

Evaluation of Selection Criteria for Implant-Supported Dental Prosthesis Among Iranian Dentists

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Abstract: Demand for dental implants is highlighted in Iran similar to other countries. The aim of this study was to evaluate by questionnaire, the selection criteria for implant-supported dental prostheses among dentists in Iran. In the present cross-sectional survey, 350 dentists in Iran were evaluated. Data were collected using a researcher-made questionnaire whose validity and reliability had been accepted. Data were analyzed with descriptive and analytical statistical methods using SPSS 21. The results showed the major source of training in dental implants were participating in university courses (69.7%), In term of important factors in implant selection criteria, cost was considered the most common reason to choose implants among the participants (73.4%). For people who have more than 5 years of experience in the field of implants, cost factors, implant level and the geometry of the implants have higher priority than any other factor. But dentists, who are under 5 years of implant experience, give priority to easy steps in surgery, prosthetics and cost of dental implants. Analysis of data showed a significant relationship between the dentists' age, educational level, the years of experience in field of dental implants and number of used implant systems ($P < 0.05$). Implant with length of 8 to 13 mm and a width of 3.5 to 5mm, cemented prostheses and implants with SLA (sandblasted large gritted acid etched) level have significant difference with the other factors ($P < 0.05$). There was great difference among the respondents concerning done treatments amount, design, and materials used for the implant prostheses.

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Key words: dental implant; selection criteria; educational level; experiences

1. Introduction

Dental implants are used for maintaining fixed and removable prosthesis. In recent years, reconstruction with dental implant is accepted by dentists and patients due to accurate functional and aesthetic results. Dental implants have gained a great success in the clinical applications of long-term survival rate which has reached to more than 90% (Friberg et al., 2008).

The results of implant therapy are based on the diagnosis. Significant success factors include in patient selection, sufficient and minimum required size of bone for implant placement, desired position, bone augmentation and various procedures of grafting (Lekholm, 1998).

As dental implants are available in different diameter and length, choosing an appropriate implantation become more complicated. To broaden and improve the outcome of treatment options, surgical and prosthetic implant attentions must be specific to each area of the implant. Tooth loss or edentulism is responsible for alveolar ridge atrophy leading to decrease ridge height and width (Moutamed, 2011). The application of narrow diameter implants is

in regions with narrow ridges and limited space. in posterior areas, wide implants are appropriate in regions with limited vertical height. They have improved stability and bone-implant contact, better emergence profile and diminished stress screws (Lazzara, 1994).

The Osseointegration implant rates are associated with surface roughness. titanium plasma-spraying, grit-blasting, acid-etching, anodization or calcium phosphate coatings are commercially available and have proven experimental effectiveness (>95% over 5 years). Osteoconductive calcium phosphate coatings support bone healing and apposition result in rapid biological of implant fixation. Duty of surface chemistry and topography on early events in dental implant osseointegration poorly understood. Furthermore, comparative clinical studies by various implant surfaces are hardly implemented (Guéhennecc et al., 2007).

The purpose of this article is to evaluate the selection criteria for implant-supported dental prostheses among Iranian dentists.

2. Materials and methods

2.1 Study design

In this cross-sectional study a researcher made questionnaire with questions related to dental implant treatment of the edentulous region. Validity and reliability had been confirmed and conducted through printed and online link among all clinically active dentists in the part of population of Iran in 2017 (March to May).

To evaluate the reliability of the questionnaire, it was distributed among 25 dental practitioners as a pilot study; originally Cronbach's alpha was calculated for reliability, then questionnaires were distributed.

Random sampling method with suitable sample size was used. Questionnaire was prepared in Persian language to facilitate completion and to have a better understanding of the questions by the respondents. It consisted of questions on age, gender, college education and job experience in dental implant treatment planning. There were a total of 7 questions on the questionnaire.

