Partial edentulism and its correlation to age, gender, socioeconomic status and incidence of various Kennedy’s classes - A cross-sectional study

Himanshu Aeran1,*, Abhinav Thapliyal1, Neeraj Sharma1, Varun Kumar1
1 Dept. of Prosthodontics, Seema Dental College & Hospital, Rishikesh, Uttarakhand, India

A R T I C L E   I N F O
Article history:
Received 15-02-2021
Accepted 25-02-2021
Available online 21-04-2021

Keywords:
Partially edentulism
Socioeconomic status
Kennedy’s classes
Survey
Garhwal

A B S T R A C T
A simple estimation of the proportion of the partial edentulous persons is a rough indication of dental diseases and also the success or failure of dental care. The epidemiological features of partial edentulosity of one community or one village can be evaluated on the basis of a cross-sectional house-to-house survey. In this study a cross-sectional house-to-house survey was carried out at lower Garhwal region of Uttarakhand, India. The objective of this study was to determine the prevalence of the level of edentulism and its relevance to other co-factors such as age, gender and socioeconomic status.

1. Introduction
Oral health contributes significantly to the quality of life. Poor oral health and tooth loss affect not only the nutritional status and phonetics, but also the overall health of individuals. Tooth loss generally occurs by caries, periodontal problems, traumatic injuries, impactions, neoplastic and cystic lesions.1 Partially edentulous arches have been classified by various methods. Among the various methods of classification like Kennedy, Applegates, Avant, Neurohar, Eichner, ACP (American College of Prosthodontics) etc., Kennedy’s classification is widely studied and clinically accepted by Dental Community. Several studies have analyzed the correlation between partial edentulosity and its influencing factors like socioeconomic, age, gender, etc.2

Owing to the large Indian population, a nationwide survey cannot be done. However, the epidemiological features of partial edentulosity of one community or one village can be evaluated on the basis of a cross-sectional house-to-house survey. Thus, a survey was carried out among the patients of lower Garhwal region of Uttarakhand to study the prevalence of the level of edentulism and its relevance to other co-factors such as age, gender and socioeconomic status.

2. Aims and Objective
To study the prevalence of the level of partially edentulism and its relevance to age, gender and socioeconomic status.

3. Materials and Methods
3.1. Study design
This cross-sectional house-to-house survey was carried out within selected areas of Uttarakhand (Pauri (101), Chamba(102), Dehradun(98), Haridwar(99) and Rishikesh(100). The survey was conducted on 500 individuals who were considered to be residents of the area. First the subjects were interviewed according to the questionnaire performa and then intra-oral examination of the subject was done in day light with the help of mouth mirror.
3.2. Inclusion criteria

1. Subjects who were willing to participate and provided informed consent were included in the study.
2. Teeth that were not salvageable and indicated for extraction due to dental caries or periodontal diseases or any other factor were considered as missing teeth.
3. Individuals who had no impedance in opening mouth were included in the study.

3.3. Exclusion criteria

1. Subjects not willing to participate.
2. Subjects not able to open mouth or patients with neurological impairment.
3. Pregnant and lactating female.

3.4. Proforma details

The study involved completion of a pre-designed and structured questionnaire. The questionnaire was framed to collect information regarding the demographic profile, dentition, educational status and monthly income. Partially edentulous arches was classified according to well accepted Kennedy’s classification as Class I, class II, Class III, Class IV.

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 11.5. Chi-square test was used for comparison. P Value < 0.05 was considered statistically significant

Criteria used for recording the data in the study:

3.5. Age

Patients were grouped into three age groups:
- 18 - 35 years
- 36 - 59 years
- > 59 years

3.6. Gender

Studied population includes both males and females.

3.7. Socioeconomic status

1. Income: For evaluation patients were grouped into different categories according to their monthly income, representing the lower, middle and higher income of social status in our country.
2. Education: It is divided into 7 categories.
   - No formal schooling
   - Less than primary school
   - Primary school completed
   - Secondary school completed
   - High school completed
   - College/university completed
   - Postgraduate degree

4. Result

The epidemiological survey was conducted in the lower Garhwal region of Uttarakhand to study the prevalence of the level of edentulism and its relevance to other co-factors such as age, gender and socio-economic status. Data was analyzed using statistical package SPSS. Chi-Square test was conducted and results were obtained and P value < 0.05 was considered statistically significant. The study focused on a total of 500 subjects to arrive at a significant statistical analysis. Given below are the results after the statistical analysis from Table 1 to 5 as well as plotted in graphic charts from 1-5.

