

SURVEY

A SURVEY OF PARTIAL EDENTULISM BASED ON KENNEDY'S CLASSIFICATION IN MAXILLARY ARCHES

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ABSTRACT

Objective: The objective of this study was to determine the various patterns of partial edentulism of maxillary arch in patients seen at department of Prosthodontics, Dr Ishrat- Ul -Ebad Khan Institute of Oral Health Sciences Karachi.

Methods: The duration of the study was six months. Utilizing consecutive sampling technique, 527 patients were included. Partial edentulism pattern was recorded by visual examination using Kennedy's classification after applying Applegate's rules.

Results: Class III dental arch was the most dominant pattern with class IV being the least in number. Kennedy's Class III modification 1 was the most common modification encountered and location of modification was mostly involved posterior areas. With increasing age, there was a decrease in percentage of Kennedy's class III and an increase in percentage of class I, class II and class IV patients. In present study gender had no significant effect on distribution of various Kennedy's classification, whereas there was statistically significant association between age and pattern of partial edentulism

Conclusion: The Kennedy's class III was the most common pattern of partial edentulism irrespective of age and gender

Key words: Partial edentulism, Kennedy's classification, Modification, Maxillary arch

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INTRODUCTION

Partial edentulism is the absence of some but not all the natural teeth in the dental arch.¹ There are many factors which are responsible for tooth loss, nevertheless, dental caries and periodontal issues have been proven to be the most common causes.²⁻⁴ Loss of teeth affects the speech, mastication and also results in poor appearance that in turn impacts the quality of life of an individual. Prosthetic replacement of missing teeth is usually required to restore the above mentioned functions.^{5,6} The relationship of missing teeth with age is well documented in literature ⁷ however; this may vary from

one individual to another on the basis of the level of education, the socioeconomic status, different types of food intake, the life style and the treatment planning formulated by different clinicians.^{8,9}

Many studies have proven that mandibular arch tooth loss is more than maxillary arch. Mandibular first molar was found to be the most commonly missing tooth most probably because of its early eruption in the jaws. Periodontal disease contributes to the loss of anterior teeth while posterior tooth loss occurs mainly due to dental caries ⁵. Most of the studies have revealed that the females have higher tooth loss tendency as compared to males.^{3, 10}

Several methods of classification of partially edentulous arches have been proposed in literature.^{11, 12} Bailyn and Beckett have recommended a classification based on whether the support of the removable partial denture (RPD) is tooth-borne, tissue-borne, or a combination of the above mentioned two.¹² Mauk suggested that the number, length and position of the edentulous spaces should be determining the basis for classification. Godfrey also mentioned the relationship of the edentulous spaces to be restored to the length and location of the areas,¹² while Costa and Avant mentioned an improved classification system which is based on a description of the edentulous arch.¹³ According to Miller and other authors, the most popular classification of all was that proposed by Kennedy.¹³

Kennedy's classification has been the most accepted classification system of all internationally. This classification system is simple and provides immediate visualization, recognition of prosthesis^{10,13} however; the application of Kennedy's classification may not be applicable in every situation without employment of certain rules. These rules were recommended by Applegate and are aimed at integrating, the factual clinical situations and appliance designs within the basic proposed classification system.¹⁴ Thus, the Kennedy's classification of partially edentulous arches is divided into four broad categories with possible subdivisions (modifications) for variations within each category.¹⁵

Documenting the pattern and prevalence of partially edentulous classification is beneficial for the clinician in diagnosis, treatment planning and it enables the clinician to understand oral rehabilitation needs for prosthodontic replacement. It is also helpful in facilitating communication, discussion, and understanding of the indicated prosthetic treatment between dental students, colleagues and the technicians.^{16,-18}

Many studies have been done in different countries on partial edentulousness,⁶ but only a few studies have evaluated the occurrence of partial edentulism in a Pakistani population. The objective of this study was to find the pattern of partially edentulous and its relationship with age and gender in maxillary arch.

METHODS

This cross sectional study was conducted from July 2013 to December 2013 on patients attending the Prosthodontics OPD at Dr. Ishrat- Ul -Ebad Khan Institute of oral Health Sciences Karachi, for replacement of their missing teeth. The sample size of 527 patients was selected utilizing consecutive sampling technique. The inclusion criteria consisted of patients from both genders, age range from 15 to 70 years, having partially edentulous areas in maxil-

lary jaw. Physically/mentally handicapped patients, completely edentulous patients and those with only missing maxillary third molars were excluded from the study. The selected patients were divided into five groups according to their age as follows:

- a) Group A consisted of patients between 15-25 years of age;
- b) Group B had patients of age 26-35 years.
- c) Group C comprised of patients who were aged between 36-45 years
- d) Group D had patients who were between the ages of 45-55 years
- e) Group E had patients over 55 years of age respectively.

