

Original article

Knowledge, Attitudes, and Willingness to Replace Missing Teeth with Dental Implants Rather Than Traditional Prosthetic Options Among Adults in Derna City, Libya: A Cross-Sectional Study

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Abstract

To assess the willingness of adults in Derna City, Libya, to replace missing teeth with dental implants rather than traditional prosthetic options, with particular emphasis on knowledge and attitudes related to implant therapy. A cross-sectional study was conducted in Derna City, Libya, from 1 June 2025 to 31 December 2025. Data were collected through face-to-face interviews using a structured Arabic questionnaire adapted from a previously published survey. Adults aged 18 years and older were recruited using convenience sampling from dental clinics and selected public areas. The questionnaire assessed sociodemographic characteristics, dental history, awareness, knowledge, attitudes, and willingness regarding dental implants. Knowledge was evaluated using five objective items, and attitude was assessed using ten items related to interest, preference, fear, expected pain, willingness to invest time, and treatment acceptance. Descriptive statistics, chi-square test, Pearson correlation, and binary logistic regression were used, and statistical significance was set at $p < 0.05$. A total of 458 participants were included in the final analysis. Awareness of dental implants was high, with 89.1% of participants reporting that they had heard about implant therapy. Dentists were the main source of information (33.6%). However, objective knowledge was limited, and 97.6% of participants were classified as having poor knowledge. Attitudes toward implant therapy were more favorable than knowledge, with 49.3% showing a moderate attitude and 24.5% a good attitude. More than half of the participants preferred dental implants as a treatment option (53.7%), and 88.2% indicated that they would accept implant therapy if it were offered free of charge. Willingness to accept free implant therapy was significantly associated with gender, education, occupation, attitude category, fear regarding surgery, willingness to invest time, and treatment preference, whereas age, knowledge score, and tooth extraction history were not significantly associated. A weak but significant positive correlation was found between knowledge and attitude scores ($r = 0.156$, $p = 0.001$). Adults in Derna City demonstrated high awareness but poor objective knowledge regarding dental implants. Nevertheless, attitudes toward implant therapy were generally moderate to favorable, and willingness to accept implants was high when cost was removed as a barrier. Financial considerations, fear, and treatment-related time commitment appear to be major obstacles to acceptance. Strengthening patient education and improving affordability may help increase informed acceptance of implant therapy in this population.

Keywords. Dental Implants, Prosthetic Rehabilitation, Missing Teeth, Patient Awareness, Attitude.

Introduction

Tooth loss remains an important public health issue because it can adversely affect oral function, facial appearance, and oral health-related quality of life. Missing teeth may impair mastication and speech and can also have psychosocial consequences by reducing self-confidence and affecting social interaction [1–3]. As a result, the replacement of missing teeth is not only a clinical concern but also an issue that influences general well-being and daily life [2,3].

Several prosthetic options are available for the management of tooth loss, including removable dental prostheses, fixed dental prostheses, and implant-supported restorations [4]. In many settings, conventional prosthetic options remain the most commonly used approaches because they are more familiar to patients, more readily available, and often perceived as less costly and less time-consuming than implant treatment [4,5]. However, dental implants have become an established treatment modality for the rehabilitation of partial and complete edentulism because of their documented functional and esthetic benefits and their favorable long-term outcomes [4,6,7].

The development of modern implant dentistry followed the introduction of osseointegration-based treatment protocols by Brånemark and colleagues, which transformed the management of missing teeth and edentulism [8,9]. Since then, implant-supported treatment has been increasingly incorporated into routine dental care in many countries [6,7]. Nevertheless, the decision to choose dental implants is shaped not only by clinical indications but also by patient-related factors, particularly awareness, knowledge, attitudes, perceived need, treatment cost, fear of surgery, and the information provided by dental professionals [10–12].

Previous studies have shown that although many patients are aware of dental implants as a treatment option, the depth and accuracy of their knowledge are often limited [10,11]. Information is frequently obtained from informal sources, such as relatives, friends, and the media, rather than directly from oral health professionals [10,11]. Inadequate knowledge and misconceptions may therefore act as barriers to the acceptance of implant therapy, especially in populations where implant services are relatively new, less accessible, or not routinely discussed in general dental practice [10–12].

