

## EVALUATION OF PARTIAL EDENTULISM BASED ON KENNEDY'S CLASSIFICATION AND ITS RELATION WITH AGE, GENDER AND ARCHES

Shafi Ullah Khan, Basheer Rehman, Misri Khan

Khyber College of Dentistry, Peshawar

### ABSTRACT

**Objective:** The aim of this study was to determine the pattern of partial edentulism and find its association with age, gender and arches.

**Material and Methods:** The sample comprise of 182 partial edentulous patients ranging from 30 years to 45 years of age. The patients were divided into three groups: group A= 30-35 years, group B=35-40 years and group C=40-45 years of age. All the subjects were clinically examined under dental unit light and Kennedy pattern was noted. Descriptive statistics was carried out using SPSS version 17.

**Results:** The study sample consisted of 182 patients, 92 male (51%) and 90 females (49%) in age range of 35 to 45 years. Kennedy's class III was found to be the most common pattern in both maxilla 36% and mandible 36%. Class IV was the least common pattern in all age groups. Partial edentulism is very slightly more common in mandible than maxilla. Regarding Class IV, it was most frequent in maxilla and in age group A. Regarding Class I; it was more common in mandible and in age group C.

**Conclusions:** Kennedy class-III is most common edentulous pattern and mandibular first molar was most common missing tooth.

**Key words:** Partial edentulism, Tooth loss, Kennedy's classification, Removable partial denture

### INTRODUCTION

Oral health contributes significantly towards quality of life (QOL)<sup>1</sup>. Loss of one or more teeth disturbs the functional balance of the remaining teeth and may result in migration, widening of proximal contacts and food impaction, bone resorption, occlusal interferences, loss of vertical dimension, altered mastication, anterior overloading, temporomandibular dysfunction with para-functional activities, altered phonetics, and aesthetics and psychological problems such as affected self-esteem and confidence<sup>2</sup>. Weight loss and restricted dietary and social activities are some of the major impacts adversely affecting the quality of life<sup>3</sup>. Edentulous (partial or complete) is a key indicator of the oral health of a populace<sup>4</sup>. An edentulous space in the dental arch is normally formed by one or mul-

tle missing tooth<sup>5</sup>. Among the causes of exodontias are periodontal problems, carious decay, traumatic injuries, orthodontic and prosthodontic indications; impactions, hypoplasia, supernumerary teeth, loss of tooth material, supra-eruptions, neoplastic and cystic lesions<sup>6</sup>. With the changing trends in dental treatment that favor retention of natural teeth, a decline in the number of complete dentures with an increase in the number of removable partial dentures (RPDs) is anticipated<sup>7</sup>. It is logical to classify partially edentulous arches that share common attributes, characteristics, qualities or traits<sup>8</sup>. The primary purpose for the classification of partially edentulous arches is to identify potential combinations of teeth to edentulous ridges in order to facilitate communication among dental colleagues, students, and technicians<sup>9</sup>. A classification also allows a longitudinal comparison of various classes of RPDs to determine whether the teaching of RPD design is consistent with the relative frequencies of RPD use<sup>9</sup>. There are more than 65000 possible combinations of teeth and edentulous spaces in opposing arches. Several methods of partial edentulism classi-

---

#### Correspondence:

Dr. Shafi Ullah Khan

Assistant Professor, Department of Prosthodontics

Khyber College of Dentistry, Peshawar

Cell: 0333-9108320

Email address: shafidentist@yahoo.com

fiction, on the basis of potential combinations of teeth to ridges have been reported in the literature<sup>10</sup>. All proposed classifications have merits and demerits. At present, Kennedy's classification is the most widely used and accepted because of its simplicity, ease of application to all semi-dentulous situations, immediate visualization of the type of partially edentulous arch being considered and differentiation between tooth borne and tooth tissue-borne partial dentures<sup>11</sup>. It also permits a logical approach to the problems of design apart from making possible the application of sound principles of partial denture design. By this classification a tremendous number of possible semi dentulous combinations have been reduced to four simple groups namely Class I, Class II, Class III and Class IV. The pattern of tooth loss has been evaluated in many selected populations in different countries<sup>12</sup>. Hoover and McDermont reported a higher prevalence of edentulism in males than females<sup>13</sup>. Marcus et al observed that the prevalence of edentulism had no relationship with gender<sup>14</sup>. It has been documented that age and tooth loss shows a positive relation. According to literature review partial edentulism is more common in maxilla than in the mandible, and anterior tooth loss following posterior tooth loss<sup>5</sup>. Without employment of certain rules, recommended by Applegate aimed at incorporating, the factual clinical situations and appliance designs within the classification, application of Kennedy's classification is difficult in every situation<sup>15</sup>.

