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ORIGINAL RESEARCH

Prevalence of Partial Edentulism Based on Kennedy Classification in a Teaching Hospital: A Retrospective Study

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Background: Partial edentulism remains a common oral health condition with significant functional and prosthodontic implications. The Kennedy classification system is widely used for categorizing partially edentulous arches due to its simplicity and clinical applicability.

Objective: To determine the prevalence and distribution of Kennedy Class I–IV partial edentulism according to age, gender, and jaw involvement among patients attending a teaching hospital in Kabul, Afghanistan.

Methods: A retrospective cross-sectional study was conducted using secondary data obtained from hospital records. The study included 328 patients diagnosed with Kennedy Class I–IV partial edentulism who attended the Prosthodontics Department between January 2023 and December 2023. Data were analyzed using IBM SPSS software. Descriptive statistics were used to determine frequencies and percentages.

Results: Among 328 partially edentulous patients, Kennedy Class I was the most prevalent (46.3%), followed by Class III (25.6%) and Class II (21.3%), while Class IV was the least frequent (6.7%). Class I and II were more commonly observed in the mandible, whereas Class III and IV predominated in the maxilla. Females showed a higher prevalence of Class I and III, while Class II and IV were more frequent among males. The highest proportion of partial edentulism was observed in the 41–50-year age group.

Conclusion: Kennedy Class I was the most prevalent pattern of partial edentulism in the studied population, while Class IV was the least common. Distribution patterns varied according to age, gender, and jaw involvement. These findings provide useful epidemiological data for prosthodontic treatment planning and oral health service development.

Keywords: partial edentulism, kennedy classification, prevalence, removable partial denture, epidemiology

Introduction

Teeth play a vital role in the stomatognathic system, contributing to mastication, speech, esthetics, and overall quality of life. Loss of natural dentition can significantly impair functional efficiency as well as psychological and social well-being.[1–4]

Partial edentulism, defined as the loss of one or more teeth within a dental arch, is a common clinical condition worldwide. It is most frequently associated with dental caries and periodontal disease, although trauma and other factors may also contribute.[4–7]

The Kennedy classification is widely used to describe patterns of partial edentulism due to its simplicity and clinical applicability. It categorizes edentulous arches into four classes based on the location and extent of tooth loss, providing a standardized framework for diagnosis and prosthodontic treatment planning.[8,9]

Understanding the distribution of partial edentulism is essential for planning appropriate prosthodontic interventions, including removable, fixed, and implant-supported prostheses.[10,11] However, there is limited epidemiological data on the

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pattern of partial edentulism in Afghanistan, particularly among patients attending teaching hospitals. This gap limits evidence-based treatment planning and oral health service development in the region.

Therefore, the present study aimed to assess the prevalence and distribution of Kennedy Class I–IV partial edentulism among patients attending the Department of Prosthodontics at a teaching hospital in Kabul, Afghanistan.

The null hypothesis was that there is no significant association between Kennedy classification and demographic variables such as age, gender, and jaw.

Materials and Methods

Study Design and Setting

This retrospective cross-sectional study was conducted among patients diagnosed with Kennedy Class I–IV partial edentulism. The study population included patients who attended the Department of Prosthodontics at Stomatology Teaching Hospital for the fabrication of removable partial dentures between January 2023 and December 2023.

Data Collection and Classification

Data were extracted from patient registration records using a structured and standardized data collection form. The variables collected included age, sex, arch involved (maxillary or mandibular), and classification of partial edentulism.

Partial edentulism was classified according to the Kennedy classification (Class I–IV), based on clinical examination records, prosthodontic treatment notes, and diagnostic casts where available. In cases where classification was unclear, supporting radiographs and clinical documentation were reviewed to ensure accuracy.

To enhance diagnostic reliability, two independent examiners with prosthodontic training performed the classification. In cases of disagreement, consensus was reached through discussion. Inter-examiner reliability was assessed using Cohen's kappa coefficient (κ), yielding a value of $\kappa = 0.905$, indicating excellent agreement. Statistical analysis was performed using IBM SPSS Statistics (Version 27).

Inclusion Criteria

Patients diagnosed with Kennedy Class I–IV partial edentulism

Patients who attended the Department of Prosthodontics during the study period

Exclusion Criteria

Patients with incomplete or missing key clinical or demographic records

Records with unclear Kennedy classification

Handling of Missing Data

Records with incomplete or missing essential variables were excluded from the final analysis. A complete-case analysis approach was adopted. A total of 82 incomplete records were excluded prior to analysis.

