



Knowledge, Awareness, and Attitude of Libyan Patients toward Dental Implant as a Treatment Modality for Oral Rehabilitation.

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ABSTRACT

Background: Tooth loss can lead to functional impairment, loss of adjacent teeth, supra-eruption of opposing teeth, difficulty speaking, low self-esteem, aesthetic problems, and feelings of depression. Therefore, restoration of function and aesthetics is an essential need for these patients. Today dental implants are widely accepted and considered as a prosthetic treatment of completely or partially edentulous patients.

Aims: The aims of the present study were to assess the awareness of the patients toward dental implants as an option for missing teeth replacement, in addition to evaluate the correlation between knowledge of implants and demographic factors including (age, sex, and education).

Materials and Methods: This was a cross-sectional survey. Self-reported questionnaires were administered to 540 patients wearing fixed and removable prosthesis. The questions explored the patient's knowledge and awareness regarding dental implants supported prosthesis, as well as its correlation to demography. The data were analyzed using IBM SPSS Statistics software (version 23.0, IBM Corp. Armonk, NY, USA).

Results: The data shows that the majority of the participants in the study were female, The mean age of the participants was 48.28 years. In terms of education level, most participants had secondary education, accounting for (72.6%). (59.30%) choosing fixed prosthesis as a treatment option to restore or replace missing teeth. However, (40.70%), still opts for removable partial dentures. Of the 540 responses that were obtained, (96.9%) had heard of dental implants, while (3.1%) were unaware of this kind of treatment. Only (9.4%) of respondents had previously received dental implant treatment, according to the data. (7.8 %) were treated with implant supported fixed prosthesis, and (1.7%) by implant supported removable prosthesis.

Conclusion: Libyan patients are highly aware of dental implant. There is a significant difference in knowledge about implants among individuals based on their educational background. It was found that higher awareness appeared among female compared to male.

Key words: Patient awareness, Libyan patients, dental implants, knowledge, Fixed prosthesis, removable prosthesis, complete denture.

Introduction

Tooth loss can lead to functional impairment, loss of adjacent teeth, supra-eruption of opposing teeth, difficulty speaking, low self-esteem, aesthetic problems, and feelings of depression.¹⁻³ Therefore, restoration of function and aesthetics is an essential need for these patients.²

There are numerous prosthetic options available to replace lost teeth, including dental implants, fixed partial dentures (FPD), and removable partial dentures (RPD).^{2,4} The choice of treatment modality for missing teeth replacement is influenced by a number of factors, including cost, discomfort, dental phobia, and needless tissue damage to adjacent teeth.² Since the identification and acceptance of the concept of osseointegration, the use of dental implants to replace missing teeth has grown exponentially.

In the context of oral reconstruction, implant dentistry has grown in significance. For people who have lost one or more teeth, dental implants are thought to be the best option. An estimated one million implants are inserted globally each year⁵. Dental implants are becoming more common in oral rehabilitation because of their high success rates and predictability.⁶

Although the missing teeth can be replaced with removable and fixed dentures, there are certain drawbacks to each.⁷ Furthermore, the acceptance rate of removable dentures is very low in young and older individuals, and the use of fixed prostheses necessitates the damage of adjacent teeth.⁸

Lack of knowledge about available treatment options presents a challenge, particularly in developing countries.⁹

Many studies have been conducted throughout the world on the knowledge and awareness of dental implants as a treatment option.¹⁰ The results revealed varying levels of awareness regarding dental implant treatment.^{11, 12} There is a high level of public awareness and acceptance of dental implants, along with a generally positive attitude toward them, according to a survey performed by Zimmer et al. (1992) among 120 American subjects. Additionally, they noted that one of the main benefits of implant dentistry was that implant-supported rehabilitations were aesthetically more pleasing than removable prostheses.¹²

Demographic factors such as age, sex, education, socioeconomic status, and place of residence are likely to have an impact on the general public's awareness and evaluation of oral implants, as demonstrated previously for health-related knowledge in England (Auckland et al. 1984).¹⁴

Furthermore, how the public views implants may depend on where they get their information. Information about oral implant treatment may be conveyed differently by the media when it highlights dramatic failures and malpractice cases than when it comes from direct conversations with people who have had the procedure or who personally know someone who has.¹³

Dental implant patient awareness and knowledge have been investigated in a number of populations, including Indian¹⁵, Turkish¹⁶, Chinese¹⁷, Malaysian¹⁰, Syrian¹⁸ patients. Each of these studies came to the conclusion that people knew very little about dental implants. On the other hand, results from surveys conducted in Saudi Arabia¹¹, India¹⁹, Switzerland²⁰, and Norway¹³ indicated a reasonable level of awareness and a positive attitude.