The aim of this study was to determine the pattern of partial edentulism and its association with age, gender and arches in population coming to Khyber College of Dentistry, Peshawar.

## METHODS AND MATERIALS

This descriptive study was carried out from August 2012 to December 2014 at the Department of Prosthodontic, Khyber College of Dentistry, Peshawar, Pakistan. Convenience sampling technique was utilized for sample collection of 182 patients who were partially edentulous and were referred to Prosthodontic department for treatments considered appropriate in accordance with their complaints.

Inclusion criteria consisted of patients from both the genders, the age range from 30 to 45 years, having partially edentulous areas in one or both jaw. Completely edentulous patients, those with only third

molars missing, physically or mentally handicapped patients, patients with teeth extracted for orthodontic purpose were excluded from the study. Patients were divided into three groups according to their age. Group A consisted of patients between 30 to 35 years of age; group B had patient age 36 to 40 years and Group C had 41 to 45 years of age. Location of missing teeth among 182 patients was arranged in nine groups, as group 1= maxillary anterior missing teeth, group 2= maxillary posterior missing teeth in one or either side, group 3= maxillary anterior and posterior missing teeth, group 4= mandibular anterior missing teeth, group 5= mandibular posterior missing teeth, group 6= mandibular anterior and posterior missing teeth, group 7= maxillary anterior and mandibular anterior missing teeth, group 8= maxillary posterior and mandibular posterior missing teeth and group 9= maxillary anterior-posterior and mandibular anterior-posterior missing teeth. The patients were interviewed and both the dental arches of each patient were examined clinically under artificial light, using a sterile dental mirror after consent. The proforma documented patient's age, gender, arch involved Kennedy's class with or without modification as ;

Class I: Bilateral edentulous areas located posterior to the natural teeth

Class II: Unilateral edentulous areas located posterior the natural teeth

Class III: Unilateral edentulous area located both anterior and posterior to it

Class IV: A single bilateral (crossing the midline) edentulous area located anterior to the remaining natural teeth.

Modification areas were not included in analysis to avoid complexity. Descriptive statistics was carried out using SPSS version 17.

## RESULTS

Gender distribution among 182 patients was analyzed as 92 (50.5%) patients were male while 90 (49.5%) patients were female giving ratio of almost 1:1. Age distribution among 182 patients was analyzed and majority of (61%) patients were in age range 30-35 years (group A), followed by group B (16%). Mean age was 35.6 years with SD 5.8 (detail is given in Table 1). The most missing tooth or teeth

location was group 5 i.e. mandibular posterior area which was 29%. The most missing tooth was mandibular first molar which was missing in 76 (41%) out of 182 subjects. A total of 890 teeth were missing among the 182 patients giving mean value of almost 5 missing teeth per patient. Out of 890 missing teeth, 48% (427) were missing in Maxillary arch and 52% (463) were missing in Mandibular arch. Forty nine percent of the missing teeth were on right side and 51% were missing on left side. Mandibular canines were among the least missing teeth (as shown in Table 2). When Class I was analyzed among age groups, it was more common in group C while Class II, Class III and Class IV were more common in group A (table 3). According to gender Class I and Class II were more

common in female (table 4). According to maxillary and mandibular arches, Class I and Class II were more common in mandible while Kennedy's Class IV was more common in maxilla. Kennedy's class III was most common pattern in both arches (71%), followed by class II (15%), class I (7.5%) and lastly class IV (5.7%). Detail is given in table 5.