Most of the dental clinics and private dental offices were included in the study. The questionnaires were handed to the dentists during their regular dental visits. All the respondents were informed about the aims and objectives of the study. Those who were not willing to give informed consent were excluded from the study; so, only 306 of 500 respondents agreed to participate in the survey with the non-response rate 30 %.

According to purpose of study dentists were grouped according to: gender, age and education.

2.2 Inclusion and exclusion criteria

All subjects provided informed consent to participate in this study. Questionnaires which were filled out incompletely were omitted from the study.

3. Results

Of 350 Iranian dentists included in the study, 268(76.6%) were male and 82(23.4%) were female with a mean age of 42.41 ± 9.1 years of at least 26 up to 64 years old (figure1,2).

The result of Chi-square test showed a significant difference between the number of participating men and women ($P = 0.000$).

Chi-square test showed a significant difference between different age groups ($P = 0.000$).

229(65.4%), 45(12.9%), 34(9.7%), 22(6.3%) and 20(5.7%) of the subjects were general dental practitioner, prosthodontist, maxillofacial surgeon, periodontist and other majors respectively (figure3).

The result of Chi-square test showed statistically significant difference in dentists' level of highest education separately. ($P = 0.000$).

The major source of training in dental implants were participating in, university courses (69.7%),

internet (47.4%), expert courses (45.7%), manufacturer courses (42%), national or international scientific meetings (41.47%), associations course (32.9%), self-learning from textbooks and journals (32.9%), formal postgraduate studies (15.1%) and other things (6.6%) (figure 4).

The result of Chi-square test showed statistically significant difference in dentists' major source of training in dental implants separately ($P < 0.05$).

Level of highest education of respondents was 1st degree: BDS/DMD/DDS (70.3%), 2nd degree: MDS/MS (16.3%), 3rd degree: PhD (5.1%) and other (8.3%) (figure5).

Subjects had job experiences for less than 5 years were 56.3%. 28.9% and 14.9% had job experiences of 5–10 and over 10 years, respectively (figure 6).

The result of Chi-square test showed statistically significant difference in dentists' work experiences separately. $P < 0.000$ 34%, 30%, 36% use one, two and more than two implant system respectively (figure 7).

Significant relationship between gender of dentist and number of used implant systems, cannot be seen ($P = 0.224$) but there is a significant relationship between number of used implant systems and dentists' educational level ($P = 0.000$). Between age of dentist and number of used implant systems, significant relationship was showed ($P = 0.000$); Graduate Level of dentists and number of used implant systems show significant relationship ($P = 0.000$); Between the years of experience in field of dental implants with implant systems that uses, significant relationship has been seen ($P = 0.000$).

Choosing implant system among respondents was based on these factors respectively: price (73.4%), simplicity of prosthetic steps (63.1%), simplicity of surgical steps (56.3%), warranty provided by manufacturer/dealer (39,1%), implant/abutment connection (37.1%), implant surface (36.9%), research documentation (33.1%), availability of stock products and technical support provided by local distributor (30.3%), cost or gift from the manufacturer or distributor (25.1%), implant geometry (22.0%), patient preference (19.1%), medical and/or dental history/anatomy of the patient (18.9%), popularity of the implant system among other dentist (18.3%), request/desire of the referring dentist (18.3%), shorter healing periods after implant placement (16.0%), training provided by the manufacturer/dealer (9.4%) (figure8).

There exists significant relationship between years of dentists' implant experiences and factors in selection criteria for implant ($P = 0.046$).

Dentists have used implants with the following characteristics: implants with a length of 8 mm to 13mm (91.1%), implants with a width of 3.5 to 5mm (84.6%), cemented prosthesis (54.3%), SLA

(Sandblasted Large gritted Acid etched) (44.9%), screw retained prosthesis (44.0%), parallel (15.7%) and tapered (34.6%) implants, Platform shifting / switching (26.6%), Laser coated implants (14.9%), TPS (Titanium Plasma Spray) (13.4%), HA (Hydroxyl Apatite) (11.7%), implant with less than 8 mm length (9.4%), implant with less than 3.5 mm width (9.1%), Zirconia abutment (9.7%), implant with more than 13 mm length (6.9%), Implant with internal (30%) and external (6.3%) connection, CAD/CAM abutments (6%), one piece implants (5.4%), implant with more than 5 mm width (5.1%), Zirconia implants (3.7%), Custom made abutment (2.6%), Acid etched (1.7%), Temporary abutment (1.4%), Calcium Phosphate (0.6%), Fluoride (0.6%), (figure9).

