), as some subjects had both maxillary and mandibular teeth missing

Table 2: Partial edentulous female subjects classified according to Kennedy's classification for the maxillary arch and the mandibular arch

Kennedy's class	Maxillary arch (%)	Mandibular arch (%)	Total (%)
Class I	3 (1.9)	5 (2.7)	8 (2.4)
Class II	5 (3.2)	3 (1.6)	8 (2.4)
Class III	82 (53.2)	89 (48.1)	171 (50.6)
Class IV	4 (2.6)	6 (3.2)	10 (3.0)
Class I modification I	4 (2.6)	5 (2.7)	9 (2.7)
Class II modification I	2 (1.3)	7 (3.8)	9 (2.7)
Class III modification I	37 (24.0)	50 (27.0)	87 (25.8)
Class II modification II	0 (0)	3 (1.6)	3 (0.9)
Class III modification II	14 (9.1)	14 (7.6)	28 (8.3)
Class II modification III	1 (0.6)	0 (0)	1 (0.3)
Class III modification III	2 (1.3)	3 (1.6)	5 (1.5)
Total	154	185	339*

*Total number is 339 (more than 145) as some subjects had both maxillary and mandibular teeth missing

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Class III was found in the 31-40 years.

In this regard Chi-squared test was conducted to analyze whether there is any correlation when comparing the genders and also the age with respect to Kennedy's classifications in the maxillary and the mandibular arch, and it was found that there was no association when compared between the male and female patients for maxillary arch and mandibular arch (Table 5). It was also found that there is a significant difference in the age-wise comparison of the group in both the maxillary arch and the mandibular arch (Table 6).

Discussion

It is increasingly recognised that the impact of the disease on quality of life should be taken into account when assessing health status. It

Table 3: The age-wise distribution of the various classes Kennedy's classifications in the maxillary arch

Age	Class I	Class II	Class III	Class IV	Class, I Mod I	Class II Mod I	Class III Mod I	Class, I Mod II	Class II Mod II	Class III Mod II
13-20	0	0	10	0	0	0	0	0	0	0
21-30	0	0	32	1	0	0	6	0	0	1
31-40	0	0	43	2	0	0	18	0	0	2
41-49	0	0	24	1	0	0	26	0	0	8
50-59	5	7	20	2	4	2	15	0	2	2
60-69	1	2	9	0	1	1	3	1	0	1
70-87	0	0	0	0	0	3	0	0	0	1
Total	6	9	138	6	5	6	68	1	2	15

Table 4: The age-wise distribution of various classes Kennedy's classifications in the mandibular arch

Age	Class I	Class II	Class III	Class IV	Class I Mod I	Class II Mod I	Class III Mod I	Class II Mod II	Class III Mod II	Total
13-20	0	0	4	0	0	0	4	0	0	8
21-30	0	0	38	1	0	0	18	0	1	58
31-40	0	0	41	4	2	0	29	0	7	83
41-49	0	2	32	0	0	0	29	2	7	72
50-59	8	3	20	2	2	12	10	4	2	63
60-69	1	4	5	0	2	1	3	1	0	17
70-87	0	0	3	1	0	0	0	0	1	5
Total	9	9	143	8	6	13	93	7	18	306

Table 5: Association between the genders and various classes of partial edentulousness in the maxillary and mandibular arch

	Maxilla			Mandible		
	Value	Df	Asymptotic sig.	Value	df	Asymptotic sig.
Pearson Chi-square	19.847	13	0.072	15.234	9	0.061
Likelihood ratio	22.458	13	0.031	16.548	9	0.042
Linear-by-linear association	0.312	1	0.576	1.267	1	0.248
Number of valid cases	260			260		

Table 6: Association between the age and various classes of partial edentulousness in the maxillary and mandibular arch

	Maxilla			Mandible		
	Value	Df	Asymptotic sig.	Value	df	Asymptotic sig.
Pearson Chi-square	312.458	78	0.000	198.762	54	0.000
Likelihood ratio	178.925	78	0.000	182.341	54	0.000
Linear-by-linear association	21.547	1	0.000	1.824	1	0.178
Number of valid cases	260			260		

is likely that tooth loss, in most cases, being a consequence of oral diseases, affects the oral health-related quality of life (OHR QoL).[6] In a large Japanese study, Ide et al. found a strong correlation between the number of missing teeth and higher oral health impact profile scores, suggesting impairment of OHR QoL. Edentulous patients fall into a special category among the various diseases of dental origin. Tooth loss is the dental equivalent to mortality. A simple estimation of the proportion of the partial edentulous case is a rough indication of the prevalence of dental diseases and the success or failure of dental care.