**Table-1: Age distribution**

Age Groups	n	%
A (30-35 years)	111	61
B (36-40 years)	32	17
C (41-45 years)	30	22
<b>Total</b>	<b>182</b>	<b>100</b>

**Table-2: Distribution of site (location) of missing teeth**

Location	n	%
Maxillary Anterior	23	12.64
Maxillary Posterior	17	9.34
Maxillary Anterior+Posterior	6	3.30
Mandibular Anterior	4	2.20
Mandibular Posterior	53	29.12
Mandibular Ant+ Post	3	1.65
Maxillary Ant+ Mandibular Ant	0	0
Maxillary Post+ Mandibular Post	46	25.27
Maxillary Ant+Post and Mandibular Ant+Post	30	16.48
<b>Total</b>	<b>182</b>	<b>100</b>

**Table 3: Distribution of Kennedy Classes according to age**

Kennedy classes	Group A		Group B		Group C		Total number of arches	
	n	%	n	%	n	%	n	%
Class I	7	3	2	1	10	3.82	19	7
Class II	19	7	7	2.6	14	5.4	40	15
Class III	111	42	34	13	43	17	188	72
Class IV	13	5	1	0.4	1	0.4	15	6
<b>Total</b>	<b>150</b>	<b>57</b>	<b>44</b>	<b>17</b>	<b>68</b>	<b>26</b>	<b>262</b>	<b>100</b>

**Table-4: Distribution of Kennedy Classes according to Gender**

Kennedy classes	Male		Female		Total number of arches	
	n	%	n	%	n	%
Class I	7	3	12	4	19	7
Class II	13	5	27	10	40	15
Class III	94	36	94	36	188	73
Class IV	8	3	7	3	15	6
<b>Total</b>	<b>122</b>	<b>47</b>	<b>140</b>	<b>53</b>	<b>262</b>	<b>100</b>

**Table-5: Distribution of Kennedy Classes according to maxillary and mandibular arches**

Kennedy classes	Maxilla		Mandible		Total number of arches	
	n	%	n	%	n	%
Class I	5	2	14	5	19	7
Class II	17	6	23	9	40	15
Class III	93	36	95	36	188	72
Class IV	11	4	4	2	15	6
<b>Total</b>	<b>126</b>	<b>48</b>	<b>136</b>	<b>52</b>	<b>262</b>	<b>100</b>

## DISCUSSION

The primary purpose in using a classification for RPD is to simplify the description of potential combination of teeth to ridges. In present study the Kennedy classification was preferred to fulfill this purpose. One of the principal advantages of the Kennedy classification is that it permits immediate visualization of partial edentulous arches and enable a logical approach to the problem of design. In addition it makes possible the application of sound principles of partial denture design. It is therefore logical method of classification<sup>4</sup>.

In this study we found that partial edentulism is higher in mandible than maxilla which is similar to the result of study conducted by Hassan Naveed<sup>15</sup> and this may have two reasons; one is anatomical anomaly of mandibular teeth and other reason is its position that due to gravity the lower teeth retain food.

In our study we found that the frequency of Kennedy class III was most common among partial edentulous patients which is in accordance with the studies by Hassan Naveed<sup>15</sup>, Zaigham<sup>4</sup> and Asif ullah<sup>16</sup>. The reason for similar results was that the subjects were from younger group i-e the mean age of these studies was almost 35 years. Our results were in contrast to study of Pournasrolla<sup>17</sup> where Kennedy class I was most common and the reason might be that old age subject were included in their study.

Male to female ratio was almost similar which is in coincidence with the study done by Ghani F and Khan M<sup>1</sup> in the same locality but in contrast to the study done by Asif Ullah where female were more than male<sup>16</sup>.

When Kennedy Class IV was stratified among different age groups and arches it was most common in age group A (30-35 years) and this is because that individual at younger age have more active life and are involved in sports due to which they usually lose their anterior teeth quite often. When class IV was stratified among arches it was more common in maxilla than mandible because maxillary anterior teeth are usually prone to trauma. But in later age there is lose of posterior teeth which changes Class IV to other Kennedy classes making Class IV least common in older age group.

Among different teeth, the mandibular first molar was most common missing tooth and this might be because of early eruption of this tooth at an age

that the patient is not fully aware of maintaining oral hygiene. Other reason for early loss of first molar is its anatomical anomaly.

This results show identity with Al-Dwairi's study<sup>12</sup> in which he investigates the frequency of different pattern of partial edentulism of 200 patients in Jordan, where Kennedy Class III was most common pattern of edentulism in both maxilla and mandible where Kennedy class IV was the least common pattern.

