Assessment of Partial Edentulism Based on Kennedy's Class IV Classification- Retrospective Study

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Abstract

Kennedy's classification provides immediate visualization, recognition of prosthesis support and assessment of design features of removable partial denture. Missing Teeth in patients with the long span Kennedy class IV situation demands biomechanical balance and aesthetic improvement. The long-span condition complicates the problem because of the unavailability of sufficient number of abutments to support the prosthesis. Conventional removable prosthesis and fixed partial denture are not advised for the same reason. The system of classifying the partially edentulous arch would be an enormous aid in providing a precise word picture of a particular dental arch that is to be discussed. Aim was to determine the prevalence of Kennedy's class IV classification among the partial edentulous patients residing in chennai who had undergone treatment for the replacement of missing tooth in the department of Prosthodontics,saveetha dental college,chennai,India. Study samples of 1341 cases were obtained from the data of 86000 patients between June 2019 and March 2020. Statistical software used for analysis was the SPSS(statistical package for the social sciences) which is designed by IBM and the statistical tests used were frequency tables along with bar graphs to analyse and compare the obtained results. The results showed that the patients with Kennedy's class IV were found to be the most prevalent in the male population. The findings of the present study showed that Prevalence of partial edentulism based on Kennedy's class IV was commonly occuring in the male population and also reveals that lower arch has a higher incidence of Kennedy's class IV.

Keywords: *Kennedy's class IV ,arch ,gender ,assess, edentulism*

Introduction

Tooth loss has an impact on an individual's oral health 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[1,2,3]. Prosthetic rehabilitation is done to regain function, speech and esthetics[4]. The purpose of partial edentulous arches provides communication between dental college students, technicians about the case for planning good treatment and to design the partial denture. It also predicts the difficulties commonly occurring with particular removable partial denture design[5,6,7,8,9,10,11,12]. The prevalence of edentulousness has been used as an indicator to evaluate the efficiency of oral health services as well as to show the oral health of a population. It has been monitored in several countries for decades. The rate of edentulousness has declined particularly in the western countries, which is at least partly attributed to improved oral health services. However, its prevalence is still high in some other countries. The Stability of the removable Prosthesis is maintained by counter resisting the occlusal forces exerted on the restored arch-curve by use of a posteriorly directed path of placement for the prosthesis.[13,14,15,16]

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The variation in number and location of the edentulous space and its relationship to the remaining natural teeth necessitates to classify the patient edentulous arches[17].An RPD rehabilitating Kennedy class IV edentulous span can be considered successful if it does not cause gingival irritation and subsequent periodontal damage, the clasp arms are inconspicuous, and it is retentive.Kennedy class IV edentulous space may be short-span, where only incisors are missing or long-span, where anterior teeth and some premolars are missing. Later, even if the abutments are periodontally sound, a fixed prosthesis would result in an unacceptable cantilever effect. With the recent trends in dental health care that favour natural dentition preservation a disease in edentulous patients number is predicted[18,19,20,21]

Various prosthetic treatment options are available for partial edentulism, including fixed partial prostheses (FPP), implants, or removable partial dentures (RPDs). However, RPDs may have limited retention and stability due to the double-support system. In case of an RPD with a free end (e.g. distal extension RPDs), these aspects could worsen because of the propensity of the prosthesis to rotate during masticatory function. The denture-users of Kennedy's class II and IV categories might experience problems such as pain, occlusal disharmony, or soft tissue injury under the denture base or connector due to displacement of the distal extension of the prosthesis. The RPDs are most commonly used in clinical practice because they are economical, and facilitate easy care of the remaining teeth.

There are more than 65000 potential combination of partial edentulism pattern in maxillary and mandibular arches,hence it is logical to classify partially edentulous arches that have common characteristics and to facilitate communication among different dental professionals[22,23,24] .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 importance in oral health. The study of trends in tooth loss,comparing rates 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[25]. The aim of this study was to analyse Kennedy's class IV among the patients who visited Saveetha Dental College.

Materials and Methods

Study Setting:

This study was carried out in a university setting which consists of subjects predominantly South Indian population. Advantages of the study includes available data,similar ethnicity.Disadvantages of this study is the fact that it is unicentred study and the geographic locations ,trends are not assessed. Approval of the study is by the ethical board of Saveetha university.Number of people involves 3 reviewers. A Guide, Researcher and a reviewing expert.

Sampling:

This is a retrospective study in which the samples were considered from the time period of september 2019 to march 2020. Case sheets reviewed for the research include patients with partial edentulous condition and cross verification of the required samples done by reviewing experts. Measures were taken to minimize the sampling bias.

