



Impact of a “TED-Style” presentation on potential patients’ willingness to accept dental implant therapy: a one-group, pre-test post-test study

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PURPOSE. A survey was conducted to assess the impact of a TED-like educational session on participants’ willingness to accept dental implant therapy. **MATERIALS AND METHODS.** Volunteers interested in having information about dental implant therapies were recruited and asked to complete a two-part survey before and after an educational session. The initial survey elicited demographic information, self-perceived knowledge on dental implants and willingness to this kind of treatment. A “TED-style” presentation that provided information about dental implant treatments was conducted before asking the participants to complete a second set of questions assessing the impact of the session. **RESULTS.** The survey was completed by 104 individuals, 78.8% were women and the mean age was 66.5±10.8. Before the educational session, 76.0% of the participants refused dental implants mainly due to lack of knowledge. After the educational session, the rejection of dental implants decreased by almost four folds to 20.2%. **CONCLUSION.** This study proved that an educational intervention can significantly increase willingness to accept treatment with dental implants in a segment of the population who is interested in having information about dental implant therapy. Furthermore, educational interventions, such as TED-like talks, might be useful to increase popular awareness on dental implant therapy. [J Adv Prosthodont 2015;7:437-45]

KEY WORDS: Dental implants; Dental education; Treatment; Acceptance; Refusal; Cost; Fear

INTRODUCTION

The detrimental impact of partial and complete edentulism

on oral function and social interactions is well documented.^{1,2} The prevalence of edentulism has decreased over the last decades,¹ however, the aging population in need of dental prosthesis is expected to keep increasing³ due to higher life expectancy.⁴

Implant-prosthodontics has been accepted as an alternative to traditional restorative treatments for partially and completely edentulous patients.^{5,6} Single and multiple tooth implants-retained prostheses have been shown to achieve high levels of success and patient satisfaction.^{7,8} For instance, implant supported overdentures have been associated with an improvement in esthetics, functional efficiency and quality of life.⁹⁻¹² Although, this treatment has limitations, just as any other dental treatment, and some clinicians still believe that it should not be considered a gold standard,^{11,13} the McGill¹⁰ and York Consensus¹¹ on overdentures, and

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most academic prosthodontists of the United States,¹² support the idea that a two-implant overdenture should be the first-choice of treatment for an edentulous mandible.

Despite all their benefits and being promoted as the treatment of choice for many conditions, dental implants are still scarcely used.¹⁴ It has been reported that patients' willingness to accept implant therapy is generally affected by the cost of the treatment, the treatment itself (surgical and prosthetic steps) and unfavorable patients' health conditions. To-date, the patient's financial circumstances remains a major obstacle to implant prosthetic treatment.^{5,15-17} However, when finance is not a limitation, patient acceptance may also be limited by the time-intensive and multi-step process involved in the implant treatment.¹⁸ Unfavorable health conditions and/or psychological and emotional factors,¹⁹ such as fear, anxiety and disbelief, can also act as barriers to dental implants acceptance.¹⁵ Lack of awareness has also been noted as an influential factor to negate the therapy.¹⁴ It has been reported that more information about dental implants should be provided to patients seeking dental prosthesis.^{20,21} TED and TED-like talks have been found to be an excellent tool for releasing scientific information to the public. Indeed, the TED Talks website is the single most popular conference and events website in the world.²² Even though, this type of talks have been criticized of dumbing down ideas, and being overly enthusiastic and mainly designed to entertain,²³ TED talks and similar platforms may be able to provide opportunities for the academy to further transmit research that might otherwise would go unnoticed by the general public.²⁴

To our knowledge, there is no information about the impact that "TED-style" educational interventions could have on the awareness of potential dental implant patients. Therefore, to assess the impact of TED-like talks on the educational needs of the society in dental implantology, we designed a survey to evaluate the public knowledge on dental implant therapies, before and after attending a tailored TED-like educational session. This approach helped evaluate the impact of this type of educational tool on prospective candidates interested in knowing more about dental implant treatments.