There is a lack of dental literature in Libya concerning patients' awareness and knowledge of dental implants. Thus, the purpose of this study was to evaluate the level of patient awareness and knowledge in Libya regarding implant-retained prostheses as a tooth replacement option. In addition to evaluate the correlation between knowledge of implants and demographic factors including (age, sex, and education).

Materials and method

This was cross-sectional survey carried out from June 2016 to June 2018 at both the prosthodontics departments, Faculties of Dentistry, University of Benghazi, Libya, and the Libyan International Medical University, Libya. In addition to multiple private dental clinics.

Participants in this study (900 subjects) included all partially and completely edentulous Libyan patients wearing complete dentures, RPDs, fixed prostheses (crowns, veneers, FPD, or dental implants), and those attending the clinics mentioned above. A total of 540 patients, both male and female, consented to participate and complete the survey; the response rate was 60%.

Self-reported questionnaires were administered to patients. The questionnaire was designed in English and then translated into Arabic. The patients had been treated with fixed and removable prostheses for different periods ranging from 1 to 10 years. It was designed to evaluate overall awareness and knowledge about dental implants. The printed questionnaire form was distributed among study participants; only completely filled-out forms were considered for completing the survey.

The data were analyzed using IBM SPSS Statistics software (version 23.0, IBM Corp., Armonk, NY, USA). The data processing and analysis involved utilizing statistical methods to examine the frequency distribution of the data. Certain answers were encoded as dichotomous variables, representing yes/no responses, while others were encoded as categorical variables when multiple choices were involved. Descriptive statistics was calculated for the majority of the questions. In addition to descriptive statistics, a chi-square test was used to compare categorical data in a contingency table, with the level of significance set at $p = 0.05$.

Results

The data shows that the majority of the participants in the study were female, making up 74.4% of the total sample. The mean age of the participants was 48.28 years, with a standard deviation of 13.46 years. In terms of education level, most participants had secondary education, accounting for 72.6% of the sample, followed by primary education at 20.9% and universities and institutions at 6.5%. (Table 1)

Table 1: Demographic data of the study participants

Character	N (%)	
Gender	Male	138 (25.6%)
	Female	402 (74.4%)
Gender	Male with implant retained prosthesis	12 (23.5%)
	Female with implant retained prosthesis	39 (76.5%)
Age	Mean Age	48.28±13.46
	19-39	142 (26.3%)

	40-69	357 (66.1%)
	70-99	41 (7.6%)
Educational level	Primary education	113 (20.9%)
	secondary education	392 (72.6%)
	universities and institutions	35 (6.5%)

93.1% of those questioned reported that they have had at least one extraction in the past. This high percentage may indicate that extractions are a common dental procedure among the population surveyed.

The data showed that a majority of respondents prefer fixed prostheses as a treatment option to restore or replace missing teeth, with 59.30% choosing this option. However, a significant portion, 40.70%, still opts for removable partial dentures. It is clear that fixed prostheses are the most popular choice among the participants. (Fig. 1)

