The Professional Medical Journal
www.theprofesional.com

ORIGINAL PROF-0-3474

DOI: 10.29309/TPMJ/2019.26.05.3474

PARTIAL EDENTULISM;

EXPLORING PARTIAL EDENTULISM PATTERNS IN MANDIBULAR ARCH AMONG PATIENTS OF KARACHI.

Bharat Kumar[1], Naresh Kumar[2], Shahid Ali[3], Shabir Ahmed[4]

1. BDS, FCPS
Assistant Professor
Department of Prosthodontics
Dow International Dental College
Dow University of Health Sciences,
Karachi, Pakistan.
2. BDS, PhD
Associate Professor
Department of Science of Dental Materials
Dow International Dental College,
Dow University of Health Sciences,
Karachi, Pakistan.
3. BDS, M.Phil, PhD.
Assistant Professor
Department Science of Dental Materials
Bibi Aseefa Dental College,
Shaheed Mohtarma Benazir Bhutto Medical University, Larkana,
Pakistan.
4. BDS, FCPS
Assistant Professor
Department of Prosthodontics
Bibi Aseefa Dental College,
Shaheed Mohtarma Benazir Bhutto Medical University, Larkana,
Pakistan.

Correspondence Address:
Dr. Bharat Kumar
Assistant Professor
Department of Prosthodontics
Dow International Dental College,
Dow University of Health Sciences,
Karachi, Pakistan.
bharat_khemani84@yahoo.com

Article received on:
09/04/2018
Accepted for publication:
15/10/2018
Received after proof reading:
18/04/2019

ABSTRACT… Objectives: The objective of this study was to determine the various patterns of partial edentulism of mandibular arch in patients seen. **Study Design:** Cross sectional study. **Setting:** Department of Prosthodontics, Dr Ishrat- Ul -Ebad Khan Institute of Oral Health Sciences Karachi. **Period:** Six months from July 2013 to December 2013. **Materials and Methods:** 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:** In present study class III partial edentulism was the most dominant pattern with class IV being the least in number in mandibular arch. The class III with one modification only involving posterior area was pr-edominant type. As the age of study participants increased, there was decrease in prevalence of class III pattern and increase in class I, class II and class IV pattern. 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: Kennedy's Classification, Mandibular Arch, Modification, Partial Edentulism.

Article Citation: Kumar B, Kumar N, Ali S, Ahmed S. Partial edentulism; exploring partial edentulism patterns in mandibular arch among patients of Karachi. Professional Med J 2019; 26(5):764-768.
DOI: 10.29309/TPMJ/2019.26.05.3474

INTRODUCTION

Partial edentulism is a condition in which one or more than one but not all teeth are missing in a dental arch.[1] The loss of tooth is multi-factorial, however, dental caries and periodontal problem are considered as main reasons for such loss.[2-4] It is well evident that the loss of teeth affects phonetic and masticatory function and also leads to poor aesthetics which consequently compromise the quality of life. Thus, Prosthodontic replacement of missing teeth is usually required to restore these functions and aesthetics.[5, 6] In literature, age of the patient has directly been related to the missing teeth.[7] Whereas, some researchers suggest that such trend may vary from one individual to another due to variation in education level, socioeconomic status, intake of different types of food, the life style and even the treatment plan of the clinicians.[8,9]

It is well known that tooth loss in mandibular arch is more common than maxillary arch. First molar is found to be the most commonly missing teeth due to its early eruption in the jaw. Moreover, periodontal disease and caries are mainly responsible for the loss of anterior and posterior teeth respectively. Furthermore, studies highlight a higher prevalence of tooth loss in females than males.[3,10]

The partially edentulous arches have been classified widely by various investigators.[11,12] According to Bailyn and Beckett, the classification is dependent upon the support of the removable

partial denture and they have classified whether the denture is tooth-borne, tissue-borne, or a combination of both.[13,14] Moreover, Mauk has suggested that the number, length and position of the edentulous spaces form a comprehensive classification.[15] The classification by Godfrey is also in partial agreement with Mauk's classification.[16] The classification based on a description of the edentulous arch was considered relatively better by Costa and Avant.[17]

The most widely accepted classification worldwide is proposed by Kennedy, its useful features include simplicity, immediate visualization, recognition of prosthesis either tooth or tissue support and assessment of design features of removable partial denture.[10,18,19] Despite these benefits, Kennedy's classification is not applicable in every case without application of certain specific rules, recommended by Applegate.[20] The Kennedy has categorized partially edentulous arches into four classes with likely modifications for variations within each class.[21,22]

The studies on the prevalence and pattern of partially edentulous classification may aid the clinician in diagnosis and treatment planning. It may also assist the operator in material selection for making prosthesis. In addition, discussion and comprehension among dental colleagues, students and technicians with regard to prosthetic treatment may be facilitated.[23-25] The studies on the pattern of partial edentulism have rarely been conducted in Pakistan. Thus, this study aimed to find the pattern of partial edentulism and its relationship with age and gender in mandibular arch.