In Libya, conventional prosthetic treatment has historically been more familiar to patients than implant-supported rehabilitation. Although dental implant therapy has become available in the country in recent decades, it may still be perceived by many people as a newer, more expensive, and more complex option than traditional prostheses. In addition, limited exposure to implant dentistry during undergraduate dental education in many settings may contribute to variations in how strongly this treatment option is introduced and explained to patients [12]. In such contexts, understanding public willingness to accept implant therapy is important for identifying barriers to treatment uptake and for planning effective patient education strategies.

Assessing willingness to replace missing teeth with dental implants rather than traditional prostheses is particularly relevant in community-based research because treatment preferences are influenced by social, economic, and informational factors, in addition to clinical need. Therefore, the aim of this cross-sectional study was to assess the willingness of people in Derna City, Libya, to replace missing teeth with dental implants rather than traditional prosthetic options, with particular emphasis on knowledge and attitudes related to implant therapy.

Methods

Study design and setting

A cross-sectional study was conducted in Derna City, Libya, over a 6-month period from 1 June 2025 to 31 December 2025. The study aimed to assess the willingness of adults in Derna City to replace missing teeth with dental implants rather than traditional prosthetic options, with particular emphasis on knowledge and attitudes related to implant therapy.

Derna is a city located in northeastern Libya, with an estimated population of approximately 140,000. Conventional prosthetic treatment has historically been more familiar and more commonly used in this setting, whereas dental implant therapy was introduced relatively recently. As a result, awareness and experience of implant treatment among the local population may still be limited compared with traditional prosthetic options.

Study population and sampling

The target population comprised Libyan adults aged 18 years and older residing in Derna City. Participants were recruited using a convenience sampling method from dental clinics and selected public areas within the city.

Individuals were eligible to participate if they were aged 18 years or above, lived in Derna City, and agreed to participate in the study. Individuals who were unwilling to participate or unable to complete the questionnaire were excluded.

Sample size

The minimum sample size required for the study was calculated as 384 participants using a 95% confidence level and a 5% margin of error. To compensate for possible non-response or incomplete questionnaires, 480 individuals were approached. Of these, 458 completed the questionnaire and were included in the final analysis, corresponding to a response rate of 95.4%.

Data Collection Procedure

Data were collected using a structured questionnaire administered through face-to-face interviews. The interviews were conducted by the co-authors and trained dental hygienists to ensure consistency and reliability in data collection, as well as to provide clarification when necessary.

Data collection was carried out in both dental clinics and public settings across Derna City. The questionnaire was translated into Arabic and underwent pretesting through a pilot study to assess clarity, validity, and cultural appropriateness. Necessary modifications were made based on the pilot results prior to the final data collection.

Study instrument

The questionnaire used in this study was adapted from a previously published survey developed by Tepper et al. [11], to assess public awareness and attitudes toward dental implants. The original questionnaire was translated into Arabic and slightly modified to suit the Libyan context while maintaining its overall structure and content. The final version included items related to sociodemographic characteristics, dental history, knowledge of dental implants, awareness, attitudes, and willingness to undergo implant therapy.

The questionnaire consisted of four sections:

- (1) sociodemographic characteristics, including age, sex, education, and occupation;
- (2) dental history and oral hygiene practices;
- (3) knowledge about dental implants; and
- (4) awareness, attitudes, and willingness toward implant therapy.

Measures of the study variables

Knowledge

Knowledge regarding dental implants was assessed using five objective items: the location of implant placement (Q9), the material of the dental implant (Q10), the part replaced by the implant (Q11), the estimated survival time of the implant

(Q22), and oral hygiene requirements in comparison with natural teeth (Q23). Each correct response was assigned a score of 1, whereas incorrect responses and “I do not know” responses were assigned a score of 0. A total knowledge score ranging from 0 to 5 was calculated and categorized as poor (0–2), moderate (3–4), and good (5).

Awareness

Awareness of dental implants was assessed using whether the participant had heard about dental implants (Q7), the source of information about implants (Q8), and the self-rated level of information about implants (Q15).

Attitudes toward implant therapy

Attitudes toward dental implants were assessed using items related to the perceived importance of replacing missing teeth (Q12), level of interest in implant restoration (Q14), preferred treatment option (Q16), ranking of treatment options (Q17), preferred provider for implant placement (Q18), fear and apprehension regarding implant treatment (Q19), expected pain associated with implant treatment (Q20), willingness to invest time in implant therapy (Q21), reasons for not choosing implant treatment (Q24), and acceptance of implant treatment if offered free of charge (Q25).