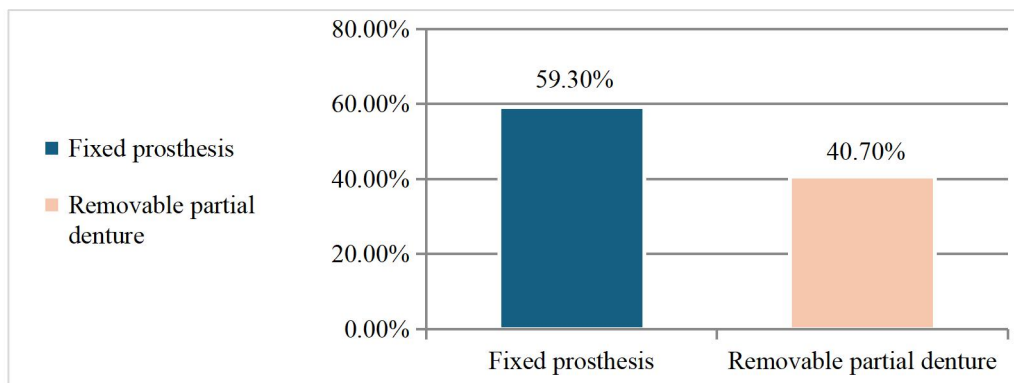


Fig.1: The type of the prosthesis respondents have as a treatment option

Table 2 demonstrate most of subjects had their fixed prosthesis constructed within the past 0-3 years, with crown and fixed partial denture being the most common types. On the other hand, the majority of subjects with removable prosthesis had acrylic RPDs, with only a small percentage selecting cobalt chromium RPDs or complete dentures. Overall, the data shows a preference for more recently constructed fixed prostheses compared to removable ones.

Table2: Missing tooth replacement type and date

Questions		Fixed	Removable
The time of the prosthesis constructed is from:	0-3 years	124 (38.8%)	113(51.4%)
	4-7 years	108 (33.8%)	71(32.3%)
	10 years or more	88 (27.5%)	36(16.4%)
Fixed prosthesis type	Fixed partial denture	156 (48.8%)	-
	Crown	116 (36.3%)	-
	Laminate veneers.	4 (1.3%)	-
	Any 2 or more combinations of the previously mentioned restorations	44 (13.8%)	-
Removable prosthesis type	Acrylic RPD	-	139(63.2%)
	Cobalt chromium RPD	-	21(9.5%)
	Complete denture	-	60(27.3%)

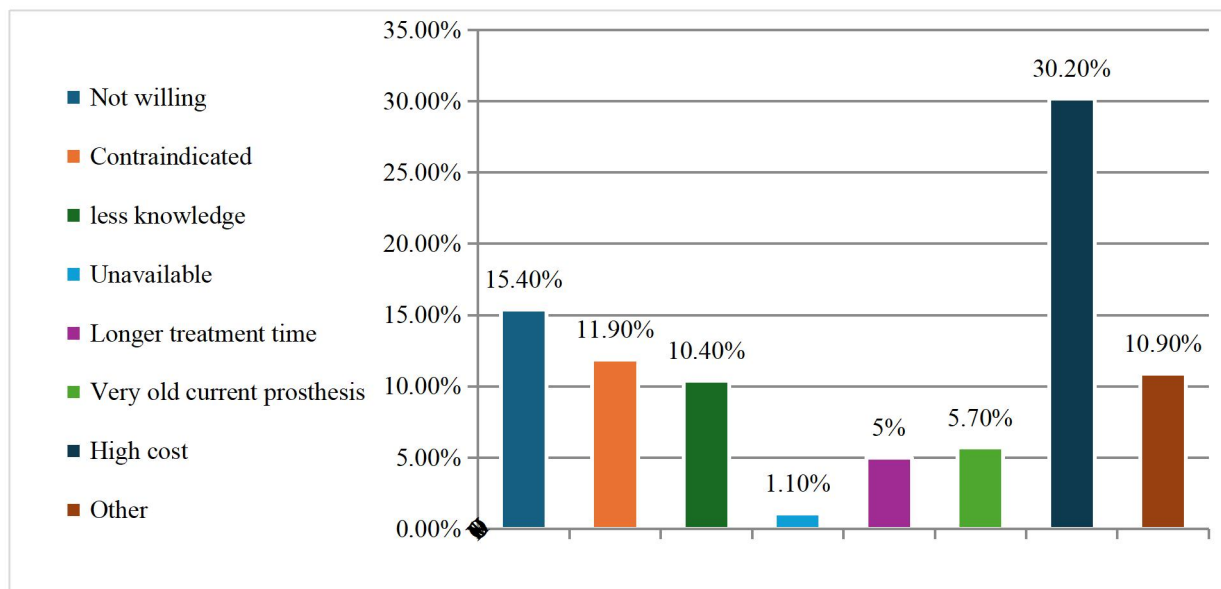
Of the 540 responses that were obtained, 96.9% had heard of dental implants, while 3.1% were unaware of this kind of treatment. Only 9.4% of respondents had previously received dental implant treatment, according to the data. 7.8% were treated with implant-supported fixed prostheses and 1.7% with implant-supported removable prostheses, as shown in Table 3.

