

# Prevalence of partial edentulism among the patients visiting a Tertiary Health Care Center in the Western Region, Nepal

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## ABSTRACT

**Introduction:** Tooth loss causes impairment, functional limitation, physical, psychological, and social disability. The study of various patterns of tooth loss can provide rough information about the frequency, causes and magnitude of oral problems, its sequelae that can eventually act as mirror image for future prosthodontic treatment needs. Hence, this study was conducted to assess the prevalence of partial edentulism and its etiology, to determine its association with sociodemographic parameters, and to find out the motivational factor/s for replacement. **Methods:** Total 417 patients with partial edentulism were examined intraorally based on Kennedy's classification with Applegate's modification. Descriptive analysis was done using frequency distribution. Pearson Chi-square analysis test was used to determine the association between demographic variables and type of tooth loss where P value < 0.05 was considered statistically significant. **Results:** Partial edentulism was more prevalent in mandibular arch (n=174, 41.7%) followed by both arches (n=129, 30.9%). Kennedy's Class III was the commonest and Kennedy's class III modification 1 was second most common type of partial edentulism. Age and educational status had statistically significant association while gender had no association with various classes of partial edentulism. Dental caries (n=262, 62.8%) followed by periodontitis (n=108, 25.9%) were the major causes of tooth loss. Functional demand (n=195, 46.8%) was the key motivational factor for the replacement among those who were willing (n=327, 78.4%). **Conclusions:** The result of this study would continue contributing to the existing data in literature on the pattern of prevalence of partial edentulism. It can also help in reinforcing the preventive strategies aiming at reducing tooth loss.

**Keywords:** Applegate's modification, Kennedy's classification, partial edentulism.

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## INTRODUCTION

Partial edentulism is a medical condition characterized by the absence of one or more natural teeth but not all. It can occur due to either dental caries, periodontal problems, impactions, trauma, congenital anomalies, neoplastic or cystic lesions.<sup>1,2</sup> The consequences that follows tooth loss include tilting of adjacent teeth, supraeruption of antagonist tooth, speech alteration, and changes in facial appearance. Ultimately, it can lead to physical impairment, functional disability, and negative psychological impact on the individual.<sup>3</sup> Regardless of various researches and advances in preventive dentistry, edentulism is still highly prevalent global public oral health problem. Thus, the study of status and pattern of tooth loss may provide an important information about the level of oral hygiene, dental health awareness, causes and magnitude of oral problems, its sequelae that eventually can act as the mirror image of prosthodontic treatment needs.

Several studies conducted in different countries have confirmed the pattern,<sup>2,4,5</sup> prevalence,<sup>6,7</sup> and correlation of partial edentulism with sociodemographic factors.<sup>8-11</sup> Till date, very limited epidemiological studies related to pattern of partial edentulism of the Nepalese population are found in the literature.<sup>12-15</sup> Most of the studies have used Kennedy's classification.<sup>11,16,17</sup> Our study has additionally used Applegate's modifications because Kennedy's classification alone would be difficult to apply to every situation without certain rules for application.

With this context, this study was conducted to assess the prevalence of partial edentulism and its etiology, to determine its association with sociodemographic parameters, and to find out the motivational factor/s for replacement in willing patients. This baseline data on the prevalence of partial edentulism could help in future to determine their prosthetic needs and identify the preventive strategies.

## METHODS

This prospective, cross-sectional descriptive study was conducted from September 2020 to April 2021 among the patients visiting Department of Prosthodontics, Gandaki Medical College, Pokhara. The primary objective of this study was to assess the prevalence of partial edentulism based on Kennedy's classification with Applegate's modification. The secondary objectives were to determine its association with various sociodemographic parameters, to find the cause of tooth loss and to determine the motivational factor/s for the replacement, if the patients are willing. We have used Kennedy's classification in this study because of its simplicity, ease of application, immediate visualization of the type of partially edentulous arch being considered and recognition of prosthesis support.<sup>18</sup>

### Kennedy's Classification:

Class-I: Bilateral edentulous area located posterior to the remaining natural teeth.

