

# Trends, Awareness and Attitude of Patients Towards Replacement of Missing Teeth in the Western Region of Saudi Arabia

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## ABSTRACT

**Introduction:** These days, individuals seem to have more expectations regarding their dental health compared to the past. There are various treatment options available for the replacement of missing teeth and associated structures, which include removable prosthesis, fixed prosthesis and implant supported prosthesis. Most of the patients require aesthetics and functional comforts with prosthodontic treatment and it can be easily achieved with dental implants and tooth coloured restorations and prostheses.

**Aim:** To assess the trends, awareness and attitude of patients towards replacement of missing teeth in western region of Saudi Arabia.

**Materials and Methods:** A cross-sectional study was conducted among the 20-60 years aged population of western region of Saudi Arabia from 1<sup>st</sup> December 2018 to 1<sup>st</sup> March 2019. A questionnaire consisted of 10 close ended, pre-tested questions which was developed to determine patient's attitude and need with regard to their dental prosthesis. The data were tabulated and analysed using Statistical Package for the Social Sciences (SPSS)

version 21. Chi-square test was used to assess the attitude and awareness among the patients towards replacement of missing teeth. The p-value less than 0.05 was considered statistically significant.

**Results:** The study included 350 patients; 162 males (46.3%) and 188 females (53.7%). Among the participants, 233 (66.6%) of them desired fixed treatment and 115 (33.40%) of them desired removable treatment. Treatment options explained by clinicians were as follows: 67 (19.1%) were suitable for Fixed Partial Denture (FPD)/dental Implant, 11 (3.1%) suitable for FPD, Removable Partial Denture (RPD) and dental Implant and 272 (77.7%) of them suitable for RPD and dental Implant. A total of 67 (19.1%) of them opted for FPD, 115 (32.9%) of them opted for RPD and 168 (48.0%) of them opted for dental Implant.

**Conclusion:** Awareness and attitude of the participants towards prosthodontics treatment were mostly high. Majority of the participants wanted to replace missing teeth for mastication and aesthetics and had favourable knowledge and attitude towards implant as a mode of treatment for replacement of missing teeth. Participants preferred fixed treatment over removable.

**Keywords:** Dental implant, Fixed prosthesis, Partial dentate, Prosthetic options

## INTRODUCTION

Teeth play an important role in the maintenance of a positive self-image and in the general wellness of an individual. Loss of teeth in an individual adversely affects the body physiology and immensely interrupts social activities. This is directly associated with a ready acceptance of the artificial prostheses for replacing missing teeth by an individual. Loss of teeth is very traumatic and a cause of discomfort for the individual which is a serious crossroad event and usually requires lots of adaptation socially as well as psychologically. Any person can accept new prosthesis easily, but only if, he is mentally stable and socially active. Three areas which determine the acceptance of the prosthesis by an individual are function, comfort and aesthetics. Among these, comfort and function are mechanical and biological factors whereas acceptance of aesthetic aspect of prosthodontic treatment is determined by the social and cultural influences [1-4].

Prosthodontic treatment for replacing missing teeth in partially edentulous patients as well as completely edentulous patients is a challenging task which involves satisfaction, comfort and affordability of the patients and improving the quality of life without harming the adjacent teeth and gingival tissues. There are numerous options available for replacing missing teeth and associated structures such as removable and fixed prosthesis and more recently, implant supported prosthesis [5,6]. Due to the advancement in the technologies, replacement of teeth with implant supported prosthesis fulfills most of the requirements of patients such as aesthetics, function and comfort which is the reason literature shows most of the patients prefer to replace their missing teeth with

implant supported prosthesis [7-9]. There are various factors which could influence patient's attitude towards prosthodontic treatment, such as common beliefs, knowledge and finance, influence of the family members, friends and co-workers. Most of the patients have more expectations of their dental health compared to the past [10].

The mechanism which is used for formulating treatment plan include assimilating information from the patient's dental and medical history, clinical examination and utilisation of data available such as radiographs. Studies have reported that there is a direct relationship between the number of teeth to be replaced and total satisfaction with the oral status [11-13].