MATERIALS AND METHODS

Approval from McGill University Health Centre Research Ethics Board was obtained to proceed with this study. Newspaper advertisements were used to invite general public to attend an informative session about dental implants for replacement of missing teeth as part of the Mini-Med School presentations program designed for general audience at the Sir Mortimer B. Davis Jewish General Hospital (Montreal, Canada) auditorium. Volunteer participants (over 18 years old, missing at least a tooth other than a third molar, able to understand English and living in, or nearby the city) were recruited to complete the survey; no incentives were provided to participate in the study. Participants were excluded if they had been previously treated with den-

tal implant. An informed consent assuring anonymity and confidentiality was signed by each respondent. The first survey elicited demographic information such as age, gender, education, income, marital status, mother tongue language, type of denture used if any, self-perceived knowledge about implants and information on whether the respondents had ever considered treatment with dental implants. In the case of treatment refusal, the reasons were also registered choosing one choice of three categories: lack of knowledge, high cost or fear/anxiety. After completing the first part of the survey, the participants received a "TED-style" comprehensive educational lecture about dental implant therapy by a Prosthodontist (S.A.).²⁵ The educational session addressed patient selection, surgical and prosthetic phase, postoperative indications, treatment options, benefits, risks of complications, maintenance and approximate costs. After the lecture, the participants completed the second part of the survey which included their willingness to accept dental implants, and their reason for refusing this treatment option, if any. In order to be included in the study, participants should have reported their level of self-perceived knowledge on dental implants prior to the educational session ('not at all' being the lowest and 'very well' the highest), and their willingness to accept dental implant therapy before and after the session.

The timing of the posttest measure is important and should be as short as possible in order to prevent the effect of the intervention from being diluted or influenced by confounding factors such as participation in other programs, as well as social, or environmental circumstances. Therefore, volunteer assessment was done immediately after the educational intervention in order to minimize impact on the recall rate.

Statistical analyses included descriptive statistics of the demographic characteristics of participants. Differences among subgroups in regarding "level of implant knowledge" and willingness to accept implant treatment were assessed using chi square tests and logistic regression. The results were expressed as odds ratio, both crude (OR) and adjusted (AOR) for the confounding variables age, gender, marital status, income, level of education, denture wearing, and level of implant knowledge. The latter variable was only considered as confounder for AOR calculations on the analysis of "willingness to accept implant treatment". OR and AOR were used to determine how strongly each level of implant knowledge was associated with the willingness to accept implant treatment in our population sample.

The "before" and "after" educational session data were compared using two-tailed Fisher's exact test to determine statistical significance of the change in willingness to accept implant therapy and the reasons for refusal of implants. The data analysis was conducted using the Statistical Package Service Solutions software (SPSS, version 20.0, Chicago, IL, USA). The level of significance was set at $P < .05$ for all analyses.

RESULTS

Out of 129 participants, 104 (response rate = 80.6%) reported the self-perceived level of dental implant knowledge, and the willingness to accept dental implants treatment before and after the educational session. The “Total” column of table 1 presents the demographic characteristics of respondents. More than three-fourths of the respondents were women and a majority was above 65 years of age (mean age 66.5 ± 10.8).

Prior to the educational session, nearly half of the participants (47.1%) reported to have poor or no previous knowledge on dental implants, while the other half (52.9%) reported moderate to extensive knowledge on dental implant treatments (Table 1). Associations between ‘level of implant knowledge’ and age, gender, annual house income, level of education, denture wearer and marital status were analyzed (Table 1). Chi square analysis and crude OR indicated that individuals with higher annual household income ($> \$50,000$) had significantly increased odds of having higher implant knowledge than individuals with lower income ($\leq \$50,000$). Similarly individuals with less than col-

lege education had lesser odds of having implant knowledge than individuals with college or higher education. After adjusting for all other confounding factors, AOR suggested that participants who were denture wearers had higher implant knowledge than non-denture wearers (Table 1). Gender differences were not significant, however women showed a tendency of being more knowledgeable about implants than men (Table 1).

The influence of demographic and clinical characteristics on the willingness to accept treatment with dental implants prior to the informative session was analyzed. Before the information session, only 24% of respondents were willing to consider implant treatment. Chi square analysis revealed that higher level of knowledge on dental implants was significantly associated with higher odds for accepting treatment with dental implants ($P < .05$). Individuals having a moderate-to-very good knowledge on dental implants were 3.8 times (Crude OR) more likely to accept the treatment than those with none-to-very little knowledge. Moreover, dentures wearers were significantly more likely to accept treatment with implants than non-wearers. Logistic regression analysis adjusting for potential confounders indicated that

Table 1. Factors influencing “level of implant knowledge”