Class-II: Unilateral edentulous area located posterior to the remaining natural teeth.

Class-III: A unilateral edentulous area with natural teeth both anterior and posterior to it.

Class-IV: Single but bilateral edentulous area located anterior to the remaining natural teeth.

Applegate's modifications have been used additionally in the study as Kennedy classification alone would be difficult to apply to every situation without certain rules for application.

Based on a previous study, at 95% confidence interval and 43.8% prevalence, sample size of 379 was calculated.<sup>12</sup> The total sample size of 417 was taken into the study after adding 10% non-response rate. The participants were selected by convenience sampling method. The willing patients with age >18 years and having partial edentulous area/s in either or both jaws were included in the study. Likewise, non-compliant patients with missing third molars only or with complete edentulism were excluded from the study. The clinical examination and data collection were done by single examiner utilizing a predetermined structured format. The recorded data included the sociodemographic details (age, sex and educational status), type and etiology of tooth loss, willingness of the patients for replacement and the motivational factor/s for the same. At the end of data collection, patients were educated about the need of regular oral hygiene maintenance and dental screening, the morbidities that occur due to negligence, causes of tooth loss, its sequelae and various ways to prevent them. The ethical clearance was obtained from Institutional Review Committee, Gandaki Medical College (REF No. 052/2077/2078). A written informed consent was taken from all the participants prior to data collection.

The obtained data were entered into the excel sheet and was analysed using SPSS version 23.0. Univariate analysis such as frequencies and percentage of demographic variables, causes and the type of tooth loss in both arches were calculated. Pearson Chi-square analysis test was used to determine the association between demographic variables and the type of tooth loss where p-value  $\leq 0.05$  was considered statistically significant.

## RESULTS

Table 1 outlines the demographic details of the study participants. Out of 417 patients, 223 (53.5%) were females and 194 (46.5%) were males. On categorization by age group, most patients with partial edentulism belonged to 51-61 years (92, 22.1%) of age group. Additionally, majority of them 151 (36.2%) had attained primary education only. In our study, partial edentulism was more prevalent in mandibular arch (n=174,41.7%) followed by both dental

arches (n=129,30.9%) and then maxilla (n=114,27.3%).

**Table 1:** Demographic details of the study participants

Parameters	Frequency (N=417)	Percentage
<b>Age</b>		
18-28 years	69	16.5
29-39 years	82	19.7
40-50 years	89	21.3
51-61 years	92	22.1
62-72 years	60	14.4
> 72 years	25	6
<b>Sex</b>		
Male	194	46.5
Female	223	53.5
<b>Educational status</b>		
Illiterate	78	18.7
Primary Education	151	36.2
Secondary Education	127	30.5
Higher Education	61	14.6
<b>Arch</b>		
Maxilla only	114	27.3
Mandible only	174	41.7
Both	129	30.9

As depicted in Table 2, Kennedy's Class III was the commonest type of partial edentulism in both maxilla (n=90, 21.6%) and mandible (n=123, 29.5%). Similarly, Kennedy's class III modification 1 was second most common type in both maxilla (n=33, 7.9%) and mandible (n=53,12.7%).

**Table 2:** Distribution of partial edentulism according to Kennedy-Applegate classification

Kennedy's Classification	Maxilla n(%)	Mandible n(%)	Total
Class I	20(4.8)	29(7)	49
Class I Modification 1	6(1.4)	15(3.6)	21
Class I Modification 2	5(1.2)	-	5
Class II	25(6)	35(8.4)	60
Class II Modification 1	18(4.3)	19(4.6)	37
Class II Modification 2	11(2.6)	7(1.7)	18
Class II Modification 3	3(0.7)	-	3
Class III	90(21.6)	123(29.5)	213
Class III Modification 1	33(7.9)	53(12.7)	86
Class III Modification 2	10(2.4)	3(0.7)	13
Class III Modification 3	2(0.5)	1(0.2)	3
Class IV	20(4.8)	18(4.3)	38
Total			546*

\* Total number is 546 (>417) as some patients had partial edentulism in both dental arches.

