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Original Article

Prevalence of Partial Edentulism Among Patients of Faculty of Dentistry Cairo University: A Cross-Sectional Study

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Abstract

Aim: This study aimed to evaluate the prevalence of partial edentulism among patients attending Faculty of Dentistry, Cairo University.

Materials and Methods: This cross-sectional study included 362 partially edentulous patients aged from 18 to 80 years. A recording sheet (a self-designed proforma) was utilized to gather data. The prevalence of Kennedy's classification and which class was determined by a visual examination using the dental mirror while the patient was seated on a dental chair.

Results: The recruited sample included a total number of 220 females and 142 males. There were 239 urban subjects and 123 rural subjects in total. 256 patients had partial edentulism in the mandibular arch while 172 patients had partial edentulism in the maxillary arch. Total classes included 145 CI, 149 CII, 105 CIII, and 29 CIV. 63.3% of the patients lost their teeth because of caries.

Conclusion: Within limitations of this study, class II was the most common in both dental arches. Partial edentulism in the mandible was found to be more common than in maxilla. Middle and senior age groups were most susceptible to tooth loss, with partially edentulous females being more prevalent than males, and caries being the most common cause.

Key Words: Kennedy's classification, prevalence, partial edentulism, Egypt

Introduction

A partially edentulous arch is lacking one or more teeth. Multiple factors such as cost of treatment, access to and use of dental services, systemic conditions, aging and socio-demographic factors are involved in the pathogenesis of tooth loss. Caries, periodontal disorders, traumatic fractures, neoplastic and cystic lesions are some of the additional causes of teeth loss. (Patel *et al.*, 2014)

The inability to speak normally, changes in facial appearance, drifting and tilting of neighboring teeth, supra eruption of opposing teeth, and psychological instability are all consequences of tooth loss. Furthermore, it could result in social disengagement, dietary restrictions, and low self-esteem, all of which are regarded as some of the main negative effects that lower life quality**.** (Sapkota, Adhikari and Upadhaya, 2013)

Estimating the incidence of partial edentulism gives an indication of the prevalence of dental diseases and also the success or failure of dental care. The need for classification of partially edentulous arches is to help identify the relation of remaining teeth to edentulous ridges; and facilitates communication, discussion and knowledge of the suggested prosthetic treatment among dentists, students and technicians. The patterns of tooth loss was evaluated in many selected populations in numerous countries and so the frequency of partial edentulism seems to vary widely between different countries(Muneeb, Khan and Jamil, 2013; Manimaran *et al.*, 2017)

The frequency of different partially edentulous arch patterns needs to be updated and revised on a regular basis. This could assist in determining the population's evolving treatment needs and offer recommendations for preventing tooth loss. Dental education should be prioritized, as should the quality of prosthodontic care given to patients' oral and general health promotion, which should emphasize the management of common oral diseases like periodontal disease and caries at various stages of progression. Considering the lack of studies determining the prevalence of partial edentulism among the Egyptian population, the study aimed to evaluate the prevalence of partial edentulism among patients attending Faculty of Dentistry, Cairo University, using Kennedy classification.

Subjects and Methods

The current cross-sectional study was approved by the Ethical Committee of the Faculty of Dentistry, Cairo University (approval number 8621). Involvement in the study was entirely voluntary. We obtained verbal informed consent from the participants. The patients who were taking part in the study were given a thorough explanation of the procedure and the goals of the study. The participants were guaranteed the confidentiality of their survey answers and free to ask any questions they had about the study or to choose not to participate at all. The study protocol was registered at clinical trial.gov with identifier **(NCT04895969)**.

Settings

The study was an observational descriptive cross-sectional study that assessed the prevalence of partial edentulism among patients attending

Faculty of Dentistry Cairo University. It was performed in the diagnostic center of faculty hospital.