Most of the researchers have focused on a particular region and did not undergo a nation-wide study. For example, study by Mohammed A et al., was restricted to Riyadh city, same way another study by Ahmed A et al., was done in Asser region and the study by Abdulrahman A et al., was confined to Al-Qassim region [14-16]. Therefore, the present study was undertaken to assess the trends, attitude and awareness among the patients in the western region (Jeddah and Makkah) of Saudi Arabia.

## MATERIALS AND METHODS

This was a cross-sectional study conducted on the patients aged 20-60 years in the western region (Jeddah and Makkah), who reported to the Dental clinics of Ibn Sina National College for Medical studies, Jeddah seeking replacement of missing teeth from 1<sup>st</sup> December, 2018 to 1<sup>st</sup> March, 2019, after approval from Ethics Committee of the Institute (Approval No.H-03-12122018).

**Inclusion criteria:** Patients more than 20 years of age, with partially edentulous dental arch, seeking replacement of missing teeth and also gave consent for participation in the study were included.

**Exclusion criteria:** Patients more than 60 years of age, with completely edentulous dental arches or those not willing to participate in the study were excluded from the study.

**Sample size estimation:** The non-probability convenience sampling technique was used for calculating the appropriate sample size. In this current study, authors kept a 95% level of confidence and precision error of 5% and the sample size was selected based on the formula by Charan J and Biswas T [17].

$$\text{Sample size} = \frac{Z_{1-\alpha/2}^2 p(1-p)}{d^2}$$

where  $Z_{1-\alpha/2}$  = standard normal variate (at 5% type 1 error (p-value <0.05), it is 1.96 and at 1% type 1 error (p-value <0.01) p=expected proportion in population based on previous studies [10,12,14,15] for pilot studies and d=absolute error or precision. Sample size for this study was calculated as 350.

A literature review was performed by the authors to validate the present cross-sectional study. Based on that, an open ended questionnaire was formulated (in English and Arabic) consisting of 10 questions. The questions were sourced from the previous studies [10,12,14]. Pilot study was conducted on 10 participants seeking replacement of missing teeth. Based on the information received from the pilot study, authors reviewed the content of each questions to make sure that study reflected appropriate phrasing and understanding and validation. The Cronbach's alpha value has ranged from 0.75-0.85.

The closed-ended questionnaire of 10 questions was constructed by the authors. First part had five questions pertaining to socio-demographic details of participants like age, gender, socio-economic status, education and occupation respectively. Second part of the questionnaire had five questions related to prosthetic status, need of the patient, desired treatments, treatment options explained by the clinician and final treatment opted by the patient respectively. The completed questionnaire was proof read by group of dentists to check for clarity and meanings of the statements.

A total of 350 patients (excluding pilot study) participated in this study. Firstly, the study was explained to the participants and consent was taken from them. Intraoral examination was performed in the dental clinic and the findings were filled by the examiners in the questionnaire with the help of World Health Organisation (WHO) oral health assessment form [18].

The WHO code and criteria were as follows:

1. Prosthetic status
  - Code 0: No prosthesis
  - Code 1: Bridge
  - Code 2: More than one bridge
  - Code 3: Partial denture
  - Code 4: Both bridge(s) and partial denture(s)
  - Code 5: Full removable denture
  - Code 9: Not recorded.
2. Prosthetic need
  - Code 0: No prosthesis needed
  - Code 1: Need for one-unit prosthesis
  - Code 2: Need for multi-unit prosthesis
  - Code 3: Need for a combination of one and/or multi-unit prosthesis
  - Code 4: Need for full prosthesis (replacement of all teeth)
  - Code 9: Not recorded.

The examiners were two dental interns who had been trained and calibrated for inter-examiner variability (kappa value was 0.83) and an average of their scores was considered. A score of 1 was allocated for each correct answer or positive response and score 0 was allocated for wrong, or negative response. Approximately, 10 minutes time was taken for filling the questionnaire. The questionnaire served as a guide to interview the participants and collect data on their perception and to assess the level of trends, attitude and awareness among them towards replacement of missing teeth. Only completely filled questionnaires were selected for final data analysis.