There was no significant relationship between dentists' implant experiences and structural characteristics in the use of dental implants (P = 0.108).

69.1%, 65.1%, 64.9%, 46% and 11.1% of the subjects trusted an implant system if it had the ADA, CE, FDA, ISO and GMP certificates respectively (figure 10).

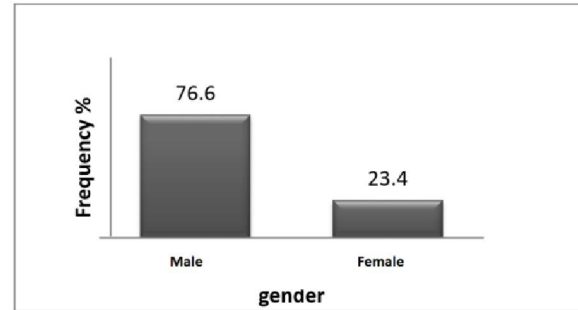


Figure 1. Evaluation of participants in the research differentiated by gender

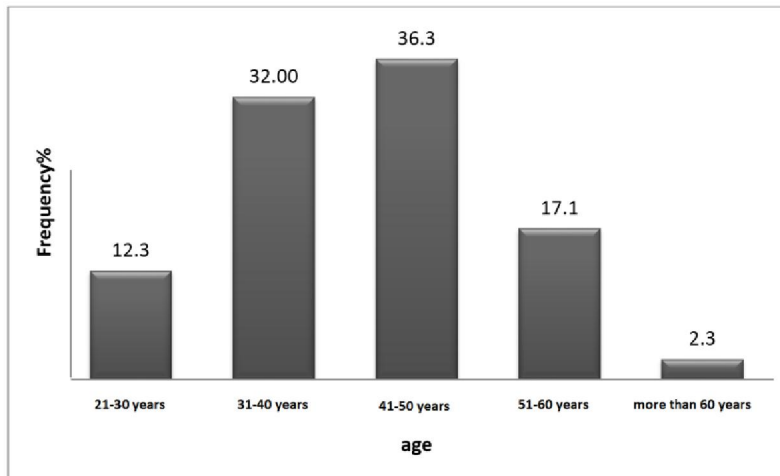


Figure 2. Evaluation of participants in the research differentiated by age

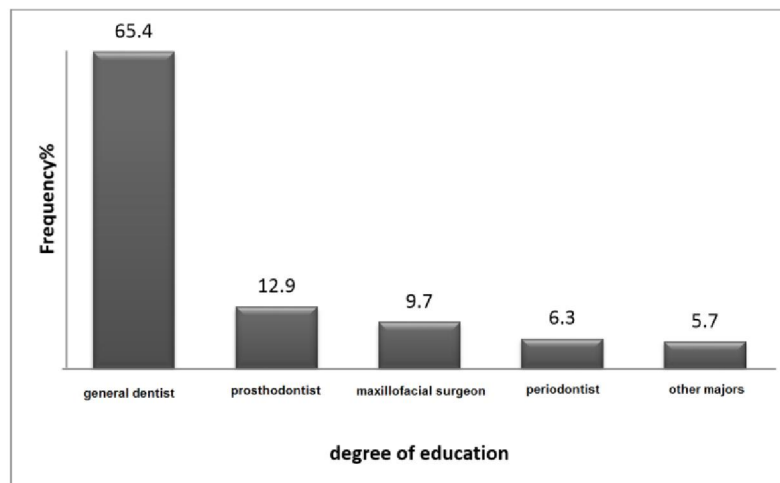


Figure 3. Evaluation of participants in the research differentiated by degree of education