Participants

Partially edentulous patient attending diagnostic center of Faculty of Dentistry, Cairo University, who met the following criteria were included in the study: being above the age of 18- regardless of their sex, race, or socioeconomic status- and having partially missing teeth in one or both arches, patients who were willing and cooperative to participate. On the other hand, patients who were completely edentulous, had extracted teeth for orthodontic reasons, had only a missing third molar, congenital missing teeth, root tips, or loose teeth that needed extraction were excluded from the study**.**

Data sources/management:

Data was obtained on 2 parts: First, a recording sheet (a self-designed proforma) was filled to gather focused variables which were collected from several articles that studied the prevalence of partial edentulism in their populations. (Niarchou *et al.*, 2011; Lone *et al.*, 2019; Mall *et al.*, 2022) Six age groups were included in the study, Group 1 (18-30y), Group 2 (30-40y), Group 3 (40-50y), Group 4 (50-60y), Group 5 (60-70y), Group 6 (70-80y). Then visual examination was done by seating the patient on the dental chair and using the mouth mirror for recording the prevalence of Kennedy's classification.

Potential sources of bias:

Selection bias:

Selection bias was avoided by including all partially edentulous patients fulfilling the inclusion criteria at the days of examination.

Recall bias:

Recall bias was avoided by carefully selecting focused research questions and choosing a proper data collection method (self-designed proforma).

Sample size calculation:

The suggested sample size was 362 patients according to a power analysis which was designed to have adequate power to apply a statistical test for the research question. According to the results of Jandial, in which the prevalence of Kennedy's Class III was (62.0%), (Jandial *et al.*, 2017) and by adopting a confidence interval of (95%), a margin of error of (5%) with finite population correction; the predicted sample size (n) was a total of (362) cases.

Statistical methods

Data were explored for normality using Kolmogorov-Smirnov and Shapiro-Wilk tests, data showed non-parametric (not-normal) distribution. Kruskal Wallis test was used to compare between more than two groups in non-related samples. Mann Whitney test was used to compare between two groups in non-related samples. Chi-square test was used to analyze frequencies. The significance level was set at significant ($p<0.05$) whereas non-significant ($p>0.05$).

Statistical analysis was performed with IBM SPSS Statistics for Windows, Version 20.0: IBM Corp.

Results

This cross-sectional study included 362 partially edentulous patients aged from 18 to 80 years old (with a mean age 49 y)

1. **Prevalence of partial edentulism according to demographics:** The total number of females recruited were 220 and males were 142. Five patients were within the age group (1), fifty patients were within age group (2), ninety-four patients were within age group (3), one hundred and ten patients were within age group (4), eighty-five patients were within age group (5) and eighteen patients were within age group (6). (Table 1)

The total number of urban subjects was 239 and rural subjects was 123. Patients having partial edentulism in the maxillary arches were 172, while in the mandibular arches were 256, thus indicating a higher incidence in the mandibular arch than in the maxillary arch. 229 patients lost their teeth due to caries, 55 patients due to PDL disease, six patients due to trauma, 70 patients due to both caries and periodontal disease, 1 patient due to trauma and PDL disease, while 1 patient due to other reasons.

Association between Prevalence of partial edentulism and demographics:

All the demographic data revealed a significant association with prevalence of partial edentulism. The significance level was <0.001.

2. Prevalence of Partial Edentulism According to Kennedy's Classification:

classes included were 145 (33.9%) CI, 149 (34.8%) CII, 105 (24.5%) CIII and 29 (6.8%) CIV.

Association between prevalence of partial edentulism and Kennedy's Classification:

A statically significant association was found. The significance level was <0.001.

3. Prevalence of Partial Edentulism According to Kennedy's Classification Correlated with Gender

Out of 362 subjects, classes in females included 81(31.6%) CI, 96 (37.5%) CII, 67 (26.2%) CIII and 12 (4.7%) CIV, while classes in males included 64 (37.3%) CI, 53(30.8%) CII, 38 (22%) CIII and 17 (9.9%) CIV. (Table 3)

Association between Prevalence of partial edentulism and gender:

No statistically significant difference was found between gender groups where (p=0.52).