Verbal consent was taken from the patients and clinical examination was carried out. Patterns of partial edentulism were recorded by visual examination. Kennedy's classification system with Applegate's modification rules was used to determine pattern of partial edentulousness. The modification spaces were divided into four categories: no modification area, anterior modification area (anterior teeth), posterior modification area (posterior teeth), combined anterior and posterior modification area (both anterior and posterior teeth) and data collected were registered onto a proforma. Descriptive statistics was analyzed using SPSS version 16. Association between discrete variables was determined by the Chi-Square test.

RESULTS

A total of 527 patients were examined and included in the study. Male patients were 268 in number (50.9%) while the female patients were 259 (49.1%). Their ages ranged from 15 to 70 years with a mean age of 44.53 (13.08) years. In the age group E (56 to 70 years) males were more common i.e. 73 (27.23%) while in age group C (36 to 45 years) females were more prevalent 71(27.41%). Distribution of various Kennedy's classes in both gender and different age groups are shown in Table 1 & Table 2 respectively. Kennedy's class III was found to be the most common in both genders and among all age groups, whereas the patients with Kennedy's class IV were least in number. Class 3 was more prevalent in ages 36-45 years, whereas class 2 in age 46-55 years age group.

Table: 1 Gender distribution of various Kennedy's classes in maxillary arch (sample 527)

GENDER	KENNEDY'S CLASSIFICATION				Total Sample
	CLASS I	CLASS II	CLASS III	CLASS IV	
MALE	42	53	156	17	268
FEMALE	36	54	157	12	259
Total	78(14.8%)	107(20.3%)	313(59.4%)	29(5.5%)	527

pValue (.757)

Table: 2 Age group distribution of various Kennedy's classes in maxillary arch (sample 527)REFERENCES

AGE GROUPS	KENNEDY'S CLASSIFICATION			
	CLASS I	CLASS II	CLASS III	CLASS IV
15-25	2 (0.37%)	3 (0.56%)	41 (7.77%)	4 (0.75%)
26-35	5 (0.94%)	13 (2.46%)	79 (14.99%)	5(0.94%)
36-45	10 (1.89%)	24 (4.55%)	89 (16.88%)	6 (1.13%)
46-55	30 (5.69%)	34(6.45%)	58 (11.00%)	6 (1.13%)
56-70	31 (5.88%)	33 (6.26%)	46 (8.72%)	8 (1.51%)

pValue: (.000)

Gender had no significant effect on distribution on various Kennedy's classification. With increasing age, a decrease in percentage of Kennedy's class III and IV cases was observed, while percentage of class I and class II was found to be increasing. Table 3 summarizes the modification in various Kennedy's classes and shows that modification 1 was more prevalent in Class I, Class II and Class III. Distributions and locations of various modifications in different Kennedy's classes are shown in Table 4.

Table: 3 Distribution of Kennedy's class according to number of modification areas in maxillary arch (Sample: 527)

KENNEDY'S CLASSIFICATION	NUMBER OF MODIFICATION				Total
	NO MODIFICATION	1 MOD	2 MOD	3 MOD	
CLASS I	40 (7.59%)	30 (5.69%)	8 (1.51%)	0 (0%)	78
CLASS II	34 (6.45%)	44 (8.34%)	23 (4.36%)	6 (1.13%)	107
CLASS III	208 (39.46%)	81 (15.37%)	23 (4.36%)	1 (0.18%)	313
CLASS IV	29 (5.50%)				29
Total	311 (59.01%)	155 (29.4%)	54 (10.24%)	7 (1.32%)	527

Table: 4 Distribution of Kennedy's classes according to pattern of modification areas in maxillary arch (Sample: 527)

KENNEDY'S CLASSIFICATION	LOCATION OF MODIFICATION				Total
	NO	ANTERIOR	POSTERIOR	COMBINED	
	modification area	modification area	modification area	modification area	
CLASS I	40 (7.59%)	20 (3.79%)	12 (2.27%)	6 (1.13%)	78
CLASS II	34 (6.45%)	16 (3.03%)	38 (7.21%)	19 (3.6%)	107
CLASS III	208 (39.46%)	20 (3.79%)	66 (12.52%)	19 (3.6%)	313
CLASS IV	29 (5.50%)	-----	-----	-----	29
					527

DISCUSSION

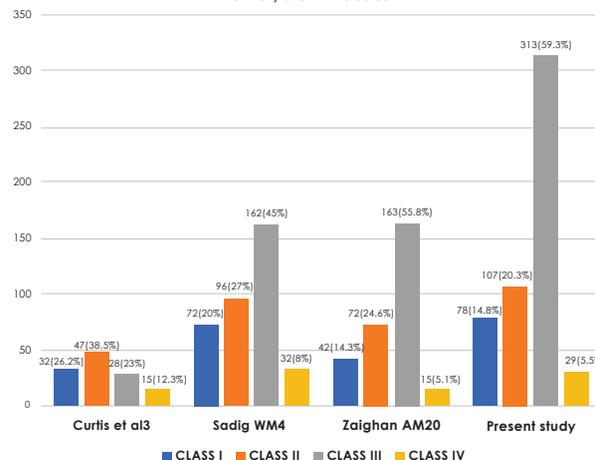
Hummel et ¹⁹ stated that a larger number of people will face partial edentulism in the near future. None-

theless, there has been a decline in the number of completely edentulous patients as well. As the number of elderly in a population increases, the cases of partial edentulism will also arise ²¹⁹. It is previously mentioned in the current study that dental caries and periodontal disease are the major causes of tooth loss.²