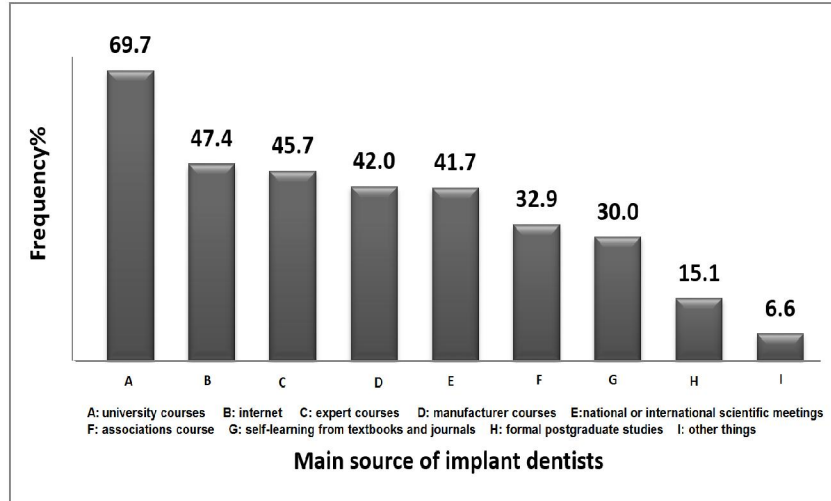


Figure 4. Evaluation of participants in the research differentiated by major source of training

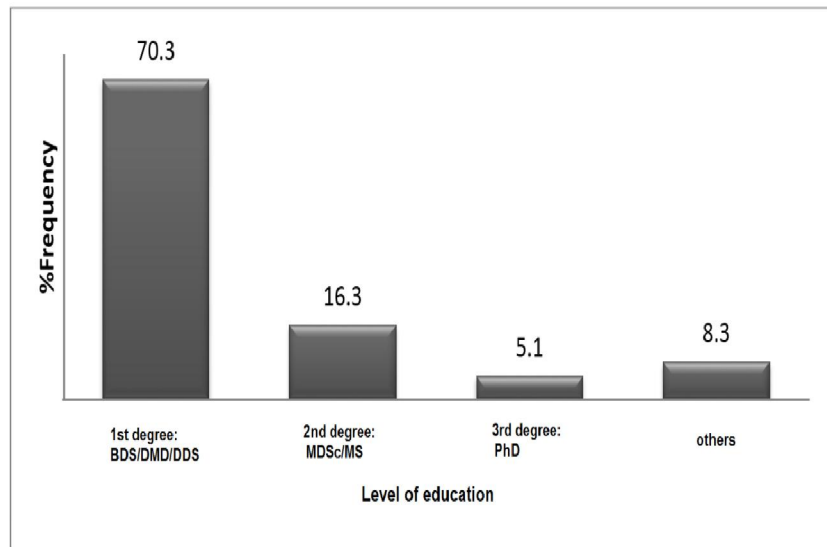


Figure 5. Evaluation of participants in the research differentiated by level of highest education

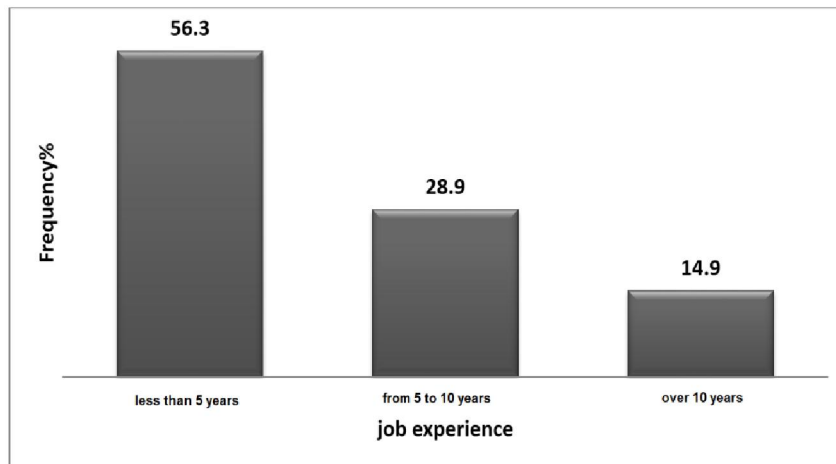


Figure 6. Evaluation of participants in the research differentiated by the number of implant system

