

The prevalence of partial edentulism and complete edentulism among adults and above population of Riyadh city in Saudi Arabia

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ABSTRACT

Objectives: The present study was conducted to investigate the prevalence of complete edentulism and partial edentulism among adults and above population in Riyadh city, in relation to gender, age, and education level. Baseline information related to edentulism will help us take action to promote oral health. **Methods:** A cross-sectional stratified cluster study was carried out in 2018-2019 in several dental care centers across Riyadh city. A total of 618 subjects aged 35-74 years were selected through convenient sampling and information related to edentulism was gathered followed by clinical examination. **Results:** Of the total sample, 349 (56.5%) were males and 261 (43.5%) were females. In the overall assessment of edentulism, it was found that the majority of the subjects 426 (69%) had one or more teeth missing. Among these subjects, there was (2.6%) who were completely edentulous, which represented (1.8%) of the total sample. **Conclusion:** A high percentage of adult patients have missing teeth and complete edentulism was found mostly in elderly people. Frequenting a dental center had an inverse relation with edentulism.

Keywords: Complete edentulism, edentulism, edentulous state, partial edentulism

Introduction

Edentulism is the state of being edentulous; without natural teeth.^[1] Oral health is not limited to merely having healthy teeth. Good oral health plays a crucial role in the economic, social, and personal development of individuals.^[2] Teeth are essential for aesthetics, mastication, phonetics, structural balance, and the overall comfort of an individual. Edentulism reduces these essentials resulting in physical, physiological, and psychological trauma for the individual.^[3] These detrimental effects can be hindering to typical day-to-day functions. It has been revealed in a previous study that extraction is one of the most performed treatment modalities rendered in the public sector in Saudi Arabia^[4] and this has subsequently contributed to edentulism

within this region. To compound this, another study revealed that there is minimum awareness among patients toward implant therapy or other appropriate forms of prostheses for the management of edentulism,^[5] thereby contributing to its growing prevalence.

Several studies have investigated the prevalence of partial edentulism.^[6-9] As an example, Heidari *et al.*^[6] examined oral health outcomes in UK adults. They found that the majority of their test subjects (94.4%) had at least one missing tooth, and only 5.6% were devoid of any missing teeth. In contrast to this, Kim *et al.*^[7] found that in the USA only a minority of 25.6% had at least one missing tooth. Moreover, Begum *et al.*^[8] stated in their study that the overall prevalence of missing teeth was 50.39% of which the highest prevalence of tooth loss (96.18%) was seen in the 65-74 years age group in both upper and lower classes.

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Regarding the prevalence of complete edentulism, in the United States, according to the most recent data^[9] surveyed 432,519 adults, among adults over 15 years of age and above. The prevalence of edentulism was 4.9%. In Canada, the overall rate of edentulism in 2010 was 6.4% and 21.7% among adults between 60 and 79 years of age.^[10] Peltzer *et al.* conducted an extensive survey to assess complete edentulism among older adults, 50 years and above, in several countries, namely India, Ghana, China, Mexico, Russia, and South Africa. Mexico showed the highest prevalence at 21.7% with Russia coming in second at 18% and India third at 16.3%. China and South Africa were similar at 9% and 8.5%, respectively. The least prevalence rate for edentulism was seen in Ghana (3%).^[11] Furthermore, a recent study in Indonesia suggested that edentulism was related to older adults having a functional disability and low social capital.^[12]

There is insufficient documentation regarding the prevalence of edentulism among the population of nationals living in Saudi Arabia. The current study aimed at investigating the prevalence of partial and complete edentulism in Riyadh city, Saudi Arabia.

Materials and Methods

Ethical clearance and informed consent

The research proposal was presented to the ethical committee, research center, at Riyadh Elm University. The study was reviewed and the institutional review board provided ethical clearance (IRB number RC/IRB/2019/40, 21-10-2019). Participants were informed about the aim and objectives of the study and informed consent was taken before data collection. They were also informed that the data would be kept anonymous and confidential. The chosen private health care center administrations were informed.

Research design

A cross-sectional stratified cluster clinical examination and a questionnaire-based study examining teeth loss among adults in Riyadh city, Saudi Arabia.

Target population

The data were collected from September 2018 to January 2019 from several private dental health care centers in Riyadh city. Patients were selected through a convenient sampling method. The city was divided into four clusters (North, East, West, South), and two random primary health care centers were selected per cluster, using randomization software.^[13] Using a sample size calculator with a confidence interval of 95% and a significance of $P < 0.05$, the targeted sample size was 600 participants of the Saudi adult population (35 years and above). The lower cutoff age of 35 years was selected because it is the official age group for investigations of oral health conditions in adults according to the latest WHO oral health surveys basic methods manual.^[14]

Inclusion and exclusion criteria

The inclusion criteria were any Saudi adult visiting the selected dental health care centers, aged 35 years and above. The exclusion

criteria were any non-Saudi, and Saudis aged below 35 years. Before the commencement of the study, participants were informed about the aim and objectives of the study and signed consents were obtained before data collection.