Characteristics		Total n (%) 104 (100)	Very well/ Moderately well n (%) 55 (52.9)	Poorly/ Not at all n (%) 49 (47.1)	OR (95% CI)	<i>P</i>	AOR (95% CI) [†]	<i>P</i>
Age*	≤ 65	28 (35.9)	13 (33.33)	15 (38.5)	1			
	> 65	50 (64.1)	26 (66.67)	24 (61.5)	1.25 (0.49-3.16)	.64	1.28 (0.33-9.34)	.72
Gender	Men	22 (21.2)	10 (18.2)	12 (24.5)	1			
	Women	82 (78.8)	45 (81.8)	37 (75.5)	1.46 (0.57-3.76)	.43	4.03 (0.79-19.75)	.09
Marital status	Single	24 (23.1)	15 (27.3)	9 (18.4)	1			
	Married	71 (68.3)	37 (67.3)	34 (69.4)	0.65 (0.25-1.69)	.38	6.42 (0.52-78.86)	.15
	Other	9 (8.6)	3 (5.4)	6 (12.2)	0.30 (0.06-1.51)	.14	7.31 (0.47-114.50)	.16
Level of education	College or higher	65 (62.5)	39 (70.9)	26 (53.1)	1			
	Less than College	39 (37.5)	16 (29.1)	23 (46.9)	0.46 (0.21-1.04)	.06	1.12 (0.31-4.10)	.86
Annual household income**	≤ \$50,000	14 (20.9)	4 (11.11)	10 (32.3)	1			
	> \$50,000	53 (79.1)	32 (88.89)	21 (67.7)	3.81 (1.06-13.75)	.04	2.15 (0.23-10.86)	.35
Denture wearer	Yes	21 (20.2)	12 (21.8)	9 (18.4)	1			
	No	83 (79.8)	43 (78.2)	40 (81.6)	0.81 (0.31-2.12)	.66	0.15 (0.03-0.83)	.03

OR: Crude Odds Ratio; AOR: Adjusted Odds Ratio

† The AOR was adjusted for age, gender, annual house income, level of education, denture wearer and marital status.

n=104, unless specified

* For ‘age’ the n=78 because 26 responses were missing.

** For ‘annual household income’ the n=67 because 37 responses were missing.

only age was a significant factor associated with willingness to accept dental implant treatment. AOR showed that participants over the age of 65 were more likely to accept dental implant treatment than younger ones ($P = .02$); although this may be a result of inflation of the estimate due to the associated small cell count for acceptance in the group of participants younger than 65 years of age.

Willingness to accept implant therapy was analyzed again after the TED-like educational session, and it was found the proportion of respondents who were willing to accept implant treatment increased significantly from 24% to 80% ($P < .05$). Interestingly, after the session no significant association was found between any of the participants' characteristics and their willingness to accept implant treatment.

The change in willingness to accept dental implants before and after the educational session and its association with potential confounders was assessed (Table 2). This test was based on a cross tabulation of responses among people who accepted/refused implant treatment prior to the information session and either kept or changed category after the information session. In our study, none of the respondents who had initially expressed their willingness to accept

implant treatment refused it implants after the information session. Moreover, a large portion of respondents that rejected implant treatment prior to the information session change their opinion after the session. The change in willingness after the educational session was apparent in all of the sub-groups analyzed, however, due to the limited number of participants in some sub-groups, it was only significant among the following categories: older than 65 years, women, married, both low and higher education, income above \$50,000, non-denture wearers and those who initially had a higher level of implant knowledge ($P < .05$) (Table 2).

Before the session, respondents that answer negatively to the question 'Have you ever considered implants?' had to give a reason by answering 'If your answer to the previous question is "no" kindly state why'. All answers fell within one of the four categories identified in tables. 'Lack of knowledge' was the main reason for not considering implant treatment Followed by 'cost', 'fear' and 'unknown' (Table 3). The reason was classified as 'unknown' when the participants did not specify an answer.

After the session, 'cost' became the most popular reason for refusal of treatment followed by 'fear' (Fig. 1).