Table 1: Showing distribution of partially edentulous patient according to Kennedy’s classification

| Kennedy’s Class | Frequency | Percentage |
|-----------------|-----------|------------|
| 1               | 172       | 34.4       |
| 2               | 148       | 29.6       |
| 3               | 98        | 19.6       |
| 4               | 82        | 16.4       |
| Total           | 500       | 100.0      |

Majority of 172 participants (34.4%) belonged to Kennedy’s class 1. Kennedy’s Class 2 and 3 had 148 (29.6) and 98 (19.6) participants respectively. 82 participants (16.4%) belonged to Kennedy’s class 4. These findings were illustrated in graphical format in Figure 1.

Increased number of partial edentulous cases were seen in middle age (36-59 years) and old age (more than 59 years) individuals with more incidence of Kennedy’s class 1 and class 2. Kennedy’s Class 3 and class 4 was found be more in younger age group individuals. There was a statistically significant correlation between partial edentulism and age (P < 0.05). These findings were illustrated in graphical format in Figure 2.

Number of females (279) in the studied group were more as compared to males (221). Incidence of Kennedy’s class 1, class 2, class 3, and class 4 was more in females as compared to male group. There was a statistically significant correlation between partial edentulism and gender (P < 0.05). These findings were illustrated in graphical format in Figure 3.

No formal schooling was seen with majority of the participants (22.4%). This was closely followed by primary school completed (19.8%) and less than primary school (16%). Secondary school completed and High school completed were seen in 76 participants each (15.2% each). Forty six (9.2%) participants had completed college/university. Only 11 participants (2.2%) had obtained a post graduate degree. There was a statistically significant correlation between partial edentulism and education (P < 0.05). As level of education increases, the incidence of...
Table 2: Showing distribution and association of Kennedy’s classification with age group

| Age       | Kennedy’s Class | Frequency | Percentage | Association |
|-----------|-----------------|-----------|------------|-------------|
| 18 - 35 years | 1               | 16        | 12.8       |             |
|           | 2               | 26        | 20.8       |             |
|           | 3               | 48        | 38.4       |             |
|           | 4               | 35        | 28.0       |             |
|           | Total           | 125       | 100.0      |             |
| 36 - 59 years | 1               | 63        | 36.4       |             |
|           | 2               | 51        | 29.5       |             |
|           | 3               | 29        | 16.8       | p value <0.05 |
|           | 4               | 30        | 17.3       |             |
|           | Total           | 173       | 100.0      |             |
| > 59 years    | 1               | 93        | 46.0       |             |
|           | 2               | 71        | 35.1       |             |
|           | 3               | 21        | 10.4       |             |
|           | 4               | 17        | 8.4        |             |
|           | Total           | 202       | 100.0      |             |

Table 3: Distribution and association of Kennedy’s classification with Gender

| Gender   | Kennedy’s Class | Frequency | Percentage | Association |
|----------|-----------------|-----------|------------|-------------|
| Male     | 1               | 80        | 36.2       |             |
|          | 2               | 65        | 29.4       |             |
|          | 3               | 40        | 18.1       |             |
|          | 4               | 36        | 16.3       |             |
|          | Total           | 221       | 100.0      |             |
|          | 1               | 92        | 33.0       | p value <0.05 |
|          | 2               | 83        | 29.7       |             |
| Female   | 3               | 58        | 20.8       |             |
|          | 4               | 46        | 16.5       |             |
|          | Total           | 279       | 100.0      |             |

Table 4: Distribution of study population according to education

| Education                                    | Frequency | Percentage |
|----------------------------------------------|-----------|------------|
| No formal schooling                          | 112       | 22.4       |
| Less than primary school                     | 80        | 16.0       |
| Primary school completed                     | 99        | 19.8       |
| Secondary school completed                   | 76        | 15.2       |
| High school completed                        | 76        | 15.2       |
| College/university completed                 | 46        | 9.2        |
| Postgraduate degree                          | 11        | 2.2        |
| Total                                        | 500       | 100.0      |

Partial edentulism decreases. These findings were illustrated in graphical format in Figure 4.