Table3: Knowledge, awareness, and attitude regarding dental implants

Question	Yes	No
Did you hear about dental implants?		
Yes	523	(96.9%)
No	17	(3.1%)
Did you do a dental implant to replace the missing teeth with a fixed supported prosthesis?		
Yes	42	(7.8%)
No	277	(51.3%)
Type of the implant supported fixed prosthesis was:		
Single implant	22	(4.1%)
Multiple implants	6	(1.1%)
Implant supported fixed prosthesis	10	(1.9%)
Did you receive an implant-supported removable denture?		
Yes	9	(1.7%)
No	211	(39.1%)

The results of the study show that the majority of participants did not opt for dental implants to replace their missing teeth, with only a small percentage choosing to do so. Among those who did receive dental implants, the most common type of fixed prosthesis was an implant-supported fixed prosthesis. Interestingly, there was a significant difference in the choice of fixed prosthesis between those who received single implants and those who received multiple implants, with a higher percentage opting for multiple implants. Additionally, very few participants received implant-supported removable dentures. These findings suggest that there may be a preference for fixed prostheses over removable dentures among individuals who choose to receive dental implants.

When asked about limitations in choosing dental implants as a treatment option, the most common reasons cited were high cost (30.20%), not willingness to do implant (15.40%), and contraindicated as a treatment option (11.90%). **Fig. 2**

**Fig. 2:** Limitations in the selection of a dental implant as a treatment option

This data suggests that there is a significant difference in knowledge about implants among individuals based on their educational background. Those with a primary education are less likely to know about implants compared to those with a secondary education or higher. The P value of less than 0.001 indicates that this difference is statistically significant. It is important for healthcare professionals to consider the education level of their patients when discussing treatment options like implants. **Fig. 3**

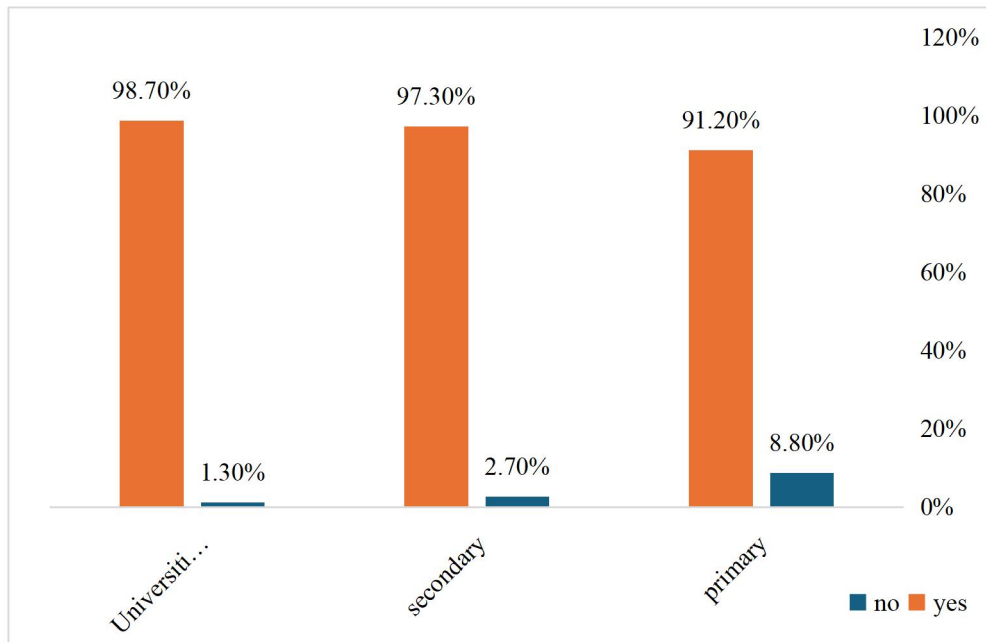


Fig. 3: Knowledge about dental implants regarding educational level ($p < 0.001$)

The data makes it evident that Benghazi was the location of prosthesis delivery for the majority of respondents (84.80%). Only 4.10% of participants obtained their prostheses in a different Libyan city. Furthermore, 10.60% of those surveyed said they obtained their prosthesis from outside Libya.