Table 2. Comparison of participants' willingness to accept implant therapy

Characteristics	Before informative session		After informative session		P†
	Accept n (%)	Reject n (%)	Accept n (%)	Reject n (%)	
	25 (24.0)	79 (76.0)	83 (79.8)	21 (20.2)	
Age*					
≤ 65	3 (18.8)	25 (24.0)	24 (38.8)	4 (25.0)	.62
> 65	13 (81.2)	37 (46.8)	38 (61.2)	12 (75.0)	.02
Gender					
Men	6 (24.0)	16 (20.3)	18 (21.7)	4 (19.0)	.25
Women	19 (76.0)	63 (79.7)	65 (78.3)	17 (81.0)	.01
Marital status					
Single	6 (24.0)	18 (23.7)	20 (24.1)	4 (19.0)	.29
Married	17 (68.0)	54 (68.4)	55 (66.3)	16 (76.2)	.01
Other	2 (8.0)	7 (8.9)	8 (9.6)	1 (4.8)	.78
Level of education					
College or higher	14 (56.0)	51 (64.6)	54 (65.06)	11 (52.38)	.04
Less than College	11 (84.0)	28 (33.4)	29 (34.94)	10 (47.62)	.02
Annual household income**					
≤ \$50,000	4 (21.0)	10 (20.8)	12 (20.1)	2 (22.2)	.66
> \$50,000	15 (79.0)	38 (79.2)	46 (79.3)	7 (77.8)	.04
Denture wearer					
Yes	10 (40.0)	11 (13.92)	17 (20.48)	4 (19.05)	.06
No	15 (60.0)	68 (86.08)	66 (79.52)	17 (80.95)	.02
Level of implant knowledge					
Poorly/Not at all	6 (24.0)	43 (54.4)	38 (45.8)	11 (52.4)	.20
Very well/ Moderately well	19 (76.0)	36 (45.6)	45 (54.2)	10 (47.6)	.01
Total	25 (24.0)	79 (76.0)	83 (79.8)	21 (20.2)	0.003

* For 'age' the n=78 because 26 responses were missing.

** For 'annual household income' the n=67 because 37 responses were missing.

† P value derived using Fisher's exact test for the difference in values recorded before and after the information session.

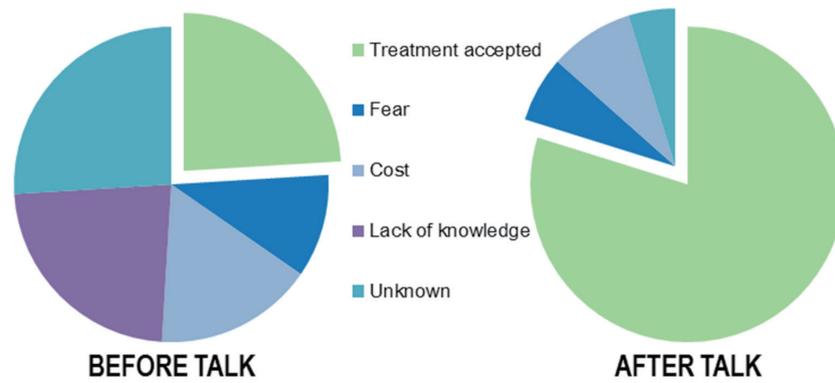


Fig. 1. Pie charts describing the proportion of participants rejecting treatment and their reasons before and after the TED-talk presentation.

Table 3. Major reasons for not considering implants before and after the TED talk session

Reason	Before information session (n = 79) n (%†/%‡)	After information session (n = 21) n (%†/%‡)	P value (two-tailed)
Fear	11 (13.9/10.6)	7 (33.3/6.7)	.105
Cost	17 (21.5/16.3)	9 (42.9/8.7)	.140
Lack of Knowledge	24 (30.4/23.1)	0 (0/0)	.001
Unknown	27 (34.2/26.0)	5 (23.8/4.8)	

† Percentages are reported in relation to the sample who refused implants (n = 79, before; n = 21, after).

‡ Percentages are reported in relation to the total population (n = 104).

Respondents who indicated ‘lack of knowledge’ as the reason for not considering implants were significantly ($P = .001$) reduced down to zero after the information session. There was no significant difference in the proportion of respondents before and after the session who indicated ‘cost’ or ‘fear’ as the reason for refusing implants (Table 3).

DISCUSSION

This study establishes the usefulness of TED-like presentations in facilitating knowledge on dental implants to the public. Patients’ knowledge shapes their preferences about a treatment and is crucial for their decision-making.^{17,26,27} Given the rapid changes in technologies and venues for public release scientific information old methods to inform the public should be reassessed.²²

TED-style talks have been successful tools for teaching students as well as the public in many healthcare sectors.²⁸ However, the application of this educational approach in dentistry has barely been explored. Underneath we discuss our findings regarding the use of this educational approach on knowledge translation on dental implants to the public.