MATERIALS AND METHODS

This cross sectional study was conducted at Prosthodontics department, Dr. Ishrat- Ul -Ebad Khan Institute of oral Health Sciences Karachi. Total 527 patients who came for replacement of missing teeth were included via consecutive sampling technique. The inclusion criteria consisted of patients from both genders, age range from 15 to 70 years, having partially edentulous areas in mandibular jaw. The physically/mentally handicapped patients, completely edentulous patients and those with only missing mandibular third molars were excluded from the study. The selected patients were divided into five age groups (A to E) with ten years age interval. The consent was taken from the patients. The clinical examination of mandibular arch of each patient was carried on dental chair with sterilized mouth mirrors in appropriate light. The patterns of partial edentulism were recorded via Kennedy's classification system with Applegate's modification rules. 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 study variables was analyzed via Chi-Square test. The level of significance was set at $P \leq 0.05$.

RESULTS:

In present study total 527 patients were examined including 249 (47.2%) male and 278 (52.8%) female. The mean age of study participants was 44 years. The pattern of edentulism among male and female patients and different age groups are shown in Table-I and II respectively. The Kennedy's class III was found to be the most common in both genders and also among all age groups, whereas class IV was least common. There was no significant association between gender and pattern of edentulism. With increasing age there is decrease in percentage of class III, while percentage of class I, class II and IV increased. Regarding modifications associated with partial edentulism, 56.9% had no any modification, 37% had one modification and only 6% had two modifications Table-III. The distribution of modification in relation to its number and location is shown in Table-IV.

DISCUSSION

Many studies have documented dental caries and periodontal disease as the leading cause of tooth loss.[2]

Gender	Kennedy's Classification				Total
	Class I	Class II	Class III	Class IV	
Male	45(8.53%)	42(7.96%)	138(26.18%)	24(4.55%)	249(47.24%)
Female	58(11%)	46(8.72%)	162(30.74%)	12(2.27%)	278(52.75%)
Total	103(19.5%)	88(16.7%)	300(56.9%)	36(6.8%)	527

Table-I. Gender distribution of various Kennedy's classes in mandibular arch

Age Groups	Kennedy's Classification				Total
	Class I	Class II	Class III	Class IV	
15-25	3(0.56%)	5(0.94%)	38(7.21%)	3(0.56%)	49(9.29%)
26-35	11(2.08%)	15(2.84%)	77(14.61%)	3(0.56%)	106(20.11%)
36-45	16(3.03%)	22(4.17%)	94(17.83%)	5(0.94%)	137(25.99%)
46-55	31(5.88%)	28(5.31%)	55(10.43%)	12(2.27)	126(23.9%)
55-70	42(7.96%)	18(3.41%)	36(6.83%)	13(2.46%)	109(20.68%)
					527

Table-II. Age group distribution of various Kennedy's classes in mandibular arch

Kennedy's Classification	Number Modification			Total
	NO MOD	1MOD	2MOD	
Class I	65(12.33%)	35(6.64%)	3(0.56%)	103(19.54%)
Class II	28(5.31%)	48(9.10%)	12(2.27%)	88(16.69%)
Class III	171(32.44%)	112(21.25%)	17(3.22%)	300(56.92%)
Class IV	36(6.83%)	------	------	36(6.83%)
Total	300(56.92%)	195(37%)	32(6.07%)	527

Table-III. Distribution of Kennedy's class according to number of modification areas in mandibular arch

Kennedy's Classification	Location of Modification				Total
	No Modification Area	Anterior Modification Area	Posterior Modification Area	Combined Modification Area	
Class I	65(12.33%)	31(5.88%)	6(1.13%)	1(0.18%)	103(19.54%)
Class II	28(5.31%)	4(0.75%)	46(8.72%)	10(1.89%)	88(16.69%)
Class III	171(32.44%)	19(3.60%)	96(18.21%)	14(2.65)	300(56.92%)
Class IV	36(6.83%)	-------	--------	--------	36(6.83%)
Total	300(56.9%)	54(10.2%)	148(28%)	25(4.7%)	527