The commonest cause of tooth loss was found to be dental caries (n=262, 62.8%) followed by periodontitis (n=108, 25.9%) and then trauma (n=20, 4.8%) (Table 3).

**Table 3:** Causes of tooth loss among study participants (N=417)

Causes of tooth loss	Frequency	Percentage
Caries	262	62.8
Periodontitis	108	25.9
Trauma	20	4.8
Caries + Periodontitis	11	2.6
Caries + Trauma	6	1.4
Congenital	7	1.7
Others	3	0.7

Out of 417 participants surveyed, 327 (78.4%) were willing to replace their missing teeth and the key motivational factor for the replacement was the functional demand (n=195, 46.8%) followed by esthetic and functional (n=79, 18.9%) and then esthetic need (n=53,12.7%).

Our study showed that age and educational status had statistically significant association with various classes of partial edentulism in both dental arches. In contrast to this, gender had no significant relationship with the pattern of partial edentulism. (Table 4, Table 5)

**Table 4:** Association of demographic parameters with various classes of partial edentulism in maxilla

Demographic parameters	Class I	Class II	Class III	Class IV	Pearson Chi-square
<b>Age (Years)</b>					
18-28	1	1	31	3	0.001*
29-39	1	4	31	3	
40-50	2	11	21	6	
51-61	11	22	25	4	
62-72	13	14	14	4	
>72	3	5	13	0	
<b>Sex</b>					
Male	15	27	67	14	0.339
Female	16	30	68	6	
<b>Educational status</b>					
Illiterate	9	16	23	5	0.006*
Primary Education	13	24	44	3	
Secondary Education	4	12	45	12	
Higher Education	5	5	23	0	

\*p-value <0.05 signifies statistically significant

**Table 5:** Association of demographic parameters with various classes of partial edentulism in mandible

Demographic parameters	Class I	Class II	Class III	Class IV	Pearson Chi-square
<b>Age (Years)</b>					
18-28	1	3	36	1	0.001*
29-39	3	7	45	3	
40-50	13	12	43	5	
51-61	13	21	29	4	
62-72	11	9	23	4	
>72	3	9	4	1	
<b>Sex</b>					
Male	16	29	74	11	0.264
Female	28	32	106	7	
<b>Educational status</b>					
Illiterate	15	15	28	1	0.003*
Primary Education	17	23	63	14	
Secondary Education	9	15	62	3	
Higher Education	3	8	27	0	

\*p-value <0.05 signifies statistically significant

## DISCUSSION

Documenting the pattern of tooth loss helps in understanding the prosthetic needs of the particular community in a more classified form. This, in turn, can be useful in educating and motivating the patients to improve their oral health practices and prevent further worsening of their overall dental status in future.

Based on our results, patients with Kennedy's Class III were most prevalent in both arches, and the most common modification was Class III modification I. This result is in line with the study by various researches in the past.<sup>2,5,7</sup> However, few studies have shown Class I<sup>19,20</sup> as most prevalent type of partial edentulism in their study. Kennedy class III is more frequent this may be due to the fact that first molar is the first permanent tooth to erupt into oral cavity and has a higher chances of being affected by caries and a greater likelihood of tooth being extracted.<sup>16</sup> We found that partial edentulism was more common in mandibular arch followed by both arches and then maxillary arch. This is because mandibular teeth erupt earlier in the oral cavity, which is more likely to be subjected to dental caries and has a higher chance of being extracted if left untreated.<sup>21</sup> These findings are consistent with the findings by some studies in past.<sup>5,14,21,22</sup> However, some earlier studies showed more prevalence of edentulism in both arches<sup>13</sup> and some in maxillary arch.<sup>4,16</sup>

Tooth loss is the 36th most prevalent global public health problem with the major cause being untreated dental

caries followed by severe periodontitis.<sup>23</sup> According to Zaigham et al.<sup>6</sup>, and Abdel Rahman et al.<sup>1</sup>, dental caries and periodontal diseases were the major causes of tooth loss in early childhood and adolescence. This finding is consistent with the result of our study. Since dental decay and periodontal diseases are preventable, more preventive programs should be employed so that the rate of tooth loss due to neglected and untreated oral diseases will decrease.