Similar results were also found in a study by Sadiq and Idowa<sup>7</sup> carried out in Saudi Arabia population. According to their study Kennedy class III was most common pattern and Kennedy class IV was least common pattern.

More studies are needed in different centers in our country to form a national database of partial edentulous pattern which helps us in identification of causes of such tooth loss and their prevention.

## CONCLUSIONS

The study concluded that class III is the most common in both arches. With an increase in age, there is an increase in Class I and Class II dental arch tendency and a decrease in class III and Class IV. Partial edentulism was found to be slightly more common in mandibular arch than in maxillary arch. Tooth loss appears to have an important role in the loss of esthetics and mastication. Prosthodontic treatment is usually needed to restore these functions.

## REFERENCES

1. Ghani F, Khan M. Missing teeth, edentulous areas and socio-demographic status adversely affect the quality of life. *J Pak Dent Assoc* 2010;19:5-14.
2. Bortoluzzi MC, Traebert J, Lasta R. Tooth loss, chewing ability and quality of life. *Contemporary clinical Dentistry* 2011;3(4):393-97.
3. Kida I A, Åström AN, Strand GV and Masalu JR. Clinical and socio-behavioral correlates of tooth loss: a study of older adults in Tanzania. *BMC Oral Health* 2006; 6:5-9.
4. zaigham A M, Muneer M U. Pattern of partial edentulism and its association with age and gender. *Pakistan oral & dental journal* June 2010; 30(1):260-3.
5. Ehikhamenor EE, Oboro HO, Onuora OI. Types of removable prostheses requested by patients who were presented to the University of Benin Teaching Hospital Dental Clinic. *Journal of Dentistry and Oral Hygiene* 2010; 2(2):15-8.
6. Al-Shammari KF, Al-Ansari JM, Al-Melh MA et al. Rea-

- sons for Tooth Extraction in Kuwait. *Med Princ Pract* 2006;15:417-22.
7. Sadig WM, Idowu AT. Removable partial denture design: A study of a selected population in Saudi Arabia. *J Contemp Dent Pract* 2002;3(4):40-53.
  8. Henderson D, McGivney GP, Castleberry DJ. McCracken's removable partial prosthodontics. 7th ed. CV Mosby. St. Louis, Toronto, Princeton 1985: 21-126.
  9. Curtis DA, Curtis TA, Wagnild GW, Finzen FC. Incidence of various classes of removable partial dentures. *J Prosthet Dent* 1992; 67: 664-7.
  10. Rasoul A, Ahmedian L, Sharifi E. A simplified classification system for partial edentulism: A theoretical explanation. *The Journal of Indian Prosthodontic Society* 2007; 7: 85-7.
  11. Bjorn AI, Owall B. Partial edentulism and its prosthetic treatment: A frequency study within a Swedish population. *Swed Dent J* 1989; 3: 15-25.
  12. AL-Dwairi ZN. Partial edentulism and removable denture construction: a frequency study in Jordanians. *Eur J Prosthodont Restor Dent*. 2006;14(1):13-7.
  13. Hoover JN, McDermott RE. Edentulousness in patients attending a university dental clinic. *J Can Dent Assoc* 1989;55(2):139-40.
  14. Marcus PA, Joshi JA, Morgano SM. Complete edentulism and denture use for elders in New England. *J Prosthet Dent* 1996;76(3):260-6.
  15. Naveed H, Aziz MS, Hassan A et al. Patterns of partial edentulism among armed forces personnel reporting at armed forces institute of dentistry pakistan. *Pakistan oral & dental Journal*; 2011; 31(1):217-21.
  16. Khan AU , Ghani F. Factors influencing the type of prosthetic restoration for partially dentate adults. *JPMI* 2010;24 (1):3-21.
  17. Pournasrolah A, Negahdari R, Rezaei G et al. Analysis of the frequency of partial prosthesis according to Kennedy's classification in dental prosthesis. *British Biomedical Bulletin* 2016;4(2):87-94.
  18. Choudhery Z, Kumar P, Amin M, Malik S. Kennedy's classification- A study done at DOW international Dental Hospital. *Pak Oral & dental J* 2016;36(4):677-79.