## STATISTICAL ANALYSIS

The data were tabulated and analysed using the Statistical Package for the Social Sciences (SPSS) version 21 (SPSS Inc., Chicago, IL). Chi-square test was used to assess the trends, attitude and awareness among the patients in the western region of Saudi Arabia towards replacement of missing teeth. The p-value less than 0.05 was considered statistically significant, and a p-value of less than 0.001 was considered highly significant.

## RESULTS

The study included 350 patients, out of which 162 were males (46.3%) and 188 were females (53.7%) [Table/Fig-1]. The mean age of the study participants was 33.76 years in Jeddah population and 37.49 years in Makkah population ranging from 20-60 years [Table/Fig-2].

Genderwise distribution in both study areas	Values	Groups		Total
		Jeddah	Makkah	
Males	Count	83	79	162
	Percent	41.5%	52.7%	46.3%
Females	Count	117	71	188
	Percent	58.5%	47.3%	53.7%
Total	Count	200	150	350
	Percent	100%	100%	100%

**[Table/Fig-1]:** Distribution of the participants based on gender. Chi-square test:  $\chi^2=4.29$ ; p-value=0.038; p-value <0.05 to be statistically significant

Age wise distribution in both study area	N	Minimum (Years)	Maximum (Years)	Mean (Years)	Std. Deviation (Years)
Jeddah	200	20	60	33.76	8.920
Makkah	150	20	60	37.49	10.518

**[Table/Fig-2]:** Mean age distribution of the participants.

Socio-economic status of the patients were as follows; 78 (22.3%) of them were of lower class, 245 (70%) of them were from the middle class and 27 (7.7%) of them were from the higher class [Table/Fig-3].

Distribution based on socio-economic status	Values	Groups		Total
		Jeddah	Makkah	
Low	Count	39	39	78
	Percent	19.5%	26.0%	22.3%
Middle	Count	155	90	245
	Percent	77.5%	60.0%	70.0%
High	Count	6	21	27
	Percent	3.0%	14.0%	7.7%
Total	Count	200	150	350
	Percent	100.0%	100.0%	100.0%

**[Table/Fig-3]:** Distribution of the participants based on Socio-economic Status. Chi-square test:  $\chi^2=18.81$ ; p-value 0.01; p-value <0.05 to be statistically significant

With regard to occupation; the labour class comprised of 73 (20.9%), business class 135 (38.6%), housewives 103 (29.4%) and professionals 39 (11.1%) [Table/Fig-4]. With respect to educational status, the number of illiterates was 71 (20.3%), educated till Primary School

163 (46.6%), High school graduates were 82 (23.4%) and graduates and postgraduates were 34 (9.7%) [Table/Fig-5].

Distribution based on occupation	Values	Groups		Total
		Jeddah	Makkah	
Labour class	Count	40	33	73
	Percent	20.0%	22.0%	20.9%
Business	Count	83	52	135
	Percent	41.5%	34.7%	38.6%
Housewife	Count	61	42	103
	Percent	30.5%	28.0%	29.4%
Professional	Count	16	23	39
	Percent	8.0%	15.3%	11.1%
Total	Count	200	150	350
	Percent	100.0%	100.0%	100.0%

**[Table/Fig-4]:** Distribution of the participants based on occupation. Chi-square test;  $\chi^2=5.52$ ; p-value 0.13; p-value <0.05 to be significant

Distribution based on education	Values	Groups		Total
		Jeddah	Makkah	
Illiterate	Count	39	32	71
	Percent	19.5%	21.3%	20.3%
Primary School	Count	110	53	163
	Percent	55.0%	35.3%	46.6%
High School	Count	35	47	82
	Percent	17.5%	31.3%	23.4%
Graduate and Postgraduate	Count	16	18	34
	Percent	8.0%	12.0%	9.7%
Total	Count	200	150	350
	Percent	100.0%	100.0%	100.0%

**[Table/Fig-5]:** Distribution of the participant's based on the education. Chi-square test;  $\chi^2=15.67$ ; p-value 0.001\* \*significant; p<0.05\* statistically significant; p<0.001\*\* statistically highly significant

The distribution of the prosthetic status of the participants across the western region was as follows: Among Jeddah population, 103 (51.5%) of them had crowns, 60 (30%) of them had bridges, 17 (8.5%) of them had porcelain veneers and 20 (10%) of them had removable prosthesis. Among the Makkah population, 65 (43.3%) of them had crowns, 52 (34.7%) of them had bridges, 14 (9.3%) of them had porcelain veneers and 19 (12.7%) of them had removable prosthesis. Chi-square tests showed highly significant differences between both the regions (p-value=0.007).