Researches have shown that the pattern of partial edentulism is influenced by various sociodemographic factors like age, sex, socioeconomic status, educational level, occupation, etc. Among the various factors studied, age is the key factor found to have relationship with the occurrence of partial edentulism. In our study, the most common age group with partial edentulism was 51 to 61 years, which is in conformity with the study by Rana et al.<sup>13</sup> and Parajuli et al.<sup>15</sup> Several factors including difficulty to perform oral hygiene procedures due to systemic diseases or functional disability could be the reason behind high prevalence of partial edentulism in older age groups. Our study has shown statistically significant relation between age and pattern of partial edentulism. There is an increase in class I and II dental arch and decrease in class III dental arch with increasing age. As age advances, due to further loss of teeth, extension of existing saddle can lead to Class I and II. This finding is in alignment with the results of previous studies.<sup>1,2,6,24</sup>

The female patients with partial edentulism outnumbered the male patients in our study which is in accordance with the other studies done in past.<sup>5,13,14,25</sup> Women have better health seeking behaviors and are more concerned for their appearance and this could be one of the reasons that females strive for dental treatment more frequently than males.<sup>24</sup> However, the association between the gender and partial edentulism is not statistically significant. This result is in concordance with the study by Araby et al.<sup>24</sup>, Rehman et al.<sup>1</sup>, Zaigham et al.<sup>6</sup> Conversely, study by Prabhu et al.<sup>21</sup> showed that there is statistically significant relation between gender and various classes of partial edentulism in both arches.

In a multivariate analysis of oral health survey conducted on the elderly in UK, it was found that age and education level had the largest effect on level of edentulousness.<sup>26,27</sup> Several studies have shown that the patients with lower educational status exhibited higher risk of

edentulism.<sup>12,25,26</sup> This finding is in line with the finding of our study. The patients with basic primary education had a higher percentage of partial edentulism than those who had pursued secondary education and the association is statistically significant. Poor education leads to the lack of awareness and motivation thereby resulting in poor oral hygiene. Such patients do not visit dental clinic unless in the state of agonizing pain that can cause eventual loss of tooth. The ones with higher education are more aware of oral health and prefer conservative dental treatment for retaining their teeth rather than extraction.

According to the study by Rathi et al.<sup>28</sup> esthetic concern was the main reason for replacing their missing teeth. However, in our study, more than 3/4th participants were willing to replace their missing teeth, functional demand being the main reason. It was observed that most patients had missing teeth in posterior regions, indicating lack of function as the major reason for their visit to dental hospital. Dental practitioners serve as driving forces for the patient's awareness about the replacement of tooth. Hence, mobile dental clinics, dental camps, and various dental outreach programs are the possible solutions to change patients' attitudes, spread awareness, and extend treatment.<sup>28</sup>

## CONCLUSIONS

Within the limitation of this study, the results showed that Kennedy's Class III was the commonest followed by Kennedy's Class III modification 1 as the second most common type of partial edentulism in both arches. Partial edentulism was more prevalent in females and in mandibular arch with caries followed by periodontitis being the most common etiologies. Age and educational status had statistically significant association while gender had no association with various classes of partial edentulism. These results have gathered information regarding the epidemiological features of partial edentulism of a community in a more classified form. This baseline data can form a background for the assessment of their prosthodontic treatment needs in future. It can also help in reinforcing the prevention strategies aiming at reducing the tooth loss. This data would also continue contributing to the existing data in literature on the pattern of prevalence. Moreover, it would be of valuable information to the National Oral Health Planners for laying out strategies to develop dental health care

management in the country. It is a single centered study. Hence, further research with larger sample size in multiple hospital settings for longer duration could be done for the extrapolation of the results.

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