Sample Size and Sampling Technique

The sample comprised all patients diagnosed with Kennedy Class I–IV partial edentulism who attended the Prosthodontics Department during the study period. A non-probability consecutive sampling technique was employed, whereby all eligible patients were included.

As this was a retrospective record-based study, no formal sample size calculation was performed. Inclusion of all available cases was intended to maximize statistical power and representativeness.

Study Variables

The dependent variable was the type of partial edentulism according to Kennedy classification. Independent variables included age group, gender, and jaw (maxilla or mandible) (Table 1).

Table 1 Variables

Independent Variables	Dependent Variables
Age group	Kennedy classes I–IV
Gender	
Jaw	

Statistical Analysis

Data were entered and analyzed using IBM SPSS Statistics for Windows, Version 27.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were computed as frequencies and percentages for categorical variables.

Associations between Kennedy classification and independent variables (age group, gender, and jaw) were assessed using the Chi-square test of independence. Prior to analysis, assumptions for the Chi-square test were evaluated, including adequacy of expected cell counts (≥80% of cells with expected frequency ≥5). Where assumptions were violated, appropriate alternatives (eg, Fisher's exact test) were considered.

For statistically significant associations, effect size was calculated using Cramér's V. A p-value of <0.05 was considered statistically significant.

Ethical Considerations

The study protocol was approved by the Institutional Review Board (IRB) of Kabul University of Medical Sciences (Approval No. 161) and conducted in accordance with the principles of the Declaration of Helsinki.

This study utilized secondary data obtained from hospital records. As the dataset contained no personal identifiers and was analyzed anonymously, the requirement for informed consent was waived. Permission to access the data was obtained from the relevant authority of Stomatology Teaching Hospital.

Data Availability

The anonymized dataset supporting the findings of this study is publicly available in the Zenodo repository (https://doi.org/10.5281/zenodo.18871752). The dataset includes all variables used for statistical analysis and for the generation of tables and figures and is available under an open license permitting reuse with appropriate citation.

Results

Overall Prevalence

A total of 395 patients attended the Prosthodontics Department during the study period. Of these, 328 patients with Kennedy Class I–IV partial edentulism were included in the final analysis, while 67 patients were excluded due to other dental conditions.

Distribution of Kennedy Classification

Kennedy Class I was the most prevalent pattern of partial edentulism, followed by Class III and Class II, whereas Class IV was the least common (Table 2).

Distribution According to Arch Type

A slightly higher proportion of cases was observed in the maxillary arch compared to the mandibular arch. Class I and Class II patterns were more frequently observed in the mandibular arch, whereas Class III and Class IV were relatively more common in the maxillary arch (Table 3).

A statistically significant association was found between arch type and Kennedy classification ($\chi^2(3, N = 328) = 23.03$, $p < 0.001$; Cramér's $V = 0.265$).

Table 2 Distribution of Kennedy Classification Among Patients

Kennedy Class	Frequency	Percent
Class I	152	46.3%
Class II	70	21.3%
Class III	84	25.6%
Class IV	22	6.7%
Total	328	100%

Distribution According to Gender

The study population included a slightly higher proportion of males than females. Class I and Class III patterns were more frequent among females, while Class II and Class IV were relatively more common among males (Table 4).

No statistically significant association was observed between gender and Kennedy classification ($\chi^2(3, N = 328) = 2.39$, $p = 0.496$; Cramér's $V = 0.085$).

Distribution According to Age

Partial edentulism was most prevalent among middle-aged patients and least common in the oldest age group. Class I and Class II patterns were most frequently observed in middle-aged individuals, Class III predominated in older patients, and Class IV was more common among younger adults (Table 5).

A statistically significant association was identified between age group and Kennedy classification ($\chi^2(15, N = 328) = 61.31$, $p < 0.001$; Cramér's $V = 0.250$)

Discussion

The present study demonstrated that Kennedy Class I was the most prevalent pattern of partial edentulism, while Class IV was the least common. This predominance of distal extension cases is consistent with studies from Saudi Arabia, where posterior tooth loss has also been reported as the most frequent pattern.[12,13] This may be explained by the increased susceptibility of posterior teeth to caries and periodontal disease, as well as challenges in maintaining oral hygiene in posterior regions.