Even though there is a considerable lack of sufficient

knowledge amongst the general public regarding dental implant treatments,¹⁴ the participants of this study reported to be even less knowledgeable on dental implants than those of previous studies.^{16,20,21,29-32} Differences among studies could be attributed to the fact that each study was performed on populations of different countries and cities, and there might be important variations among these populations in terms of health awareness.

In our study, the willingness to accept dental implants from participants interested in knowing more about the treatment option, prior to the educational session, was relatively low (24%) compared to previous population-based (56.7%),²⁹ patient-based (75%),³⁰ and edentulous patient-based studies (79%).³² This seems to confirm that there might be substantial differences among populations in terms of their willingness to accept the treatment. It seems that those who need the treatment more, such as dental patients, especially edentulous ones, are more likely to accept it. This possibility was confirmed in our study as we observed that edentulous participants showed higher levels of self-reported knowledge on dental implants, and higher odds for accepting the treatment (prior to the educational session) than the rest of the study group. The fact that in

our study the information session increased treatment acceptance to levels reported in patient-based studies (79%)³³ seems to suggest that differences in treatment acceptance among populations are probably related to their knowledge level. In the following sections we address in detail the different factors that influenced willingness to accept implant treatment.

Similarly to a previous report,¹⁴ in this study, prior to the educational intervention, older participants (over 65 years) were more likely to accept dental implants than younger ones. This observation could be explained by the fact that even though younger people might have a positive attitude towards dental implants,^{16,29-31,34} in our study, older participants showed relatively higher levels of knowledge on dental implants than younger ones. These findings seem to confirm that age differences in willingness to accept implants are probably knowledge-based.

Although it has been reported that men might be more likely to accept dental implant treatments than women,¹⁴ in our study we could not observe gender differences in willingness to accept these treatments.

Also, we observed that participants with higher level of education showed a tendency to have a higher level of knowledge on dental implants (Table 1), confirming previous reports.²⁰ However, we were not able to observe the association between participants' level of education and their willingness to accept the treatment that has been reported elsewhere,³⁴ probably due to the overall high level of education of our study group.

Economic and social factors have been described to affect patient decision.³⁵ In the present study, our higher income group was significantly more knowledgeable about dental implants than the lower income one (Table 1), which is in agreement with previous studies.²⁰ However, we could not observe the relation between 'income' and 'willingness to accept treatment reported in other studies.^{29,34}

Before the information session, denture wearers had significantly more knowledge on dental implants (Table 1) and higher willingness to accept dental implant treatments than non-denture wearers. This suggests that people who have the need are usually more interested in seeking knowledge, and those who have more knowledge on dental implants might be more likely to accept the therapy. However, previous evidence is controversial; some studies^{14,32} have reported higher implant acceptance amongst denture wearers, whereas, others have reported the opposite.^{34,36} These differences among studies are probably associated to other factors such as previous knowledge on dental implants.¹⁴

As a result of the educational session, significant changes in acceptance of implants were noted. Recent studies in the medical field demonstrated the positive impact of educational sessions such as TED-like talks, on participants' willingness to accept treatment or preventive behavior.^{33,37} Within the dental field, a similar pre- and post-testing approach has been carried out for participants' willingness to accept esthetic treatments resulting in positive results.³⁸ However, the present is the first study of this nature related

to dental implants. Here we confirm that our "TED-style" educational session had a very strong impact on participants' willingness to accept treatment with dental implants, particularly among people older than 65 years, women, married individuals and those with high income (Table 2).

There are various barriers for acceptance of implant treatment. Our study demonstrates that the level of implant knowledge plays a major role when potential patients have to make a decision regarding the therapy. Before the information session, a high portion of respondents refused implant treatments due to their limited knowledge on the topic. Previous studies have reported that lack of knowledge could be the reason behind 11.8% of implant treatment refusals among patients.¹⁴ However, the significant fourfold increase in participant willingness to accept dental implant treatments after the educational session seems to indicate that the importance of patient knowledge of the treatment might have been underestimated. The magnitude of change in treatment acceptance after the educational session indicates that lack of knowledge could be the reason behind almost 50% of treatment refusals. This further demonstrates the importance of creating awareness and the need of providing information to the general public to help them make informed decisions. Notably, after the session none of the participants indicated lack of knowledge as a refusal reason anymore, which implies the appropriateness of the content of the educational session. Another barrier for accepting dental implant therapy is cost. In this study, 'cost' became the most frequent answer for refusing implants after the session (Table 3). This financial constraint has also been reported as the main reason for refusal in previous studies,^{14,16,21,31,34,39} which is consistent among both high and low income groups.²⁰ It is well known that patients' decision-making towards dental treatments is highly dependent on their willingness-to-pay for the treatment. Therefore, it is important that clinicians carefully convey the benefits of dental implants with the increased costs, and present feasible financing options to their patients.⁴⁰ Our results confirmed that fear of surgical risks and complications can lead patients to abstain from choosing implant treatments.^{32,41} There is an inverse relation between knowledge and anxiety that can be managed by reducing unfamiliarity.^{26,27} However, the fact that the educational session was unable to reduce the number participants afraid of dental implant treatments reveals limitations in our approach that would have to be addressed in future educational interventions focused on fear management.