The patients' treatment needs across the western region were as follows: among Jeddah population, 91 (45.5%) of them wanted prosthesis for mastication, 107 (53.5%) of them wanted it for aesthetics and only 2 (1%) of them wanted prosthesis for the speech. In the Makkah population, 62 (41.3%) of them wanted prosthesis for mastication, 87 (58%) of them wanted for aesthetics and only 1 (0.7%) of them wanted prosthesis for the speech. Chi-square test showed no significant differences between the 2 regions (p-value=0.68).

Desired treatments by the patients were as follows: Among the Jeddah populations, 128 (64%) of them wanted fixed treatment and 72 (36%) of them wanted removable treatments. Among the Makkah populations, 105 (70%) of them wanted fixed treatment and 45 (30%) of them wanted removable treatment. Chi-square test showed no significant differences between both the regions (p-value=0.28).

The various treatment options explained by clinicians were as follows: Among Jeddah populations, 27 (13.5%) of them were suitable for fixed prosthesis as well as dental implants and 165 (82.5%) of them suitable for removable prosthesis as well as dental implants. Among

the Makkah populations, 40 (26.7%) of them were suitable for fixed prosthesis as well as dental implants and 107 (71.3%) of them were suitable for removable prosthesis as well as dental implants. Chi-square tests showed highly significant differences between both regions (p-value=0.006).

And also, final treatments opted by the participants: Among Jeddah population, 30 (15%) of them opted for fixed prosthesis, 70 (35%) of them opted for removable prosthesis and 100 (50%) of them opted for dental implants. Among the Makkah populations, 37 (24.7%) of them opted for fixed prosthesis, 45 (30%) of them opted for removable prosthesis and 68 (45.3%) of them opted for dental implants. Chi-square test showed no significant differences between the 2 regions. (p-value=0.073) [Table/Fig-6].

Treatment options studied	Variables	Values	Groups		Total	Chi-square value	p-value
			Jeddah	Makkah			
Prosthetic status	Crown	Count	103	65	168	91.11	0.007*
		%	51.5%	43.3%	48%		
	Bridge	Count	60	52	112		
		%	30%	34.7%	32.0%		
	Porcelain veneers	Count	17	14	31		
		%	8.5%	9.3%	8.85%		
RPD	Count	20	19	39			
	%	10.0%	12.7%	11.1%			
Need of the patient	Mastication	Count	91	62	153	0.76	0.68
		%	45.5%	41.3%	43.7%		
	Aesthetics	Count	107	87	194		
		%	53.5%	58.0%	55.4%		
	Phonetics	Count	2	1	3		
		%	1.0%	0.7%	0.9%		
Desired treatments	Fixed treatment	Count	128	105	233	1.13	0.28
		%	64%	70%	66.6%		
	Removable treatment	Count	72	45	115		
		%	36%	30%	33.40%		
Treatment options explained by clinicians	FPD, implant	Count	27	40	67	10.22	0.006*
		% within Groups	13.5%	26.7%	19.1%		
	FPD, RPD, implant	Count	8	3	11		
		% within Groups	4%	2%	3.1%		
	RPD, implant	Count	165	107	272		
		% within Groups	82.5%	71.3%	77.7%		
Final treatment opted by the patient	FPD	Count	30	37	67	5.22	0.073
		% within Groups	15%	24.7%	19.1%		
	RPD	Count	70	45	115		
		% within Groups	35%	30%	32.9%		
	Implant	Count	100	68	168		
		% within Groups	50%	45.3%	48%		

**[Table/Fig-6]:** Distribution of the participants based on counselling, desired replacements and replacements of missing teeth given. Chi-square test;  $\chi^2=5.22$ ; p<0.05\* statistically significant; p<0.001\*\* statistically highly significant

## DISCUSSION

Many researchers have indicated that patient needs can enormously influence treatment results in medicine and dentistry [18-20]. Keeping this in mind, this study was conducted to assess the attitude and awareness among the patients in the western region of Saudi Arabia towards replacement of missing teeth.