Depending on the data, it can be observed that most respondents have undergone regular dental checkups, with 100% of participants indicating that they have visited a dentist for this purpose. Additionally, 85.4% of respondents have opted for prosthetic replacement for missing teeth, indicating a significant interest in oral health and aesthetics. Furthermore, 91.7% of participants expressed a concern for oral hygiene measures following the delivery of their prosthesis, highlighting a strong commitment to maintaining their oral health post-treatment. **Table 4**

Table 4: Respondent attitude about dental checkups and teeth replacement

Questions	Yes	No
Have you ever gone to a dentist to get a regular dental checkup?	540 (100%)	0
Did you do a prosthetic replacement for the missed tooth\teeth?	461(85.4%)	79(14.6%)
Do you care about the oral hygiene measures ,especially after the delivery of your prosthesis?	495(91.7%)	45(8.3%)

The results of the study show that a majority of participants of all educational levels expressed a commitment to maintaining their oral hygiene post-prosthesis delivery. This strong dedication to oral health is reflected in the high percentage of individuals who have gone to a dentist for regular checkups and those who have undergone prosthetic replacement for missing teeth. The findings suggest a significant statistical relationship between receiving prosthesis and a heightened awareness of oral hygiene measures. Additionally, the P value of 0.236 indicates that there is a trend towards participants caring about their oral health post-treatment. **Table 5**

Table 5: Participants attitude about dental checkups and teeth replacement according to educational level

Questions	Primary	Secondary	Universities and Institutions	P Value
Have you ever gone to a dentist to get a regular dental checkup?	113(100%)	392(100%)	35(100%)	-
Did you do a prosthetic replacement for the missed tooth\teeth?				
Yes	105(92.9%)	325(82.9%)	31(88.6%)	0.025
No	8(7.1%)	67(17.1%)	4(11.4%)	
Do you care about the oral hygiene measures ,				

especially after the delivery of your prosthesis?				
Yes	108(95.6%)	355(90.6%)	32(91.4%)	0.236
No	5(4.4%)	37(9.4%)	3(8.6%)	

4. Discussion

Since dental implants improve denture stability and retention, functioning, and quality of life, they have been recommended primarily for individuals who are edentulous. But nowadays, both partially and completely edentulous people use them as prosthetics to replace their lost teeth.⁵

With a high success rate, implant therapy is becoming a more and more common form of treatment. Recently, it has become the focus of the patients' interest; therefore, in order to help patients who lack the education or background knowledge to make an informed choice between implant-supported dentures and removable dentures, dentists must evaluate their degree of knowledge regarding dental implants and whether their perception of dental implants actually reflects reality.^{5,21}

Reduced function, adjacent teeth drifting, opposing teeth supra-erupting, altered speech, low self-esteem, aesthetic issues, and bereavement are all consequences of tooth loss.² Even though tooth loss is preventable, it is still regarded as a public health concern because its incidence has not decreased in recent years.²²

According to the data from the current study, 93.10% of respondents, or the vast majority, had at least one extraction in the past. This high proportion might suggest that, among the population surveyed, extractions are a common dental procedure.