For analytical purposes, these items were dichotomized into more favorable and less favorable responses toward implant therapy. Responses reflecting greater interest in implants, preference for implant treatment, lower fear, lower expected pain, greater willingness to invest time, and acceptance of implants if offered free of charge were considered more favorable. A total attitude score ranging from 0 to 10 was then calculated and categorized as poor (0–4), moderate (5–7), and good (8–10).

Outcome variable

The primary outcome variable was willingness to accept dental implant therapy if offered free of charge, as assessed by Q25. This variable was coded as 1 for “yes” and 0 for “no”.

Statistical analysis

Data were entered and analyzed using IBM SPSS Statistics version 25 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the characteristics of the study participants. Categorical variables were presented as frequencies and percentages. Associations between categorical variables were assessed using the chi-square test. Pearson correlation analysis was used, where appropriate, to examine relationships between scored variables. Binary logistic regression analysis was performed to identify factors associated with willingness to accept implant therapy. Statistical significance was set at $p < 0.05$.

Ethical considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki and its later amendments. Participation was voluntary, and written informed consent was obtained from all participants before inclusion in the study. All questionnaires were completed anonymously, and confidentiality of the collected data was maintained throughout the study.

Results

A total of 458 participants were included in the final analysis. Females represented 54.1% of the sample, and males represented 45.9%. Nearly half of the participants were employees (46.5%), 37.8% were students, and 94.8% had a university education (Table 1). The mean age of the participants was 27.48 ± 7.98 years (Table 8).

Table 1. Sociodemographic characteristics of the study participants (n = 458)

Characteristic	Category	n	%
Gender	Male	210	45.9
	Female	248	54.1
Occupation	Unemployed	30	6.6
	Employee	213	46.5
	Self-employed	40	8.7
	Retired	2	0.4
	Student	173	37.8
Education	≤ High school	24	5.2
	University	434	94.8

Regarding oral health behavior, 69.7% of participants reported visiting the dentist only in emergencies, whereas only 2.8% reported regular dental attendance. Manual toothbrush use was reported by 66.8% of participants, and 66.8% had a history of one or more tooth extractions (Table 2).

Table 2. Dental attendance, oral hygiene practices, and oral health history (n = 458)

Variable	Category	n	%
Dental attendance	Emergency only	319	69.7
	Not at all	6	1.3
	Regular basis	13	2.8
	Not regular	120	26.2
Dental hygiene visits/year	No visit	140	30.6
	One visit	182	39.7
	Two visits	114	24.9
	Three visits	16	3.5
	> Three visits	6	1.3
Oral hygiene products	Electric toothbrush	4	0.9
	Manual toothbrush	306	66.8
	Manual toothbrush & mouth rinsing	146	31.9
	Other	2	0.4
History of gum problems requiring treatment	Yes, current	93	20.3
	Yes, treated	104	22.7
	No	261	57.0
Tooth extraction history	No history of extraction	152	33.2
	One or more teeth extracted	306	66.8

Awareness of dental implants was high, with 89.1% reporting that they had heard about implant therapy. Dentists were the main source of information (33.6%), followed by friends (26.4%) and social media (17.0%). Nevertheless, the mean self-rated level of information was only 4.83 ± 1.82 (Table 3).

Table 3. Awareness and information sources regarding dental implants (n = 458)

Variable	Category	n	%
Heard about dental implants	Yes	408	89.1
	No	50	10.9
Source of information	Dentist	154	33.6
	Friends	121	26.4
	Internet	41	9.0
	Social media	78	17.0
	Someone with implant experience	10	2.2
	Other	4	0.9
	No information	50	10.9
Subjective information level	Mean $\pm$ SD	4.83 ± 1.82	

Objective knowledge regarding dental implants was limited. Correct responses ranged from 2.4% for implant material to 58.7% for oral hygiene effort required for implant care. Only 22.1% correctly identified that implants are placed in the jawbone, and 13.1% correctly identified that implants replace the root (Table 4). Overall, 97.6% of participants were classified as having poor knowledge and 2.4% as having moderate knowledge (Table 5). Although the theoretical knowledge score ranged from 0 to 5, the observed scores in the present sample ranged from 0 to 4, as no participant achieved the maximum possible score of 5. The mean knowledge score was 0.99 ± 0.73 (Table 8).