4. Prevalence of Partial Edentulism According to Kennedy's Classification Correlated With Age

Out of 362 subjects, classes in (A1) included 1 (16.70%) CI, 3 (49.90%) CII, 1 (16.70%) CIII and 0 (0%) CIV, (A2) included 15 (26.30%) CI, 22 (38.60%) CII, 14 (24.6%) CIII and 6 (10.50%) CIV, (A3) included 33 (30.60%) CI, 43(39.80%) CII, 26 (24.00%) CIII and 5 (5.60%) CIV, (A4) included 42 (32.2%) CI, 47(36.6%) CII, 33 (25.3%) CIII and 8 (6.2%) CIV, (A5) included 46 (44.60%) CI, 28 (27.2%) CII, 22 (21.4%) CIII and 7(6.8%) CIV and (A6) included 8 (34.7%) CI, 6 (26.2%) CII, 9(39.1) CIII and (0) CIV.

Association between Prevalence of partial edentulism and age:

No statistically significant difference was found between age groups where (p=0.154)

Table (1): The frequency & percent

Variables		**Demographic data**		
		N	**%**	**p-value**
Gender	**Females**	**220**	**60.8%**	
	Males	**142**	**39.2%**	**<0.001***
Age (Years)	**A1 (18-30)**	**5**	**1.4%**	
	A2 (31-40)	**50**	**13.8%**	
	A3 (41-50)	**94**	**26.0%**	**<0.001***
	A4 (51-60)	**110**	**30.4%**	
	A5 (61-70)	**85**	**23.5%**	
	A6 (71-80)	**18**	**5.0%**	
Residency	**Urban**	**239**	**66%**	
	Rural	**123**	**34%**	**<0.001***
Arch	**Maxilla**	**172**	**40.2%**	
	Mandible	**256**	**59.8%**	
Reason	**Caries**	**229**	**63.3%**	
	PDL disease	**55**	**15.2%**	**<0.001***
	Trauma	**6**	**1.7%**	
	Caries and PDL	**70**	**19.3%**	
	Trauma and PDL	**1**	**0.3%**	
	Other	**1**	**0.3%**	

Table (2): Prevalence of partial edentulism according to Kennedy's classification

	Classes	N	%	p-value
Classes total	**CI**	**145**	**33.9%**	**<0.001***
	CII	**149**	**34.8%**	
	CIII	**105**	**24.5%**	
	CIV	**29**	**6.8%**	

Table (3): Prevalence of Partial Edentulism According to Kennedy's Classification Correlated With Gender

	classes	N	%	N	%	p-value
Classes	**CI**	**81**	**31.6%**	**64**	**37.3%**	**0.521ns**
	CII	**96**	**37.5%**	**53**	**30.8%**	
	CIII	**67**	**26.2%**	**38**	**22%**	
	CIV	**12**	**4.7%**	**17**	**9.9%**	

Table (4): Prevalence of Partial Edentulism According to Kennedy's Classification Correlated With Age

		A1		A2		A3		A4		A5		A6		
		N	%	N	%	N	%	N	%	N	%	N	%	
classes	**CI**	**1**	**16.70%**	**15**	**26.30 %**	**33**	**30.60%**	**42**	**32.20 %**	**46**	**44.60 %**	**8**	**34.70 %**	**0.154ns**
	CII	**3**	**49.90%**	**22**	**38.60 %**	**43**	**39.80%**	**47**	**36.30 %**	**28**	**27.20 %**	**6**	**26.20 %**	
	CIII	**1**	**16.70%**	**14**	**24.60 %**	**26**	**24.00%**	**33**	**25.30 %**	**22**	**21.40 %**	**9**	**39.10 %**	
	CIV	**1**	**16.7%**	**6**	**10.50 %**	**50**	**5.60%**	**8**	**6.20%**	**7**	**6.80%**	**0**	**0%**	

Discussion

This study was a descriptive cross-sectional study. Cross-sectional studies are useful in identifying the number of people affected by a certain condition. (Wang and Cheng, 2020) Literature suggests that the prevalence of various patterns of partially edentulous arches should be frequently revised and updated. This will help identify the changing treatment needs of the population and provide guidelines for teaching and learning as well. A wide range of outcomes and risk factors can be evaluated from this type of studies.