Table-IV. Distribution of Kennedy's classes according to pattern of modification areas in mandibular arch

Kennedy Classification	Four Studies			
	Curtis et al[3]	Sadig et al[4]	Zaigham AM[27]	Present study
Class I	100 (48.8%)	116 (30.7%)	44 (13.4%)	103 (19.5%)
Class II	61(29.7%)	110(29.1%)	98 (29.8%)	88 (16.7%)
Class III	31 (15.2%)	140 (37%)	180(54.7%)	300 (57%)
Class IV	13 (6.3%)	12 (3.2%)	7 (2.1%)	36 (6.8%)
Total	205	378	329	527

Table-V. Comparison of distribution of Kennedy's classification in mandibular arch in 4 studies

Since the population of elderly patients is increasing across the globe, hence the prevalence of partial edentulism is likely to increase in the near future as suggested by Hummel *et al*.[26] The primary purpose for reporting partial edentulism, location and the number of edentulous areas is to simplify the description of potential combinations of teeth to ridges.[19]

In present study the number of partially edentulous females (52.8%) outnumbered the males (47.2%), which is in agreement with the findings of Zaigham AM.[27] However, Sadig WM et al[4] and Naveed H et al[5] reported more males

with partially edentulous areas. The difference could be due to variable education level and socioeconomic status of study populations.

The most frequent pattern of partial edentulism in present study was class III, followed by class I and class II. This is in agreement with the findings of studies carried out in Saudi Arabia and Pakistan.[4,5] In contrast, study carried out at school of Dentistry, University of California, found Kennedy's Class I to be predominant in the mandibular arch, followed by class II, class III and class IV[3] (Table-V). The difference between the two studies could be due to different age. In present study Kennedy's class IV was the least common, which is in agreement with most of the studies carried out in past[3,4,27] (Table-V). Since anterior teeth are least susceptible to caries this could be one reason for least occurrence of Kennedy's class IV.

The prevalence of Kennedy's class III was common 94(17.83%)) in age group C (36-45 years) and 77(14.61%) in age group B (26-35years) in this study. This may be because of early loss of first molar due to caries. This finding is similar to study carried out in Pakistan.[27] Moreover, class I, II and IV was found more frequently in older age groups and this loss of teeth in these age groups could be due to local as well as systemic factors.[7] The disease factors responsible for loss of teeth was age related; with caries and periodontal diseases being the major etiology of tooth loss in children and adults respectively.[2]

In this study, one modification was most common in class I, class II and class III. These findings are in similarity with Naveed H et al study results.[5]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 posteriorly located modifications were predominant. These finding corroborate the results of Sadig WM[4] and Niarchou AP[12] studies. The least common location of modifications in our study were combined anterior as well as posterior teeth involved in class I and class III, while in class II , least common location were involved anterior teeth. However in the study of Sadig WM et al[4] least common location of modifications in class I were posteriorly placed, in class II and class III, least common modifications were anteriorly placed, while in the study of Niarchou AP[12] least common location of modifications in class I, class II and class III were involved in combined anterior and posterior teeth.

In comparison of gender and age with the distribution of Kennedy's classification, the result revealed that the gender had no statistically significant difference on prevalence of various Kennedy's classification; this finding is in line with the results of Zaigham AM[27] study.

This study was carried out to document the pattern of edentulism only in mandibular arch among male and female patients who reported for replacement of missing teeth. Therefore, these numbers do not reflect the prevalence of pattern of partial edentulism within the general population. More studies are required at various centers around the country, to form and maintain generalized national database of partial edentulism, which may help in prevention and treatment of partial edentulism.

CONCLUSION

The Kennedy's class III was the most common pattern of partial edentulism irrespective of age and gender. The Class IV was least common. Only one modification was most common in Class I, Class II and Class III. In present study no significant association between gender and pattern of partial edentulism was found, while significant association between age group and pattern of partial edentulism was found.

REFERENCES

1. McGarry TJ, Nimmo A, Skiba JF, et al. **Classification system for partial edentulism.** J Prosthodont. 2002; 11:181-93.

2. Esan TA,Olusile AO, Akeredolu PA and Esan Ao. **Socia-demographic factors and edentulism.** The Nigerian Experience. BMC oral health. 2004; 4(1):3.