Table 4. Correct responses to dental implant knowledge items (n = 458)

Knowledge item	Correct answer n	Correct %
An implant is placed in the jawbone	101	22.1
The implant is made of titanium	11	2.4
An implant replaces the root	60	13.1
Estimated survival time >20 years	12	2.6
Implants require more oral hygiene effort than natural teeth	269	58.7

Table 5. Overall knowledge score category (n = 458)

Knowledge category	n	%
Poor knowledge	447	97.6
Moderate knowledge	11	2.4

Despite the limited knowledge, attitudes toward implant therapy were relatively more favorable. Most participants considered replacement of missing teeth to be very important (84.9%). Dental implants were preferred by 53.7% of participants regardless of cost or time, and 51.5% ranked dental implants as their first treatment option. Most respondents preferred implant placement to be performed by a specialist (86.9%). However, 54.4% reported higher expected pain, 45.2% expressed more fear regarding implant surgery, and 70.5% were less willing to invest time in treatment and follow-up care. Cost was the most frequently reported reason for not choosing implant therapy (63.5%). Overall, 49.3% of participants had a moderate attitude, 24.5% had a good attitude, and 26.2% had a poor attitude, with a mean attitude score of 5.95 ± 1.97 (Tables 6–8).

Table 6. Attitudes, preferences, and willingness regarding dental implant therapy (n = 458)

Attitude/preference variable	Category	n	%
Importance of replacing missing teeth	Very important	389	84.9
	Other responses	69	15.1
Interest in implant restoration	More interest	167	36.5
	Less interest	291	63.5
Preferred treatment option	Dental implant	246	53.7
	Other option	212	46.3
Best-ranked option	Dental implant	236	51.5
	Other option	222	48.5
Preferred provider	Specialist	398	86.9
	Other	60	13.1
Fear regarding surgery	Less fear	251	54.8
	More fear	207	45.2
Expected pain	Less pain	209	45.6
	More pain	249	54.4
Willingness to invest time	More willing	135	29.5
	Less willing	323	70.5
The main reason for not choosing implants	Cost	291	63.5
	Other reasons	167	36.5
Acceptance if the implant is offered free	Yes	404	88.2
	No	54	11.8

Table 7. Overall attitude score category (n = 458)

Attitude category	n	%
Poor attitude	120	26.2
Moderate attitude	226	49.3
Good attitude	112	24.5

Table 8. Descriptive statistics for continuous and score variables (n = 458)

Continuous variable	Mean $\pm$ SD	Range
Age (years)	27.48 ± 7.98	18–65
Self-rated oral hygiene	5.83 ± 1.94	1–10
Interest in implant restoration	5.05 ± 1.86	1–10
Subjective information level	4.83 ± 1.82	1–9
Fear/apprehension regarding implant surgery	5.93 ± 2.04	1–10
Expected pain	6.06 ± 2.40	1–10
Willingness to invest time	4.73 ± 1.94	1–10
Knowledge score	0.99 ± 0.73	0–4
Attitude score	5.95 ± 1.97	1–10

When participants were asked whether they would accept implant therapy if offered free of charge, 88.2% answered yes (Table 6). Willingness to accept a free implant was significantly associated with gender ($p = 0.002$), using the Chi-square test; education level ($p = 0.004$), using Fisher's exact test; overall attitude category ($p < 0.001$), using Fisher's exact test; fear regarding surgery ($p = 0.001$); willingness to invest time in treatment ($p < 0.001$); treatment preference ($p < 0.001$), using the Chi-square test; and occupation ($p = 0.002$), using Fisher's exact test (Tables 9 and 10).

In contrast, willingness was not significantly associated with age ($p = 0.925$), using the independent samples t-test; knowledge score ($p = 0.377$), using Fisher's exact test; or history of tooth extraction ($p = 0.522$), using the Chi-square test (Tables 9 and 10).

A weak but statistically significant positive correlation was observed between knowledge and attitude scores ($r = 0.156$, $p = 0.001$) using the Pearson correlation test, indicating that participants with higher knowledge tended to have slightly more favorable attitudes toward implant therapy (Table 10).