Many prosthetic options for replacing missing teeth are available, such as: removable partial dentures (RPD); fixed partial dentures (FPD); and dental implants². Sometimes, implants may be the only viable option for a patient's successful rehabilitation and quality of life restoration. One problem is that not all patients are aware of available treatments, especially in developing countries.⁹

The current survey examined patient attitudes, awareness, and knowledge about the use of dental implants to replace missing teeth in various private and public clinics in Benghazi City. Among the 540 participants in this survey, the majority 96.9% were aware of dental implants. The data showed that just 9.4% of respondents had previously undergone dental implant treatment. Implant-supported fixed prostheses were used in 7.8% of cases, and implant-supported removable prostheses in 1.7% of cases. The results of the present study were significantly different from the results reported by **Jha A et al**¹⁵, **Tomruk et al**¹⁶, **Kalala-Kazadi et al**¹⁷, **Kohli S et al**¹⁰, and **Nesreen A et al**¹⁸ which stated low levels of awareness as 25%, 27.7%, 14.4%, 56%, and 16.6%, respectively. However, other research supports our study's findings and shows high level of patient attitude, awareness, and knowledge toward dental implants.^{11,18,20}

In terms of education level, most participants had secondary education, followed by primary education and universities and institutions. This data suggests that there is a significant difference in knowledge about implants among individuals based on their educational background. Those with a primary education are less likely to know about implants compared to those with a secondary education or higher. It is important for healthcare professionals to consider the education level of their patients when discussing treatment options like implants. This was in agreement with a study performed by **Ajayi et al. (2016)** in the Nigerian population, who found that individuals with higher educational levels possessed greater knowledge of implants and demonstrated that major information on dental implants was provided by dental health practitioners (41.5%).²³

El-Huni (2017) revealed that there is increasing interest in choosing dental implants as a treatment option among Libyan patients. Implant dentistry at the undergraduate and postgraduate levels should be engaged in academic programs.²⁴

In relation to the gender It was noticed that most of the participants were female, and the percentage of females with implant-retained prostheses was (76.5%) higher than that of males (23.5%) This could be because of their strict aesthetic demands, **Schneider,C. et al. (2019)** agreed with the results obtained in this survey that regular dentist and dental hygienist consultation may reflect the patient's awareness of oral health. In studies conducted abroad, it was found that higher awareness appeared among females compared to males, and also more among people with higher than lower education or income levels.²⁵

Factors like age and a high level of education combined with a somewhat higher income can influence the findings of this research. In the present study, the majority of the respondents were in the middle to old age group (40 - 69). This may be explained by the middle-aged and educated population's growing interest in and awareness of dental technology advancements.¹³ The findings of this survey were in line with **Berge et al**,¹³ who conducted a study in Norway and reported that well-educated individuals 45 years of age and older were knowledgeable about dental implants. .

According to **Alajlan, A. et al. (2019)**, both in developed and developing countries, implant treatment methods for restoring masticatory function and aesthetics are becoming increasingly popular and well-understood.²⁶ This is in concordance with our study outcome, which was clear from the data: the majority of respondents, 84.80%, received their prostheses in Benghazi. Only 4.10% of respondents received their prosthesis in another city in Libya. Additionally, 10.60% of respondents received their prostheses outside of Libya.

Many studies, like **Kohli, S. et al. (2015)**¹⁰ and **Ozçakır Tomruk et al. (2014)**¹⁶, revealed that the dentist was the most popular source of information about implant treatment, but other people also learned about it from friends, family, and social media. However, these sources don't provide evidence-

based information, so patients may believe that implant therapy is the best option available and may always be feasible. Because of these information sources, there may be misunderstandings about biological, technical, and aesthetic considerations that lead to the idea of permanent implants that don't require extra care or hygiene.

According to the survey data, the majority of participants have had regular dental checkups, with 100% saying they have visited a dentist specifically for this purpose. Furthermore, 85.4% of respondents chose to replace their missing teeth with prosthetics, demonstrating a strong interest in both oral health and appearance. In addition, 91.7% of participants indicated that they were concerned about maintaining their oral hygiene after receiving their prosthesis, demonstrating a strong commitment to doing so after treatment.

According to **Sekerci, E. et al. (2020)**, implant therapy, despite its higher cost, is positively related to enhanced quality of life by improving dental health, mastication, speech, and comfort. Consequently, individuals with greater incomes were more likely to select dental implants as their first and preferred option of treatment, and the majority of patients, regardless of medical or financial considerations, would select implant-supported fixed dentures as a therapeutic option.²⁷

The study's findings indicate that while a small percentage of participants decided to replace their missing teeth with dental implants, the majority of participants did not. They may refuse because of the high cost or because they are afraid of surgery and the complications that may arise afterward, having heard about such experiences from friends or family who undoubtedly face different circumstances. Other reasons for refusing to have implants could be the lengthy and difficult prosthetic process as well as the unsatisfactory aesthetic outcomes, particularly in the case of female patients. Consequently, patients ought to be informed about flapless or nonsurgical implant placement techniques.