The primary purpose of location of partial edentulism and the number of edentulous areas is to simplify the description of potential combinations of teeth to ridges.¹³ The Kennedy's classification was preferred in the present study to fulfill this purpose. It is worth mentioned the important of the distribution of partial edentulism according to the age and gender. As patterns of tooth loss may differ according to age, gender, education level and social status, determination of the incidence and its comparison with previous surveys could provide clinically useful information and also help in the education programs for dental training in teaching hospitals.

In our study the number of partially edentulous males (50.9%) outnumbered the females (49.1%), which is in accordance with the study of Sadig WM et al ⁴ and Naveed H et al⁵ and in contrast with the student conducted by Zaigham AM ²⁰. Figure 1 shows the comparison of various Kennedy's classification studies in maxillary arch carried out on different populations during different years in four studies.

FIGURE 1: Comparison of distribution of Kennedy's classification in maxillary arch in 4 studies



The most frequent pattern of partial edentulism in our study in maxillary arch was class III, followed by class II, class I and class IV being the least frequent. This is in concordance with the study carried out by Sadig WM et al⁴ , Zaigham AM²⁰ and Patel JY et al ²¹ whereas Curtis DA et al³ found Kennedy's Class II to be predominant in the maxillary arch, followed by class I, class III and class IV. Difference between the two studies is because of the age factor, as the mean age in study conducted by Curtis DA³ study was 55 years while in the current study, mean age of patient was found to be 44.53 years. Kennedy's class IV was the least seen group in all the studies

listed in Figure 1. The low percentage of Kennedy IV could be due to a reason that there are less chances of anterior tooth loss as compared to the posterior region of arch. In another study conducted by Naveed H et al⁵ at the department of Prosthodontics, Armed Forces Institute of Dentistry, concluded that the Kennedy's Class III was the most predominant, while Kennedy's Class IV was least common pattern encountered in maxillary arch, which is in accordance with our study.

Prevalence of Kennedy's class III was common (89 (16.88%)) in age group C (36 – 45 years) and class II was common 34(6.45%) in age group D (46-55years) in this study. This may be because of early loss of first molar due to dental caries. While in Zaigham AM²⁰ study, Kennedy's class III in maxillary arch was commonest in age groups I and II (85.5% and 78%) and class II (35%) was common in age group V respectively.

There is increase in percentage of class I & II in later age groups as more teeth are lost due to multiple causes in older age⁷. Various disease factors responsible for loss of teeth were age related; with caries and periodontal diseases being the major etiology of tooth loss in children and adult respectively². According to Naveed et al⁵, the most common classification was class III, while the class II was the least common. The most common modification in class I, class II and class III was modification 1. These findings are in similarity with the finding of our study. These similar finding of classifications and modification were seen in study conducted by Patel JY et al²¹

Among the location of modifications, according to teeth involved whether it is anterior, posterior or combined, the most common modifications were located anteriorly in class I, while in class II and class III cases, posteriorly located modifications were predominant. These finding are in corroborating with the results of Sadig WM⁴ and Niarchou AP¹². The least common location of modifications in our study were combined anterior as well as posterior teeth in class I and class III cases, while for patients in class II, least common locations of modifications were seen in anterior regions. However; in the study conducted by Niarchou AP¹² least common locations of modifications in all three classes i.e. class I, class II and class III were involved in combined anterior and posterior regions of maxillary arches.

In comparison of gender and age with the distribution of Kennedy's classification, the results of current study showed that the gender had no statistically significant difference on prevalence of various Kennedy's classifications and this finding is consistent with the results of the student conducted by Zaigham AM²⁰. While in relation of age to distribution of various Kennedy's classification, class III were reported most common in age group (36-45 years),

while it was mostly present in age group (20– 29 years) of Rashid R et al²² study. Class II in Rashid R et al²² study was found mostly in 60 years plus age group, while in our study class II was commonly seen in 46-55 years age group.

The current study, although carried out in a public sector institute of Pakistan, only partial edentulous areas of maxillary arches were tabulated. These numbers do not reflect the prevalence of pattern of partial edentulism within the general population. Authors feel that more studies should be conducted at various centers across the country, to form and maintain generalized national database of partial edentulism, which will help us in identification of pattern of tooth loss, their causes and the prevention.

CONCLUSION

The study concluded that the Kennedy's classification III is the most common in both gender and age groups, while Class IV was found to be the least common in both gender and in age group A. Amongst the modifications, the most common modification was Modification 3 in all Class I, Class II and Class III cases. Gender had no significant effect on distribution of various Kennedy's classification, while age had statically significant outcome.

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