Table 9. Bivariate associations with willingness to accept free dental implant therapy (Q25)

Variable	Category	Accepted free implant n/N (%)	Declined free implant n/N (%)	P value
Gender	Male	196/210 (93.3)	14/210 (6.7)	0.002*
	Female	208/248 (83.9)	40/248 (16.1)	
Education	≤ High school	16/24 (66.7)	8/24 (33.3)	0.004**
	University	388/434 (89.4)	46/434 (10.6)	
Tooth extraction history	No history	132/152 (86.8)	20/152 (13.2)	0.522*
	One or more extracted	272/306 (88.9)	34/306 (11.1)	
Knowledge score	Poor knowledge	393/447 (87.9)	54/447 (12.1)	0.377**
	Moderate knowledge	11/11 (100.0)	0/11 (0.0)	
Attitude category	Poor attitude	84/120 (70.0)	36/120 (30.0)	<0.001**
	Moderate attitude	208/226 (92.0)	18/226 (8.0)	
	Good attitude	112/112 (100.0)	0/112 (0.0)	
Fear regarding surgery	More fear	171/207 (82.6)	36/207 (17.4)	0.001*
	Less fear	233/251 (92.8)	18/251 (7.2)	
Willingness to invest time	Less willing	297/323 (92.0)	26/323 (8.0)	<0.001*
	More willing	107/135 (79.3)	28/135 (20.7)	
Preferred treatment	Other option	172/212 (81.1)	40/212 (18.9)	<0.001*
	Dental implant	232/246 (94.3)	14/246 (5.7)	

* Chi-square test; ** fisher exact test

Table 10. Additional inferential analyses

Analysis	Statistic	P value
Age by willingness (t-test)	$t = 0.094$	0.925***
Knowledge-attitude (Pearson correlation)	$r = 0.156$	0.001****
Occupation vs willingness (Fisher exact test)	Fisher exact test = 16.125	0.002**

*** Independent sample T test; **** Pearson correlation coefficient.; ** fisher exact test

Regarding the preferred treatment option regardless of time and cost, more than half of the participants (53.7%) selected dental implants as their first choice, followed by fixed prostheses (42.8%), while only a small proportion (3.1%) preferred removable prostheses (Table 11).

Table 11. Preferred treatment option regardless of time and cost

Characteristic	n	%
Dental Implant	246	53.7
Fixed prosthesis	196	42.8
Removable prosthesis	14	3.1

When stratified by gender, females demonstrated a higher preference for dental implants (66.9%) compared to males (38%). In contrast, males showed a greater preference for fixed prostheses (54.2%) than females (33%). Removable prostheses were selected only by males (6.6%), with no female participants choosing this option (Table 12).

Table 12. Preferred treatment option by gender

Treatment Option	Gender	n	%
Dental Implant	Male	80	38.0
	Female	166	66.9
Fixed prosthesis	Male	114	54.2
	Female	82	33.0
Removable prosthesis	Male	14	6.6
	Female	0	0.0

A statistically significant association was observed between gender and preferred treatment option based on Question 16 ('What do you prefer for treatment regardless of time, cost, oral hygiene?'), which assesses participants' preferred treatment modality among four treatment options (removable prosthesis, fixed prosthesis, dental implant, or no preference) using Fisher's exact test at $p < 0.001$. Females were significantly more likely to prefer dental implants, whereas males were more inclined toward fixed and removable prosthetic options (Table 13).

A multivariable logistic regression analysis was conducted to assess the factors associated with acceptance of dental implant therapy based on Question 25 ('If you get an offer for free to replace your missing tooth with a dental implant, do you agree to do it?'), which evaluates willingness to accept dental implant treatment if offered free of charge. The variables included in the model were age, gender, education level, and occupation.

The analysis revealed that gender was a statistically significant predictor of implant acceptance ($p = 0.001$). Males were significantly more likely to accept dental implant treatment compared to females (OR = 3.32; 95% CI: 1.59–6.93).

Education level was also found to be a significant predictor ($p = 0.001$), with participants of higher educational status being nearly five times more likely to accept dental implants (OR = 4.86; 95% CI: 1.90–12.40).

Table 13. Preferred treatment option versus gender (refers to Question 16.)

Variable	Gender	n/N (%)	P value
Dental Implant	Male	80/210 (38.0)	<0.001**
	Female	166/248 (66.9)	
Fixed prosthesis	Male	114/210 (54.2)	<0.001**
	Female	82/248 (33.0)	
Removable prosthesis	Male	14/210 (6.6)	<0.001**
	Female	0/248 (0.0)	

** Fisher's exact test

In contrast, age was not significantly associated with implant acceptance ($p = 0.158$; OR = 0.97; 95% CI: 0.93–1.01). Similarly, occupation showed no statistically significant association ($p = 0.774$; OR = 0.97; 95% CI: 0.82–1.17). (Table 14).