Method of examination

The questionnaire was asked and filled by the investigator, and oral examination of subjects was done as described by the WHO Oral Health Survey, Basic Methods, 2013.^[14] On average, 15 min were taken to examine and record the data for each patient.

The survey instrument

The questionnaire consisted of three parts: the first part of the questionnaire collected demographic data (patient's gender, age, occupation, and education level); the second part gathered information about the utilization of oral health services; while the third part jotted down information pertaining to the examination for tooth loss.

Training and calibration of the examiner

Before the study, two investigators were selected and trained to diagnose prosthetic status and need on clinical examination according to the WHO Oral Health Survey, Basic Methods.^[14] For intraexaminer calibration, the examiner repeated the examination on 15 subjects randomly selected. The Kappa value was 0.925.

Data analysis

Chi-square and cross-tabulation analysis of the collected data was done using IBM Statistical Package for Social Sciences (SPSS) Version 25.

Results

A total of 618 subjects participated in the study, of which more than half were male (56.5%). The participants were further subgrouped based on location, age, gender, education level, and sector of employment, as is presented in Table 1.

The oral health behavior of the participants is depicted in Table 2 which shows the duration elapsed since their last visit to a dentist, the reason for the last visit, and smoking habit.

Of the entire study population, 426 (69%) were found to have one or more missing teeth. Among these participants, 2.6% presented with complete edentulism; representing 1.8% of the total study population.

Correlation between age categories and missing teeth was assessed by using the Chi-square test and is presented in Table 3. There was a statistical significance seen when comparing edentulism with age. Additionally, it was found that 82% of the completely edentulous participants were aged above 55 years. This indicated a positive correlation between age and complete edentulism.

The prevalence of missing teeth varied at different levels of education and was found to be statistically significant as is seen in Table 3.

Table 1: Descriptive statistics for the sociodemographic variables

Variables		n	Percentage
Area	North	145	23.5%
	East	175	28.3%
	West	155	25.1%
	South	143	23.1%
	Total	618	100.0%
Age groups (Years)	35-44	320	51.8%
	45-54	173	28.0%
	55-64	80	12.9%
	65-74	45	7.3%
	Total	618	100.0%
Gender	Male	349	56.5%
	Female	269	43.5%
	Total	618	100.0%
Education	No formal education	20	3.2%
	Primary	10	1.6%
	Intermediate	32	5.2%
	Secondary	162	26.2%
	University	394	63.8%
Occupation	Total	618	100.0%
	Government	89	14.4%
	Private	529	85.6%
	Total	618	100.0%

Table 2: Oral health behavior among participants

Oral health behavior		n	Percentage
Last visit duration	Less than 6 months	109	17.6%
	6-12 months	293	47.4%
	More than 1 year	216	35.0%
	Never visited dentist	0	0.0%
Reason for last visit	Consultation/advise	52	8.4%
	Pain or trouble with teeth, gums, or mouth	197	31.9%
	Treatment/follow-up treatment	242	39.2%
	Routine checkup	106	17.2%
Smoking habit	Don't remember	21	3.4%
	Yes	166	26.9%
	No	452	73.1%
	Total	618	100.0%

Missing teeth differed among the participants living in different areas of the Riyadh city, however, there was no significance seen based on geographic location. Likewise, gender too did not show any statistically significant influence on the edentulism of the participants.

Oral health behavior variables of the last visit to the dentist ($P = 0.000$), the reason for the last visit ($P = 0.000$), and smoking habits ($P = 0.001$) all have shown a significant association with the missing teeth Table 4.

Discussion

Edentulism, no doubt, is one of the critical problems throughout the world population. This study provides an overview of the

prevalence of complete edentulism and partial edentulism in relation to gender, age, education level, and oral health behavior. Several studies assessing the prevalence of edentulism have been conducted worldwide,^[6-12] however, there is a lack of documented data regarding edentulism in Saudi Arabia.

A total of 618 study participants comprising 349 males (56.5%) and 269 (43.5%) females with a mean age of 46.4 years took part in this study. Most of the participants had a university-level education (63.8%).

In the overall assessment of edentulism, it was found that the majority of the subjects (426 [69%]) had at least one missing tooth. In a similar study conducted by Almutairy and Mohan in the AlQassim region, Saudi Arabia, a similar rate of missing teeth at 62.5% was observed.^[15] Yet another study conducted by Heidari *et al.* showed a higher rate of edentulism, where 94.4% of their study population had at least one missing tooth.^[6] In contrast to this, a study done by Kim *et al.* showed that only 25.6% of the total participants had at least one missing tooth.^[7] The age group of the participants could possibly be the reason for this difference; Kim *et al.*^[7] studied participants falling in the age group of 18–39 years, whereas in the present study, the age groups were distributed between 35 and 74 years.