Data Collection/tabulation

The Study samples of 1341 cases were obtained from the patient records and analysed the total data of 86000 patients between June 2019 and March 2020. The required data i.e,patients with removable partial Denture were collected and entered in a methodical manner in an excel sheet for the tabulation of data and further statistical analysis data was validated by 1-2 external reviewers and all the non specific, unclear or incomplete data were excluded from the study.

Analytics

Statistical software used for analysis is the SPSS(statistical package for the social sciences) which is designed by IBM and the statistical test used were frequency tables along with bar graphs to analyse and compare the obtained results. Independent variables include ethnicity,age and gender. Dependent variables includes, missing teeth and arch involved

Results and Discussion

Out of the total sample size 1341 cases,Result values obtained were, (Table 1)males showed 58.8% and females were 41.1%Also observed that the

increased age of male population was higher. And also this study reports that the occurrence of Kennedy's class IV is predominantly higher in the lower arch (Table 2 and Figure 1). According to Niarchou et al., noted that Kennedy's class were more frequent among males than females thus is in concordance with similar studies and also with literature[26]. Spakota B et al., observed that females are more edentulous compared to males but at the same time they are more concerned about replacing the missing teeth. This may be due to the dependency upon the males for this dental treatment to save the teeth. However, they are more conscious about their appearance which explains their preference for replacement of missing teeth[27]. Several studies have observed that prevalence of partial edentulism is more common in mandibular arch than maxillary arch as follows.

There was a significant association between male patients with the missing teeth in the lower arch of Kennedy's class IV classification(Pearson Chi-Square Value-0.918; $p>0.05$) Hence it was not significant (Figure 3). Prabhu et al., noted that partial edentulism was more common in the mandibular arch compared to maxillary arch. This is due to the fact the mandibular teeth erupt earlier in the oral cavity which is more for higher caries rate and higher chance of the tooth to get extracted[28]. Gad et al., Basutkar et al.,and Charyeva et al., noted that frequency of partial edentulism was higher in the mandibular arch compared to maxillary arch[29,30,31]. However there were few limitations encountered in this study .

The study contained some data that were unclear of certain reporting parameters such data were not considered. Another limitation was the geographic limitation i.e, assessment of predominantly South Indian population. Further this study is an unicentered study. Future research should focus on panel data to better understand the relationship between gender,arch involvement and the development of Kennedy's class IV. The scope of this study is that the prevalence and association of Kennedy's class IV with various parameters is essential to record.

Table 1: Table showing the frequency distribution of gender among patients with Kennedy's class IV partial edentulism.Male patients with Kennedy's class IV classification were 41.1% and females were 58.6%.

GENDER	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
MALE	789	41.1	41.1	41.1
FEMALE	550	58.6	58.6	58.6
TRANS GENDER	2	0.3	0.3	0.3
TOTAL	**1341**	**100.0**	**100.0**	

Table 2: Table showing the frequency distribution of missing teeth/arch among patients with Kennedy's class IV partial edentulism. The distribution of upper arch is 48.2%,lower arch is 49.0% and both arch is 2.8%.

MISSING TOOTH / ARCH	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
UPPER ARCH	647	48.2	48.2	48.2
LOWER ARCH	657	49.0	49.0	49.0
BOTH ARCH	37	2.8	2.8	2.8
TOTAL	**1341**	**100.0**	**100.0**	