An implant-supported fixed prosthesis was the most popular kind of fixed prosthesis among individuals who did receive dental implants. It's interesting to note that patients who received single implants and those who received multiple implants chose fixed prostheses very differently, with a higher percentage of patients choosing multiple implants. When patients use multiple implants to share the masticatory load and extend the anticipated life of these implants, they may be demonstrating an attitude of education towards the procedure.

Furthermore, the fact that so few participants had removable dentures supported by implants suggests that people who choose to have dental implants prefer fixed prostheses to removable ones. Patients tend to be more content with the function, speech, and appearance of implant-supported fixed prostheses than removable ones. This could be because fixed prostheses have higher retention and stability, which can result in higher occlusal forces for function. It could also be because the materials used in both types of prostheses, their longevity, and their ability to be polished and finished to provide a better aesthetic. The data from the Benghazi survey indicates that a majority of respondents prefer fixed partial dentures (FPD) as a replacement for missing teeth. However, a significant portion, still opts for removable partial dentures. It is clear that fixed partial dentures are a more popular choice among those surveyed for tooth replacement. The majority of respondents had their fixed prosthesis constructed within the past 0-3 years, with 48.8% for FPD, followed by 36.3% for crown. On the other hand, the majority of respondents with removable prostheses had acrylic RPDs, with only a small percentage choosing cobalt chromium RPDs or complete dentures. Overall, the data shows a preference for more recently constructed fixed prostheses compared to removable ones.

According to **Al-Johany et al.'s (2010)** study, 61.5% of participants preferred implant prostheses, while fixed partial and removable dentures were preferred by 35.2% and 3.3% of participants, respectively. For the following reasons, the majority of research participants favored fixed prosthetic replacement over removable dentures: (a) comfort (43.7%), (b) natural-looking (41.3%), (c) increased masticatory capacity (35.7%), and (d) ease of speech and communication (25.4%). A significant barrier in choosing a dental implant prosthesis is the higher cost.¹¹

Patients ought to be aware of various options for replacing lost teeth, as several factors were found to be the cause of no respondent's implant therapy (**Kakala, E. et al., 2014**). These factors include the high expense of oral implant rehabilitation in comparison to the population's low income, the lack of implant equipment in the majority of public hospitals, and the fact that the majority of patients' are not informed about dental implants as an alternative treatment for oral rehabilitation.²⁸

When asked about the reasons behind their inability to choose dental implants as a treatment option, survey respondents most frequently mentioned factors: high cost (30.20%), unwillingness to undergo implant surgery (15.40%), and contraindicated as a treatment option (11.90%). If there are no medical contraindications, patients should be informed about dental implants as a better treatment option because, in some cases, the cost of a conventional tooth-supported fixed prosthesis is significantly higher than that of an implant-supported fixed prosthesis in the same situation, by adding more units, to gain acceptable retention and support. Furthermore, the implant in these situations will replace lost teeth without requiring the other teeth to be prepared; as a result, the implant treatment for the remaining dentition will be more conservative.

Conclusion

- The study showed that almost all patients were aware of dental implants, reflecting the increasing popularity of this treatment approach.
- There is a significant correlation between demographic factors (age, sex, education, and socioeconomic status) and dental implant awareness; this should be considered when treating edentulous patients.
- As most of the patients found dental implant treatment to be expensive and unaffordable, efforts should be made to reduce the cost of dental implants to a more affordable rate and provide this modality of treatment in public hospitals and polyclinics.

- 10.4% of the respondents were not informed about implants by their dentists, so dentists should be more involved in the promotion of information about dental implants as a treatment modality to replace missing teeth.

Ethical approval:

Approval for this study was obtained from the Dean's office of both Dental Faculties and the Benghazi Syndicate of Dentistry, and informed consent was obtained from all individual participants included in the study.

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