3. Curtis DA, Curtis TA, Wagnild GW and Finzen Fc. **Incidence of various classes of removable partial**

dentures. J Prosth Dent. 1992; 67(5):664-7.

4. 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.

5. Naveed H, Aziz MS, Hassan A, Khan W, Azad A A. **Patterns of partial edentulism among armed forces personnel reporting at armed forces institute of dentistry Pakistan.** Pak Oral & Dent J. 2011; 31(1):217-21.

6. Leung KCM, Pow EHN. **Oral rehabilitation with removable partial denture in advanced tooth loss situations.** Hong Kong dent J. 2009; 6:39-45.

7. Muneeb A, Khan BA, Jamil B. **Causes and pattern of partial edentulism/exodontia and its association with age and gender: semi-rural population, Baqai dental college, Karachi, Pakistan.** Inter Dent J Stud Res. 2013; 1(3):13-18.

8. Thomas S, Al-Maqdassy SE. **Causes and pattern of tooth mortality among adult patients in a teaching dental hospital.** Ibnosina J Med BS. 2010; 2(4):160-67.

9. Ali R, Rehman R, Noreen N. **Pattern of tooth loss in patients reporting to Khyber College of Dentistry, Peshawar.** JKCD. 2012; 3(1):17-21.

10. Rasoul A, Ahmadian, et al. **A simplified classification for partial edentualism: A theoretical explanation.** Journal Ind prosthodont society. 2007; 7(2):85.

11. Al-Johany SS, Andres C. **ICK Classification system for partially edentulous arches.** J Prosthodont. 2008; 17:502-07.

12. Niarchou AP, Ntala PC, Karamanoli EP, Polyzois GL, Frangou MJ. **Partial edentulism and removable partial denture design in a dental school population: a survey in Greece.** Gerodontology. 2011; 28:1-7.

13. Bailyn M. **Tissue support in partial denture construction.** *Dent Cosmos*. 1928; 70:988-97.

14. Beckett LS. **The influence of saddle classification on the design of partial removable restorations.** J Prosth Dent. 1953; 3(4):506-16.

15. Mauk EK. **Classification of mutilated dental arches requiring treatment by removable partial dentures.** J A D A. 1942; 29:2121-31.

16. Godfrey RJ. ***Classification* of removable partial dentures.** J Am Coll Dent. 1951; 18:5-13.

17. Costa E. **Simplified system for identifying partially edentulous dental arches.** J Prosthet Dent. 1974; 32:639-45.

18. Miller EL. **Systems for classifying dentulous arches.** J Prosthet Dent. 1970; 24:25-40.

19. McCracken's. **Removable partial prosthodontics.** 12th edit. St. Louis, Missouri: Mosby; 2011.

20. Applegate OC. **The rationale of partial denture choice.** J Prosthet Dent. 1960; 10:891-907.

21. Kennedy E. **Partial denture construction.** Dental Items of Interest, 1928; 1:3-8.

22. Kennedy E. Classification. **In: Essentials of removable partial denture prosthesis.** 2nd ed Philadelphia: WB Saunders Company 1960; 9-25.

23. Lana A. Shinawi. Partialedentulism: **A five year survey on the prevalence and pattern of tooth loss in a sample of patients attending King Abdul Aziz University - Faculty of Dentistry.** Life SciJ. 2012; 9(4):2665-71.

24. Frandz WR. **Variability in dentists designs of a removable maxillary partial denture.** J Prosthet Dent. 1973; 29:172-82.

25. Arigbede AO, Taiwo JO. **Pattern of demand for removable acrylic partial denture (RPD) in the city of Port Harcourt, Nigeria.** Nigerian H J. 2011; 11(2):47-50.

26. Hummel SK, Wilson MA ET AL. **Quality of removable partial dentures worn by the adult U.S. population.** J Prosthet Dent. 2002; 88:37-43.

27. Zaigham AM, Muneer MU. **Pattern of partial edentulism and its association with age and gender.** PODJ. 2010; 30(1):260-263.

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Bharat Kumar	Conceived overall idea of this research work and collected the data.	
2	Naresh Kumar	Critically reviewed the manuscript.	
3	Shahid Ali	Analyzed the data and wrote results and introduction section of the manuscirpt.	
4	Shabir Ahmed	Wrote abstract and discussion sections of the manuscript and managed the referencing.	