Distribution of participants in this study was found to be 46.3% males and 53.7% female participants. Most of the participants

were in the age group of 20-40 years unlike other study by Alharbi AA et al., conducted survey in Riyadh and age group varied from 15-55 years and 52% and 48% of female and male participants participated, respectively [21]. In addition, Leena SA and Sayegh A et al., reported that most of the participants at the age group of 40-49 years and 50-59 years in their studies respectively [22,23].

Based on the results of this study, 70% belonged to the middle class category and 38.6% participants had small time business and most of the female participants 29.4% were housewives. Study by Mohammed DA et al., reported that 50% of study population was illiterate [24]. Other studies by Wanyonyi KL et al., and Nadeem S et al., reported that replacement of missing teeth was more common among the patients from a high socio-economic status. According to them income and educational status of an individuals were often correlated and prevalence of wearing dentures increased with the increase in the level of literacy [25,26]. In addition, Marcus PA et al., in their study reported that 40.21% of the participants were just primary educated and their knowledge was insufficient with relation to the replacement of missing teeth [27].

In this study, 55.4% of them wanted to replace their missing teeth for aesthetics and 43.7% of them wanted for mastication. However, study by Muteb SA et al., reported that 79.2% of the study population believed that function and aesthetics could be maintained by replacing missing teeth [28]. In addition, study by Manoj S et al., reported that 40% preferred fixed prosthesis for aesthetic purpose [29]. Similar findings were reported by Simhachalam RN in his study that masticatory difficulty was the most frequently voiced complaint [30].

Among the participants of this study, 65.7% of them desired fixed treatment and 32.0% of them desired removable treatment. Mohammed A et al., in their study reported that 86.7% preferred fixed prosthesis [14]. In addition, Firas AMA et al., reported in their study that 40.5% of subjects showed positive attitude towards fixed treatment as mode of replacement of teeth and only 20.1% felt removable prosthesis as a better option [31]. Similar survey was done in Jizan area of Saudi Arabia by Naveen RR et al., reported that around 50% of the sample preferred removable treatment while 25% preferred fixed treatment and the result was opposite to the present study [32].

In this study, 19.1% of the participants were suitable for fixed prosthesis as well as dental implants. A total of 3.1% of them were fit for fixed prosthesis, removable prosthesis as well as dental implants and 77.7% of them were suitable for removable prosthesis as well as dental implants. Final treatment opted by the participants were as follows: 19.1% of them opted for fixed prosthesis, 32.9% of them opted for removable prosthesis and 48.0% of them opted for dental implants. The need for dental prosthesis varies from removable and fixed prosthesis which is in accordance to studies by Mously HA et al., and Suleiman A et al., reported that 76% and 61.5% of the participants in their studies, opted for implant prosthesis respectively [33,34]. In contrast to this, study by Gadeer NM et al., reported that 85% of the participants wanted fixed prosthesis [35]. However, according to Abdulrahman A et al., implant prosthesis was used for the mastication purpose [16].

In addition, Suleiman A et al., reported that 66.4% knew about dental implants as an option in replacing missing teeth [34]. Berge TI, and Tepper G et al., reported that the level of awareness regarding dental implants was 70.1% and 72%, respectively and only 3.3% of the subjects chose removable prosthesis as the best treatment in replacing missing teeth [36,37]. Rastogi I in her study reported that different treatment options were explained to the patients based on the requirements and 62%, 28% and 10%

of participants were fit for dental implants, fixed prosthesis and special dentures respectively. However, 56.8%, 28%, 12.4% and 1.6% of the participants opted for complete dentures, acrylic RPD, fixed prosthesis and dental implants respectively [38]. In addition, Amal AS in her study reported that 71.8%, 17.6% and 10.6% of the participants preferred fixed prosthesis, dental implants and removable prosthesis respectively [39]. Study done in Srilanka by Rasika MJ, reported that among the participants of their study, 77.9%, 32.9% and 25.2% were aware of removable prostheses, dental implants and fixed prosthesis respectively [40] [Table/Fig-7].