In summary, after the session 'lack of knowledge' was no more a reason for refusal of implant therapy whereas 'cost' and 'fear' remained influencing factors (Table 3). Hence, besides educational interventions, cost control strategies and psychological interventions design to decrease fear should also be put into place to remove these obstacles.⁴²

It has been estimated that the majority of patients do not have the information they need for health care decision-making.⁴³ Accordingly, in our study we provided participants with detailed information on topics that usually

affect patients' attitudes regarding treatments with dental implants. This included details on treatment benefits, success rate, duration, and costs, as well as surgical procedures, post-surgical maintenance and alternative therapies.^{40,41,44} The positive results of our educational intervention indicated that participants' lack of knowledge on dental implants and the associated refusal of the treatment could be successfully addressed (Fig. 1).

Evidence suggests that health behavior is influenced by confidence, incentives, expectations, goals, beliefs and motivation.⁴⁵ Beliefs and preferences are in turn based on knowledge and previous experiences.^{20,40} Our study demonstrates that there is certain public ignorance on the treatment options available to manage edentulism, and TED-style talks could be useful and effective tools for satisfying the demand for healthcare information on this topic. TED talks could also be an interesting way to increase awareness of the excellent research our academic colleagues are conducting amongst the practicing community, which may, as a secondary benefit, serve as a means of promoting and attract dentists to their continuing education programs.

Although the results of this survey provide a fair indication of what is taking place in our study sample, certain limitations are inevitable. The pre-test/post-test design is a widely accepted approach which evaluates quantitative changes in outcomes, especially behavioral items. However, its biggest weakness is the 'response shift bias' due to a change in the participants' metric due to a new understanding of a concept being taught.⁴⁶ Self-perceived surveys are not the most accurate method for measuring knowledge,⁴⁷ and hypothetical situations may produce an over-estimation of affirmative responses for a therapy when compared to real life decision-making scenarios.⁴⁸ Previous exposure to information on dental implants was not assessed. However, the participants' self-perceived level of knowledge was registered.

Our study sample was relatively limited and had a skewed representation in many categories such as gender with very high proportion of females (78.8%), marital status and annual household income with under-representation of singles and low income individuals, respectively. Furthermore, age was heavily concentrated in the older age range. However, we do not find this a substantial predisposition since young patients need implants less often than older patients.^{30,49} For these reason, future studies with a larger sample size would allow to investigate additional relationships that could not be confirmed in our study. Our participants recruited were driven by the newspaper invitation and therefore this study may not be generalized to the entire population. Despite these limitations, this study could set the base for conducting further studies in order to be transferred to a population seeking implant knowledge.

This survey showed missing data for age and income with 26 and 37 non-respondents in their categories, respectively. In this study, no population characteristic factors were significantly associated with missing age data ($P > .05$). Nevertheless, missing data for annual household

income was more predominant for females ($P = .002$) and individuals aged 65 and above ($P = .009$). Therefore, an inference of randomly missing data could not be established. Hence, multiple imputation (MI) or weighting techniques for missing data was not carried out due to the validity issues associated with MI for non-random missing data.⁵⁰ The reason for refusal was not reported by some of the respondents who refused the treatment (34.2% before and 23.8% after the educational session). More detailed studies are required to better understand the behavioral and patient management requirements for increasing implant acceptance. Also, future studies with a larger sample size would be able to overcome the problems raised by the missing data.

CONCLUSION

A TED-like educational session can increase potential patients' awareness on dental implants and significantly increase the willingness to accept the treatment. Therefore, proper education is a major promoter in individuals' decision-making heuristics towards an evidence-based decision. Future research should focus on evaluating such educational programs in clinical environments.

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