In contrast, studies from Pakistan and India have reported Kennedy Class III as the most prevalent pattern.[14,15] These differences may be attributed to methodological variations. The Pakistani study was conducted in a diagnostic clinical setting using direct visual examination and consecutive sampling, which may capture earlier stages of tooth loss and increase the observed prevalence of bounded edentulous spaces (Class III). Furthermore, the application of Applegate's rules and exclusion of modification spaces may influence classification outcomes. Similarly, the Indian study utilized dental cast analysis in a treatment planning context, which may allow more precise detection of smaller edentulous areas. In contrast, the present retrospective study, conducted in a prosthodontic setting, is more likely to include advanced cases requiring rehabilitation, thereby increasing the prevalence of Class I patterns.

With respect to age distribution, the highest prevalence of partial edentulism was observed among individuals aged 41–50 years, while the lowest prevalence was noted in older age groups. These findings are consistent with studies conducted in Saudi Arabia and India.[13,16] This pattern may reflect the cumulative burden of oral disease, with middle age representing a transitional phase associated with increased tooth loss and prosthodontic treatment needs. However, some studies have reported peak prevalence in older age groups.[17] This variation may be explained by differences in study design, including the use of direct clinical examination and study cast analysis, as well as variations in sampling strategies, sample size, and age group categorization.

Regarding gender distribution, a slight male predominance was observed. Although Class I and Class III patterns were more frequent among females, and Class II and Class IV were more common among males, no statistically

Table 3 Distribution of Kennedy Classes According to Arch Type

Arch type	Class I		Class II		Class III		Class IV		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Maxillary arch	66	20.1%	30	9.1%	58	17.7%	16	4.9%	170	51.8%
Mandibular arch	86	26.2%	40	12.2%	26	7.9%	6	1.8%	158	48.2%

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Table 4 Distribution of Kennedy Classification Among Different Genders

Gender	Class I		Class II		Class III		Class IV		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Male	82	25%	36	11%	43	13.1%	8	2.4%	169	51.5%
Female	70	21.3%	34	10.4%	41	12.5%	14	4.3%	159	48.5%

Table 5 Distribution of Kennedy Classes Among Different Age Groups

Age groups	Class I		Class II		Class III		Class IV		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
20–30	9	2.7%	9	2.7%	12	3.6%	3	0.9%	33	10%
31–40	3	0.9%	9	2.7%	17	5.2%	9	2.7%	38	11.6%
41–50	68	20.7%	23	7%	22	6.7%	6	1.8%	119	36.2%
51–60	50	15.2%	15	4.6%	27	8.2%	0		92	28%
61–70	17	5.2%	11	3.6%	6	1.8%	4	0.9%	38	11.6%
71–80	5	1.5%	3	0.9%	0		0		8	2.6%

significant association was identified. Similar findings have been reported in previous studies.[8,18] These observations suggest that gender differences may be influenced more by healthcare-seeking behavior and access to dental care than by biological factors.

In terms of arch distribution, Classes I and II were more prevalent in the mandible, whereas Classes III and IV were more frequently observed in the maxilla. While some studies have reported a higher prevalence of all classes in the mandible,[19] the differences observed in the present study may be attributed to variations in sample composition and age distribution, as well as differences in data collection methods. Anatomical and functional differences between the maxilla and mandible may also contribute to variation in tooth loss patterns.

Importantly, this study provides region-specific epidemiological data on the distribution of Kennedy classification in Afghanistan, where such data remain limited. These findings have practical implications for prosthodontic treatment planning and highlight the need for preventive strategies targeting posterior tooth loss.

Overall, while the findings are broadly consistent with international literature, the observed differences emphasize the role of methodological and population-related factors in shaping the distribution of partial edentulism.

Study Limitations

This study has several limitations. First, as a hospital-based study, the sample may not be fully representative of the general population, introducing potential selection bias. Second, the retrospective record-based design relies on the accuracy and completeness of existing data, which may lead to information bias. Additionally, variations in clinical assessment and documentation of Kennedy classification may have introduced classification bias. The study also did not account for potential confounding factors such as socioeconomic status, oral hygiene practices, and access to dental care. Finally, as a single-center study conducted in Kabul, the findings may have limited generalizability to other populations.

Future Directions

Future research should focus on multicenter, prospective studies with standardized clinical assessment protocols to improve data accuracy and generalizability. Incorporating broader population samples and evaluating additional

variables, including socioeconomic and behavioral factors, would provide a more comprehensive understanding of the epidemiology of partial edentulism.

Conclusion

Kennedy Class I was the most prevalent pattern of partial edentulism, while Class IV was the least common. Overall, the findings indicate that posterior tooth loss patterns are more frequent, particularly in the mandible, and that partial edentulism is most commonly observed in middle-aged adults. These results highlight the need for targeted preventive and prosthodontic strategies to address tooth loss in high-risk groups and improve oral health-related quality of life.