As monthly income increases, the incidence of partial edentulism decreases. The association between Kennedy’s classification with monthly income was found to be statistically significant with p value < 0.05. These findings were illustrated in graphical format in Figure 5.

5. Discussion

Table 1 represented the distribution of partial edentulous cases according to Kennedy’s classification. Majority of 172 participants (34.4%) belonged to Kennedy’s class 1. Kennedy’s Class 2 and 3 had 148 (29.6) and 98 (19.6) participants respectively. 82 participants (16.4%) belonged
Table 5: Association of Kennedy’s classification with monthly income

| SES               | Kennedy’s Class | Frequency | Percentage | Association |
|-------------------|-----------------|-----------|------------|-------------|
|                   | 1               | 42        | 33.6       | p value < 0.05 |
|                   | 2               | 27        | 21.6       |             |
| Less than Rs.5000 | 3               | 33        | 26.4       |             |
|                   | 4               | 23        | 18.4       |             |
|                   | Total           | 125       | 100.0      |             |
|                   | 1               | 36        | 32.1       |             |
|                   | 2               | 41        | 36.6       |             |
| Rs. 5000 - Rs. 10000 | 3        | 14        | 12.5       |             |
|                   | 4               | 21        | 18.8       |             |
|                   | Total           | 112       | 100.0      |             |
|                   | 1               | 37        | 41.1       |             |
|                   | 2               | 26        | 28.9       |             |
| Rs.10001 - Rs.30000 | 3       | 16        | 17.8       |             |
|                   | 4               | 11        | 12.2       |             |
|                   | Total           | 90        | 100.0      |             |
|                   | 1               | 20        | 30.8       |             |
|                   | 2               | 18        | 27.7       |             |
| Rs.30001 - Rs.50000 | 3      | 15        | 23.1       |             |
|                   | 4               | 12        | 18.4       |             |
|                   | Total           | 65        | 100.0      |             |
|                   | 1               | 21        | 38.2       |             |
|                   | 2               | 22        | 40.0       |             |
| More than Rs.50000 | 3             | 7         | 12.7       |             |
|                   | 4               | 5         | 9.1        |             |
|                   | Total           | 55        | 100.0      |             |
|                   | 1               | 16        | 30.2       |             |
|                   | 2               | 14        | 26.4       |             |
| Not disclosed     | 3               | 13        | 24.5       |             |
|                   | 4               | 10        | 18.9       |             |
|                   | Total           | 53        | 100.0      |             |

Fig. 2: Distribution of Kennedy’s class according to age (in %)

Fig. 3: Distribution of Kennedy’s class according to gender (in %)

Fig. 4: Distribution according to education completed (in percent)

Fig. 5: Distribution of Kennedy’s class according to monthly income (in %)
to Kennedy’s class 4. This can be attributed to the fact that with aging event like tooth loss increases resulting in more class 1 and class 2. These findings were in correlation with Khalil A et al., who also observed more class 1 and class 2 in combination type of edentulousness. These findings were illustrated in graphical format in Figure 1.

Table 2 represented the age distribution of the sample of 500 cases. Majority of the cases 202 (40.4%) were more than 59 years, followed by participants of age Group 36 – 59 years 173 (34.6%). The remaining 25% (125 cases) belonged to age range 18 – 35 years. This is in accordance with the fact that the middle and senior age group is the most prone to loss of teeth due to ageing and subsequent partial edentulism. It was also found in the study that with increase in age, there was an increase in class 1 and class 2 dental arch tendency and a decrease in class 3 and class 4. This study was in accordance with the study done by Vidhya Jeyapalan. These findings were illustrated in graphical format in Figure 2.

The Table 3 represented the gender distribution of the sample of 500 cases. Females were predominant with 55.8% (279 cases). Females in this surveyed group had a lower level of education and employment status, because of which they had to depend on the male members of the family to take them for dental treatment. This could be a reason for more females being partially edentulous. Moreover it was seen that females cooperated better than males for the study. These findings were illustrated in graphical format in Figure 3. This study was in accordance with the study done by Prabhu and Osterberg, which also shows the correlation between the gender and various classes of partial edentulousness.