S. No.	Author names, (year of the study), (reference number)	Place/ Region	Sample size	Replacement options and results	Conclusion of the study
1.	Atheer MA et al., 2018 [19]	Qassim, KSA	150	Among the participants, 55% have no information about replacement of missing teeth and also, they have greater number of missing teeth in comparison with the educated people.	Replacement of missing teeth is affected by age, socio-economic status and educational level of the participants.
2.	Alharbi AA et al., 2020 [21]	Riyadh, KSA.	402	Among the participants, 67.2% of them (31 to 50-year-old patients) had highest level of knowledge regarding dental implants as a mode of replacement of teeth.	Dental implants are widely accepted among patients, with dentists being their main source of information.
3.	Mohammed DA et al., 2021 [24]	Abha, KSA.	200	Among the participants, 47% of them did not replace their missing teeth due to financial reasons while 27.5% did not aware.	Most common reason for loss of teeth were dental caries. As both these conditions can be prevented and repeated awareness campaign should be carried out in order to increase the awareness regarding oral hygiene.
4	Amal AS, 2016 [39]	Hail, KSA	200	Among the participants, 71.8%, 17.6% and 10.6% preferred fixed prosthesis, dental implants and removable prosthesis respectively.	Regarding type of prosthetic treatment depends upon the socio-economic status, level of education and monthly income of patients
5	Rasika MJ, 2017 [40]	Peradeniya, Srilanka	425	Among the participants, 77.9, 32.9% and 25.2% were aware of removable prostheses, dental implants and fixed prosthesis respectively.	Most of the participants opted for RPD. Dentists' involvement in educating patients on prosthetic options needs to be improved.



6.	Fazal G, 2013 [41]	Pakistan	210	Majority of the study population, 83.4% did not know about dental implants.	Patients' knowledge and awareness about dental implants was found poor and many refrain from getting it because of their high cost. Dental Practitioners should include information about dental implants when explaining prosthodontic options for replacing missing teeth.
7.	Singh SK et al., 2020 [42]	Himachal Pradesh, India.	240	Among the participants, 92% of them were aware of dental implants for replacing missing teeth.	A high level of awareness among public regarding dental implants and special measures should be made to reduce the cost of dental implants to a more affordable rate.
8.	Saeed AQ, 2018 [43]	Aseer, KSA.	479	Among the participants, 22.2% of them were well informed about dental implants, 59.3% of them were moderately informed, 16.1% of them were poorly informed, and 2.4% were not all informed about dental implants.	High treatment cost for dental implant therapy was the main reason for patients refraining from implant therapy.
9	Present study	Jeddah, KSA	350	19.1% of them opted for fixed prosthesis, 32.9% of them opted for removable prosthesis and 48.0% of them opted for dental implant.	Maximum number of participants was aware of and opted for implant supported prosthesis.

**[Table/Fig-7]:** Summary of various studies done internationally [19,21,24,39-43].

Fazal G et al., reported that majority of the study population, 83.4% did not know about dental implants [41]. In contrary, Singh SK et al., in their study reported that, 92% of the participants were aware of dental implants for replacing missing teeth [42]. Saeed AQ, in his study concluded that high treatment cost for dental implant therapy was the main reason for patients refraining from implant therapy [43]. In addition, Naveen RR et al., in their study concluded that lack of awareness of various prosthodontic treatment options amongst patients prevented them from utilising available treatment. Dental camps and prosthodontic outreach programmes are possible solution to change the attitude, to raise awareness and knowledge of the patients regarding various methods of replacement of missing teeth [32].

### Limitation(s)

Firstly, small sample size. Secondly, the study was performed in an institutional set-up where prosthetic treatment charges are different as compared to private dental care centers. Thirdly, edentulous patients were not included in this study.

## CONCLUSION(S)

Awareness and attitude of the participants towards prosthodontics treatment were mostly in high level. Majority of the participants wanted to replace missing teeth for mastication and aesthetics. Participants preferred fixed treatment over removable treatment. Most of the participants had favourable knowledge and attitude towards implant as a mode of treatment for replacement of missing teeth. Hence keeping the results of this study in mind, better treatment can be made possible for the patients while taking their desires into consideration.

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