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Disclosure

The authors declare that they have no competing interests in this work.

References

1. Syed A, S N. Kennedy classification distribution across different sociodemographic groups in partially dentate populations. *J Bacha Khan Coll Dent*. 2023;1(2):45–51. doi:10.65293/jbkcd.v1i02.19
2. Almutairy A, M M. Prevalence of partial edentulism among young Saudi women of Qasim and their perception of early tooth loss. *Int J Dent Res*. 2017;5(2):172. doi:10.14419/ijdr.v5i2.8224
3. Kahar AR, J J. Assessment of pattern of partial edentulism and its correlation with age. *Int J Med Res Health Sci*. 2023;12(10):8–16.
4. Nayyer M, Khan D, Gul H, Aslam A, Khan N, Aslam F. Patterns of partial edentulism according to Kennedy's classification: a cross-sectional study. *Pakistan Armed Forces Med J*. 2020;70:87–90.
5. Prasad S, Garg S. Prevalence of partial edentulism and awareness to restore the same among patients visiting a tertiary dental care centre in Ambala, Haryana, India: a cross-sectional study. *J Clin Diagn Res*. 2025;19(4):13–17. doi:10.7860/jcdr/2025/74059.20828
6. Kumar B, Kumar N, Ali S, Ahmed S. Partial edentulism: exploring partial edentulism patterns in mandibular arch among patients of Karachi. *Prof Med J*. 2019;26(5):764–768.
7. Karadi RH, Awad GD, Mansi ZM, et al. The prevalence of partial edentulism and associated factors: a cross-sectional study. *Dentistry 3000*. 2024;12(2). doi:10.5195/d3000.2024.736
8. Deeksheetha P, Pandurangan KK, Kareem N. Prevalence and pattern of partial edentulism according to Kennedy's classification: a retrospective study. *Int J Dent Oral Sci*. 2021;8(8):4114–4118. doi:10.19070/2377-8075-21000840
9. Tulsani MG, S R. Prevalence of Kennedy classification in partially edentulous patients: a retrospective study. *Indian J Forensic Med Toxicol*. 2020;14(4):5585–5591. doi:10.37506/ijfmt.v14i4.12489
10. McCracken WL. *McCracken's Removable Partial Prosthodontics*. 13th ed. St. Louis: Elsevier; 2016.
11. Özkurt-kayahan Z, C Ö, Kazazoğlu E. Partial edentulism and treatment options. *Yeditepe Dent J*. 2017;13(1):31–36. doi:10.5505/yeditepe.2017.62207
12. Gad MM, Al-Thobity AH, Rahoma A. Prevalence of partial edentulism and RPD design in patients treated at College of Dentistry, Imam Abdulrahman Bin Faisal University, Saudi Arabia. *Saudi Dent J*. 2020;32(2):74–79. doi:10.1016/j.sdentj.2019.07.002
13. Al-Angari N, Al-Angari S, Andijani A, Alqahtani A. Various classes of removable partial dentures: a study of prevalence among patients attending a dental and educational institute in Riyadh, Saudi Arabia. *Saudi Dent J*. 2021;33(7):656–660. doi:10.1016/j.sdentj.2020.05.002
14. Bukhari JH, Zafar R, Javed Iqbal M, Rafiq M, Abdullah U, Noreen R. Prevalence of Kennedy's classes in partial edentulism: a cross-sectional study. *Pak J Med Health Sci*. 2022;16(1):1260–1262. doi:10.53350/pjmhs221611260
15. Choudary Z, Khan P. Kennedy's classification: a study done at Dow International Dental Hospital. *Pak Oral Dent J*. 2016;36(4):677–679.
16. Bharathi M, Reddy K, Vinod V, Misuriya A, Bharathi M, Babu KRM. Partial edentulism based on Kennedy's classification: an epidemiological study. *J Contemp Dent Pract*. 2014;15(2):229–231. doi:10.5005/jp-journals-10024-1520
17. Devishree RA, Sangeetha S, Jain A. Prevalence of partial edentulism according to Kennedy's classification based on age, gender, and arch. *Drug Invent Today*. 2018;10:108–110.
18. Anjum R, Shoaib A, Gul S, Ahmad S. Frequency of Kennedy's classification among partially edentulous patients presenting at a tertiary care hospital in Islamabad. *Pak Oral Dent J*. 2021;41:111–114.
19. Lone MA, Shah SA, Mir S. Pattern of partial edentulism based on Kennedy's classification among dental patients in Kashmir: retrospective study. *Int J Appl Dent Sci*. 2019;5(2):209–221.