Table 14. Multivariable logistic regression analysis of factors associated with acceptance of dental implants (refers to Question 25.)

Variable	Odds Ratio (OR)	95% CI	p-value
Age by year	0.970	0.929-1.012	0.158
Gender	3.323	1.59-6.93	0.001
Education Level	4.85	1.90-12.39	0.001
Occupation	0.974	0.815-1.165	0.774

Discussion

This cross-sectional study assessed willingness to replace missing teeth with dental implants rather than traditional prosthetic options among adults in Derna City, Libya, with particular attention to knowledge and attitudes toward implant therapy. The findings showed that awareness of dental implants was relatively high, yet objective knowledge was markedly poor. Despite this limited knowledge, attitudes toward implant therapy were generally moderate to favourable, and a large majority of participants indicated that they would accept implant treatment if it were offered free of charge. These findings suggest that in this population, willingness to consider implant therapy may be driven less by detailed technical knowledge and more by perceived treatment value, professional influence, and economic accessibility.

A notable finding of the present study was the contrast between high awareness and poor factual knowledge. Nearly nine out of ten participants had heard of dental implants, but only a small minority correctly identified basic information such as implant material, anatomical placement, or expected longevity. This pattern is consistent with previous studies showing that public familiarity with the term "dental implant" does not necessarily reflect an accurate understanding of the treatment itself. Earlier surveys in Austria, India, Saudi Arabia, and other settings have similarly reported that while

many participants had heard about implants, detailed knowledge regarding indications, components, and maintenance requirements remained limited [13–17]. This gap between awareness and knowledge is important because superficial familiarity may create unrealistic expectations or treatment hesitancy rather than informed decision-making.

The predominance of poor knowledge in the current study may reflect the relatively recent introduction of implant dentistry in Libya, especially outside major academic or private urban centres. In addition, implant-related oral health education appears to remain insufficient at the community level. Public knowledge is often shaped by informal communication rather than structured patient education, and this was also reflected in the present findings, where dentists, friends, and social media were the main sources of information. Previous studies have shown that dentists are frequently the primary source of implant information, although family members, friends, and mass media also contribute substantially [13,14,16,18–21]. When informal or non-clinical sources dominate, patient understanding may be fragmented or inaccurate. This underlines the importance of improving dentist-led communication and public oral health education concerning tooth replacement options.

Although knowledge was poor, participants' attitudes toward implant therapy were more favourable. More than half preferred implants over fixed or removable prostheses when asked about treatment preference, and more than half also ranked implants as their first choice. This is in agreement with studies from different countries showing that implants are commonly perceived as a desirable option because of their expected advantages in aesthetics, stability, comfort, and preservation of adjacent teeth [14,16,22–26]. At the same time, a favourable attitude did not eliminate concerns. Many participants reported fear of surgery, anticipated pain, and limited willingness to invest time in treatment and follow-up care. These concerns have also been documented in previous studies, where fear of surgical intervention, treatment duration, and uncertainty about outcomes reduced acceptance of implant therapy [15,22,27]. Taken together, these findings suggest that implant therapy may be positively viewed in principle, but practical and emotional barriers still affect readiness to proceed.

Cost emerged as the dominant reason for not choosing implant therapy, which is consistent with the existing literature. Numerous studies have identified financial burden as the main barrier to implant treatment uptake, particularly in low- and middle-income settings and in populations where implant therapy is not routinely covered by insurance or public health systems [14–16,21,22,25,28]. In the present study, willingness to accept treatment increased substantially when implant therapy was hypothetically offered free of charge, with 88.2% of participants indicating acceptance. This finding strongly suggests that cost is not a minor inconvenience but a central determinant of treatment preference in this context. It also indicates that the low routine uptake of implants in Derna may not simply reflect rejection of the treatment concept, but rather restricted affordability. In settings with limited disposable income, even favourable attitudes may not translate into actual treatment behaviour.