Among the participants who had at least one missing tooth, 2.6% were completely edentulous, which represented 1.8% of the total sample. This rate was comparably low in comparison with Slade *et al.*^[9] and could possibly be attributed to the geographic differences; wherein Slade *et al.*^[9] surveyed both urban and rural regions in the USA, while the present study investigated only urban areas. Most of the participants (82%) who had complete teeth loss were above 55 years old and represented 7.2% of that age category. This percentage was similar to what Peltzer *et al.* found in South Africa, which was 8.5%, but less than most of the other countries which they studied.^[11] The possible reason for the different percentages may be attributed to the methodology, wherein the present study included the oral examination of participants, while in Peltzer *et al.*'s study, self-reporting by the participants was done, which may overestimate the prevalence.

In the present study, age showed a significant positive correlation with missing teeth. The results showed that 55.9% of participants in the 35–44 years group had tooth loss, while 91.25% of 65–74 years participants were edentulous in one form or the other. Similar findings were reported in other studies.^[8,11]

The role of gender in edentulism showed no significant impact on teeth loss; this study found that the rate of tooth loss was sparingly higher in males (71.1%) compared to the female (66.2%) participants. This was in accordance with Kim *et al.*, where they found no relationship between gender and tooth loss.^[7]

Oral health variables such as the participants' last visit and the reason for the last visit had a significant correlation with missing teeth. It was seen that 41.3% of those who had missing

Table 3: Sociodemographic factors associated with missing teeth

Sociodemographic variables		Missing teeth				Chi-square	df	P
		Yes		No				
		n	Percentage	n	Percentage			
Age (Years)	35-44	179	42.0	141	73.3	60.735	3	0.000*
	45-54	132	31.0	41	21.5			
	55-64	73	17.1	7	3.7			
	65-74	42	9.9	3	1.6			
	Total	426	100.0	192	100.0			
Education	No formal education	17	4.0	3	1.6	30.563	4	0.000*
	Primary	3	0.7	7	3.7			
	Intermediate	31	7.3	1	0.5			
	Secondary	124	29.1	38	19.9			
	University	251	58.9	143	74.3			
	Total	426	100.0	192	100.0			

Table 4: Association between oral health behavior variables and missing teeth

Oral health behavior variables		Missing teeth				Chi-square	df	P
		Yes		No				
		n	Percentage	n	Percentage			
Last visit	Less than 6 months	63	14.8	46	24.0	25.766	2	0.000*
	6-12 months	187	43.9	106	55.2			
	More than 1 year	176	41.3	40	20.8			
Reason for last visit	Consultation/advise	37	8.7	15	7.8	43.426	4	0.000*
	Pain or trouble with teeth, gums or mouth	147	34.5	50	26.0			
	Follow-up treatment	179	42.0	63	32.8			
	Routine checkup/treatment	45	10.6	61	31.8			
Smoking habit	Don't know/don't remember	18	4.2	3	1.6	11.877	1	0.001*
	Yes	132	31.0	34	17.7			
	No	294	69.0	158	82.3			

teeth had not visited the dentist for more than 1 year. It was also seen that patients who visit the dental clinic routinely and regularly for a checkup have the least amount of missing teeth. Even though this finding does not represent the whole picture, other behaviors related to dental health can impact edentulism, such as oral hygiene, use of fluoride products, and intake of fluoridated water. This was in agreement with a similar study conducted by Gilber *et al.* where they concluded that people with loss of teeth showed less frequent visits to dental care centers, inability to pay dental care fees, irregular dental hygiene practices.^[10]

Furthermore, the present study showed that only 21.4% of the participants were smokers with some form of edentulism. This was similar to Peltzer *et al.*, where they reported that current smokers have fewer missing teeth than former smokers.^[11] One possible explanation for these differences in the frequency and duration of the habit as well as the cigarette brands used within the different populations.

In agreement with other studies,^[8,11] this study found that having lower education was associated with edentulism; this result may be related to awareness, having better education may lead to improved awareness and dental health behavior.

Tooth loss should be evaluated clinically through primary care clinicians and managed with a dental professional. Immediate restoration is preferred to avoid certain circumstances. Primary care clinicians are well-positioned to reduce rates of oral disease. They can include oral health into routine practice by advising about oral hygiene, diet, smoking cessation, and fluoride supplementation; and screening for dental disease.

Limitations of this study were its short duration and that it was held only in private dental clinics which don't allow for a holistic overview of certain demographics such as economic status. Further research is needed to investigate edentulism on a larger scale

Conclusions

Within the limitations of the current study, it was concluded that a high percentage of adult patients have missing teeth, and complete edentulism was found predominantly among elderly adults. Gender did not play a role in tooth loss. The frequency of visits to a dental care center had a positive correlation with edentulism.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient (s) has/have

given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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