Table 4 represent education status among the 500 participants. No formal schooling was seen with highest frequency in 112 participants (22.4%). This was closely followed by primary school completed (99–19.8%) and less than primary school (80–16%). Secondary school completed and High school completed were seen in 76 participants each (15.2% each). Forty six (9.2%) participants had completed college/university. Only 11 participants (2.2%) had obtained a post graduate degree. Less educated people aren’t much aware about oral health care. People with better employment status are more concerned about their aesthetics and opted for dental treatment. Less educated people aren’t much aware about oral health care. People with better employment status are more concerned about their aesthetics and opted for dental treatment. Socio economic parameters have direct influence on the replacement of missing teeth. This is in correlation with the finding done by Palmer and Moen and Ronald. More educated and financially sound people were more likely to be more aware regarding oral health issues. The fact that maximum number of subject had no education, depicts the real scenario of lack of education. Similar observations were made by Ronald. These findings were illustrated in graphical format in Figure 4.

The Table 5 explained the distribution of 500 participants according to the monthly income. Majority of the participants 125 (25.0%) had an earning less than 5000. It was followed by an earning of Rs. 5000 – Rs.10000 by 112 participants (22.4%). Followed by 90(18.0) participants who earned 10001-30000. 53 participants (15.2%) refused to disclose their income. 65 (13.0%) participants and 55 participants (11.0%) earned Rs. 30001 – Rs.50000 and more than Rs. 50000 respectively. It was found that Partial edentulism depends on socio-economic parameters like family income, education, occupation, etc. Partial edentulism decreases in the employed group and when family monthly income increases. The lower income group people could not afford to the treatment procedures that would have saved their questionable tooth, so might have opted for extraction. This is in correlation with the finding done by Moen and Ronald.

So the result of the foregoing study may serve as a baseline data that may assist in future planning and implementation for oral health services among the population in lower Garhwal region of Uttarakhand and may prove to be an important asset for oral health service.

6. Conclusion
Age, gender, socioeconomic status was found to be a significant co-factors associated with Partial edentulism. The prevalence of level of partial edentulism was found to be higher in females than males specially in older age and middle age participants respectively. Class 1 and class 2 dental arch tendency increases whereas class 3 and class 4 type decreases with increase in age. Partial edentulism is found to be lesser in younger participants. More educated and financially sound people were likely to be more aware regarding oral health issues.

7. Source of Funding
None.

8. Conflict of Interest
The authors declare that there is no conflict of interest.

References
1. Jeyapalan V. Partial Edentulism and its Correlation to Age, Gender, Socio-economic Status and Incidence of Various Kennedy’s Classes – A Literature Review. J Clin Diagn Res. 2015;9(6):14–21. doi:10.7860/jcdr/2015/13776.6124.
2. Petersen PE. Priorities for research for oral health in the 21st century- the approach of the WHO Global oral health programme. Community Dent. 2005;22:71–4.
3. Prabhu N, Kumar S. Partial edentulousness in a rural population based on Kennedy’s classification: An epidemiological study. J Ind Prosthodont Soc. 2009;9(1):18–23.
4. Osterberg T, Carlson GE, Mellstrom D, Sundh W. Cohort comparisons of dental status in the adult Swedish population between 1975
and 1981. Community Dent Oral Epidemiol. 1991;19:195–200. doi:10.1111/j.1600-0528.1991.tb00145.x

5. Palmer BB, Moen BD. A dental survey of an urban, employed group. J Am Dent Assoc. 1957;54(1):56–68. doi:10.14219/jada.archive.1957.0002

6. Ettinger RL, Beck JD, Jakobsen J. Removable prosthodontic treatment needs: A survey. J Prosthetic Dent. 1984;51(3):419–27. doi:10.1016/0022-3913(84)90235-3

Author biography

Himanshu Aeran, Director Principal, Professor & Head
https://orcid.org/0000-0002-7723-7108

Abhinav Thapliyal, PG 3rd Year

Neeraj Sharma, Professor

Varun Kumar, Professor

Cite this article: Aeran H, Thapliyal A, Sharma N, Kumar V. Partial edentulism and its correlation to age, gender, socioeconomic status and incidence of various Kennedy’s classes - A cross-sectional study. Int J Oral Health Dent 2021;7(1):8-13.