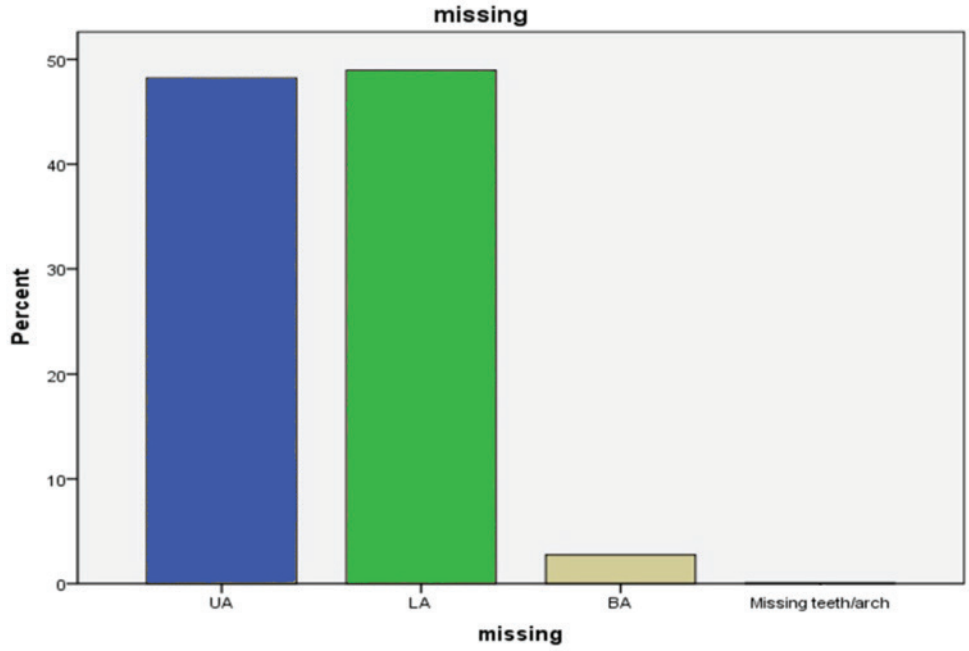

Figure 1: Bar graph showing the distribution of missing teeth in different arches, upper arch (Blue),lower arch Green) and both arch (Yellow) across a scale of 1-100. x axis represents the arch containing the missing tooth based on kenney's Class IV and y axis represents the number of patients under each category. There is a slight increase in the number of missing teeth in lower arch than upper arch.

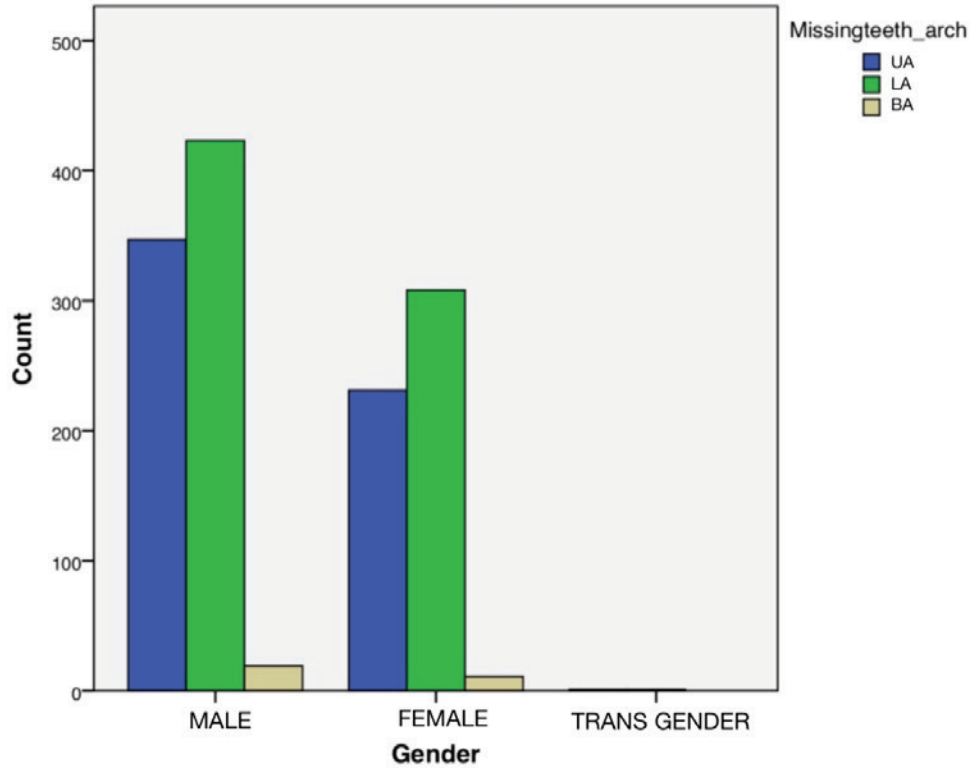

Figure 2: Bar graph depicting the association between the Gender and the missing teeth based on Kennedy's class IV Classification in different arches. X axis represents gender and Y axis represents the frequency of missing teeth in different arches. Blue colour denotes upper arch, Green colour denotes Lower arch, and Yellow colour denotes Both arch. Missing teeth were more in the lower arch among males than females. However, chi square tests revealed Pearson's chi square value : 0.948 df: 4 p value=0.918 (>0.05), statistically not significant.

Conclusion

Further evaluation based on bigger sample size, multi location studies with details on the oral hygiene,status of loyalty could be helpful. The findings of the study showed that Prevalence of partial edentulism based on Kennedy's class IV was commonly occuring in the male population and lower arch has a higher incidence of Kennedy's class IV.

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Ethical Clearance: It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number- SDC/SIHEC/2020/DIASDATA/0619-0320)

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