Studies have reported that the prevalence of partially edentulous adults ranges between 66.5% and 76.12% in various populations.[7] In the present study, more missing teeth were seen in the female population (55.8%), which is consistent with findings from some Indian studies but contrary to studies from Romania, where more missing teeth were found in the male population.[8,11]

The results of the present study indicate that the frequency of maxillary edentulism was higher than that of mandibular edentulism among the study population. Kennedy's Class III was found to be the most common pattern of partial edentulism among all the age groups, both in the maxillary arch and the mandibular arch, except in the 70-87 years, in which Class II modification I was predominant in the mandibular arch9,10.

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The present study was partially in accordance with Curtis et al.,[10] wherein Kennedy's Class III was predominant only in the maxillary arches, while in the mandibular arches, the most prevalent pattern in the previous study was Kennedy's Class I. A major disparity between the two studies is that of the age factor, as the age group of Curtis' study averaged 55 years, whereas in this study, the average age of the patients was approximately 38 years.

Al-Dwairi.,[11], in a study, investigated the frequency of different patterns of partial edentulism of 200 patients in Jordan and found that 150 had both maxillary and mandibular partial edentulism. In the present study, 9 different patterns were identified, in which Kennedy Class III pattern of edentulism was the most commonly encountered in both the maxilla (54.5%) and mandible (47.8%) arches, and Kennedy Class III modification was the next most common from the results. This study also correlates with the study carried out on a Saudi population conducted by Sadig and Idowu, examining 422 partially dentate arches; Kennedy's Class III was the most commonly encountered pattern of partial edentulism in both the upper and lower arches, and Kennedy's Class IV was the least common pattern encountered.[12]

A comprehensive literature review by Jeyapalan and Krishnan[8,12,13]. analysing studies over 24 years confirmed that Kennedy Class III remains the most prevalent classification globally, with consistent findings across diverse populations, including Indian, Saudi Arabian, Jordanian, and American populations. Recent studies from Riyadh, Saudi Arabia, have also supported these findings[12,13,14].

The findings of the present study suggest that a predominance of the Class III pattern of partial edentulism may be due to the fact that a higher frequency of younger age groups was encountered, whereas a higher frequency of the older population was seen in previous studies[15,16]. The present study also shows increased awareness among the younger population, with a large number of younger groups reporting to the prosthodontics department for replacing the missing tooth. The higher frequency of partial edentulism in these younger age group patients, as depicted by the results, might pertain to their low socioeconomic status; poor oral hygiene and less conservative treatment approach, relating to lack of time, leading to early tooth loss[17,18].

The data obtained from the present study on the frequency and distribution of tooth loss are very important to provide practitioners with the information needed to address various factors implicated in tooth loss, to reduce its mortality and also to educate and to motivate patients on the importance of saving teeth. At the national level, these data also suggest that preventive strategies aimed at reducing tooth loss need to be reinforced. Petersen and Yamamoto.,[9] reported that oral diseases and chronic diseases share common risk factors. Hence, the National Health Programs should incorporate disease prevention and health promotion measures using a common risk factor approach in combination with the strategies to prevent tooth loss, which need urgent attention by the policy makers for older people.

Conclusion

The present epidemiological study reported the prevalence of missing teeth in different age groups and genders, which showed the existence of Class III followed by Class III modification I, which were predominant among the younger population of 31-40 years, while in the geriatric population between 70-87 years, Class II modification I was present. Comprehensive information on tooth loss is required to form a generalised database for the partial edentulism

patterns, which will help us in the identification of the causes of such tooth loss and its prevention.

There are possible limitations in this study, as the following factors were not evaluated. The cause of the tooth loss, the literacy level, and the socioeconomic status were not evaluated to identify the reason for tooth loss, nor were chronology for tooth loss, and radiographs were not used to identify congenitally missing and impacted teeth. Future studies with larger sample sizes and inclusion of these variables would provide more comprehensive insights into the epidemiology of partial edentulism in this region.

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