An important finding was that willingness to accept free implant therapy was significantly associated with gender, education, occupation, overall attitude, fear level, willingness to invest time, and baseline treatment preference, whereas knowledge score and age were not significantly associated with willingness. The lack of association between knowledge and willingness is interesting and suggests that acceptance of implant therapy may be influenced more by beliefs, perceived benefits, and practical considerations than by technical understanding alone. Some previous studies have also observed that higher awareness does not always correspond to greater readiness for treatment, especially when cost or fear remains substantial [15,27]. By contrast, the strong association between attitude measures and willingness in the present study supports the argument that behavioural intention toward implant therapy is closely linked to perceived desirability and emotional readiness.

Participants with university education were more likely to accept implant therapy than those with lower educational attainment. This finding is broadly consistent with earlier reports showing that education is associated with greater acceptance of advanced dental treatment and more positive views toward oral rehabilitation options [16,22,29]. Education may improve health literacy, exposure to dental information, and confidence in seeking complex care. Similarly, the observed association with occupation may reflect differences in income security, social exposure, or access to dental services. However, some occupational categories in the current sample were small, so this finding should be interpreted cautiously.

Gender differences were also observed, with male participants being more willing than female participants to accept free implant therapy. The explanation for this pattern is not entirely clear, but it may relate to differences in treatment-related anxiety, financial decision-making, or perceptions of surgical procedures. Previous studies on sex differences in implant awareness and acceptance have produced mixed findings, with some reporting no significant difference and others suggesting higher acceptance or awareness in one sex depending on context [17,29–31]. This indicates that gender effects are likely context-specific and may be mediated by social and cultural factors rather than sex alone.

The weak but statistically significant positive correlation between knowledge and attitude indicates that better-informed participants tended to have slightly more favourable attitudes toward implants, although the effect size was small. This suggests that knowledge alone is unlikely to transform acceptance unless it is paired with communication that directly addresses fear, pain expectations, time commitment, and affordability. In practical terms, educational interventions should therefore not be limited to factual explanation of implant components or procedures; they should also include realistic counselling on treatment stages, postoperative discomfort, maintenance, expected longevity, and cost-benefit

considerations. Patient-centred education may be especially relevant in communities where implants are still perceived as relatively new or unfamiliar.

The present findings have implications for both dental practice and oral health policy in Libya. First, the high awareness but poor factual knowledge observed here indicates a need for more structured patient education about modern tooth replacement options. Second, because dentists were the leading source of information, general dental practitioners and specialists are well positioned to improve patient understanding through routine counselling. Third, the major influence of cost suggests that expanding financial access, whether through staged payment plans, subsidized care, or selective institutional support, could substantially improve uptake among interested patients. Finally, because fear and expected pain were significant correlates of acceptance, communication strategies should explicitly address the surgical nature of implant treatment and correct misconceptions that may discourage care.

This study should be interpreted in light of several limitations. First, the cross-sectional design does not allow causal inference between participant characteristics and willingness to accept implant therapy. Second, the use of convenience sampling limits generalizability beyond the surveyed population and may have introduced selection bias. Third, the sample was highly educated, with a very large proportion of university-educated participants, which may not fully represent the broader population of Derna or Libya. Fourth, willingness was measured using a hypothetical question about free treatment rather than actual treatment uptake, and stated willingness may overestimate real clinical acceptance. Finally, some questionnaire scoring decisions, particularly for attitude classification, reflect study-specific operational definitions and may not be directly comparable with all previous studies.

Despite these limitations, the study provides useful baseline evidence from an underreported setting. To our knowledge, few studies have examined public willingness to replace missing teeth with dental implants in eastern Libya, particularly in Derna City. The study therefore adds context-specific evidence on how awareness, knowledge, attitudes, and perceived barriers shape acceptance of implant therapy in a population where traditional prostheses remain more familiar.

Conclusion

Within the limitations of this cross-sectional study, adults in Derna City, Libya, showed high awareness but poor objective knowledge regarding dental implants as an option for replacing missing teeth. Despite the limited level of factual knowledge, attitudes toward implant therapy were generally moderate to favourable, and willingness to accept implant treatment was high when financial barriers were removed. Cost, fear of surgery, expected pain, and limited willingness to invest time emerged as the main barriers to acceptance, whereas more favourable attitudes, higher educational level, and preference for implant therapy were associated with greater willingness to accept treatment. These findings highlight the need for improved patient education and more accessible implant services to support informed decision-making and wider acceptance of implant therapy in this setting.

Conflicts of Interest

The authors declare no conflicts of interest.

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