Participants included in the study were outpatients attending the diagnostic center of the Faculty of Dentistry, Cairo University, which is of the biggest hospitals providing free therapeutic services for patients, which in turn provides an excellent gate for a huge number of patients on a daily basis. In the current study, Kennedy classification was used to determine the edentulous spans as a measurement tool as it is simple, the foremost generally used, widely accepted and allows for instant visualization and recognition of partial edentulous areas. (Parajuli *et al.*, 2020a)

In this study, the total number of females were 220 out of 362 (60.8%) showing that female patients were dominant. This could be attributed to the more frequent dental visits by females seeking for dental care for their inadequate and unaesthetic dentition than the male counterpart.(Prabhu *et al.*, 2009) On the other hand, other studies reported that males suffer more from partial edentulism which could be because of the poor brushing habits due to their work schedule.(Sadig and Idowu, 2002; Manimaran *et al.*, 2017).

Age is the major factor identified to have a considerable association with the occurrence of partial edentulism. The majority of the study participants who had partial edentulism belonged to the A4 (51-60) age group. This is consistent with the fact that the middle and senior age groups are the most vulnerable to tooth loss due to ageing and inability to complete oral hygiene routines due to systemic disorders or functional incapacity. On the contrary younger age groups showed lesser frequencies of partial edentulism as they are more keen on the esthetic and functional role of their teeth.

There is a huge discrepancy in oral health care provision in Egypt between urban and rural areas. The replacement of lost teeth is greatly influenced by socioeconomic factors such as literacy, career, family income and other factors. Population in lower socioeconomic classes tends to be more affected by edentulism primarily due to lack of awareness and low income. (Jeyapalan and Krishnan, 2015b; Khan *et al.*, 2022).

The higher prevalence of partial edentulism was reported in the mandibular arch which could be attributed to the early eruption of mandibular teeth compared to the maxillary teeth. (Keyf, 2001; Abdel-Rahman, Tahir and Saleh, 2013; Yunus Patel, Vohra and Mohammed Hussain, 2014) Class II was the most prevalent

class, this increase in the frequency of class II patients could be explained with increased attempts for tooth loss prevention awareness, whereas the frequency of class III and IV patients was lower than that of class I and class II due to the fixed prosthodontic approach. (AL.Judy, 2018)

According to the results of the current study, tooth decay accounts for a higher incidence of partial edentulism (55%). The primary cause of tooth loss is dental caries, which may be attributed to dietary pattern changes, a transition from a hard, fibrous diet to one that is higher in refined carbohydrates, a change in people's socioeconomic background, and changes in lifestyle over time. (Manimaran *et al.*, 2017; Parajuli *et al.*, 2020b).

Conclusion

The most common Kennedy classification, within the study's limitations, was class II. Caries was a factor that contributed to partial edentulism more frequently. To ensure that patients at the Faculty of Dentistry receive proper oral care and replace their teeth on time, more efforts should be done to enhance dental education and patient motivation.

Recommendations:

Future iterations of the study should incorporate a larger sample size and encompass all dental centers within the region. In addition to assisting in the creation of preventive programs to help people avoid losing their teeth, more research will help predict the community's need for prosthetics. In addition to promoting oral hygiene, methods for enhancing the population's educational attainment should be devised. Basic dental care should also be easily accessible or provided by health insurance.

Conflict of Interest:

The authors declare no conflict of interest.

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Ethics:

This study protocol was approved by the ethical committee of the faculty of dentistry-Cairo university on: 24/6/2021, approval number: 8621

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