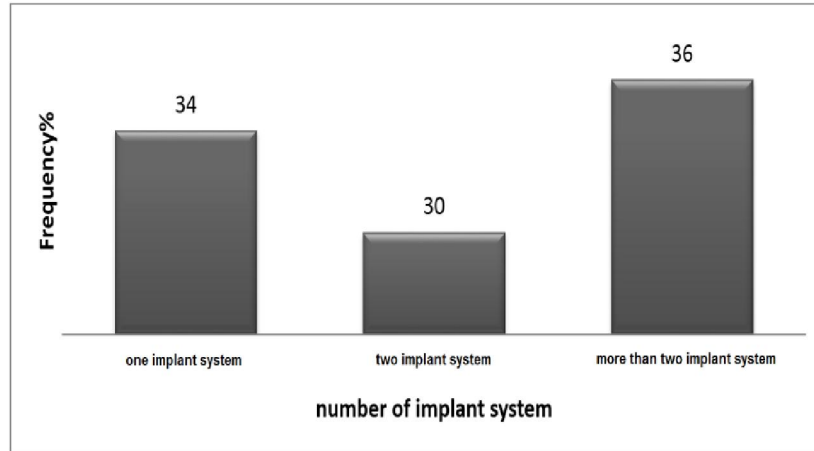


Figure 7. Evaluation of participants in the research differentiated by the number of implant system

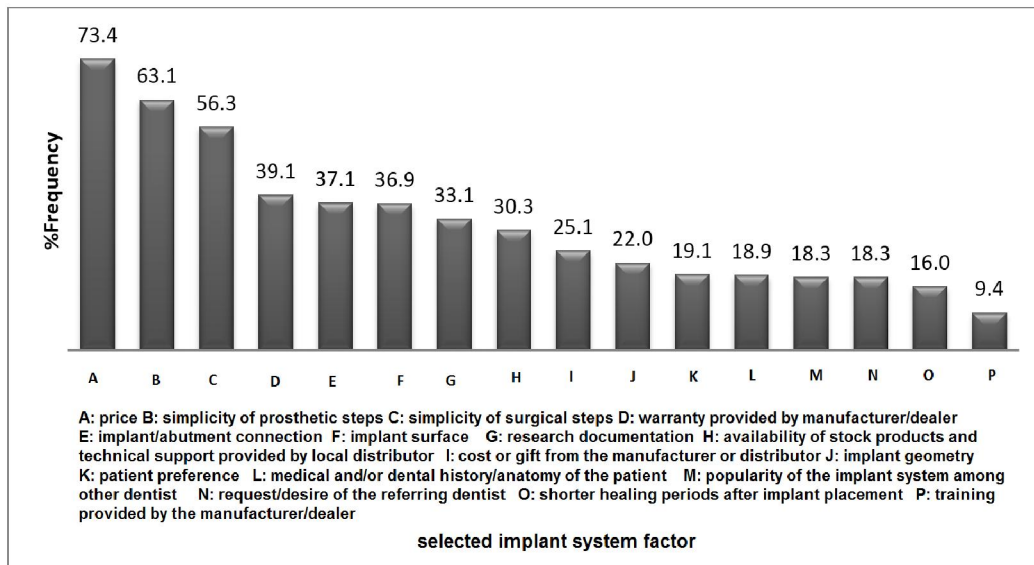


Figure 8. Evaluation of participants in the research differentiated by indicators of quality

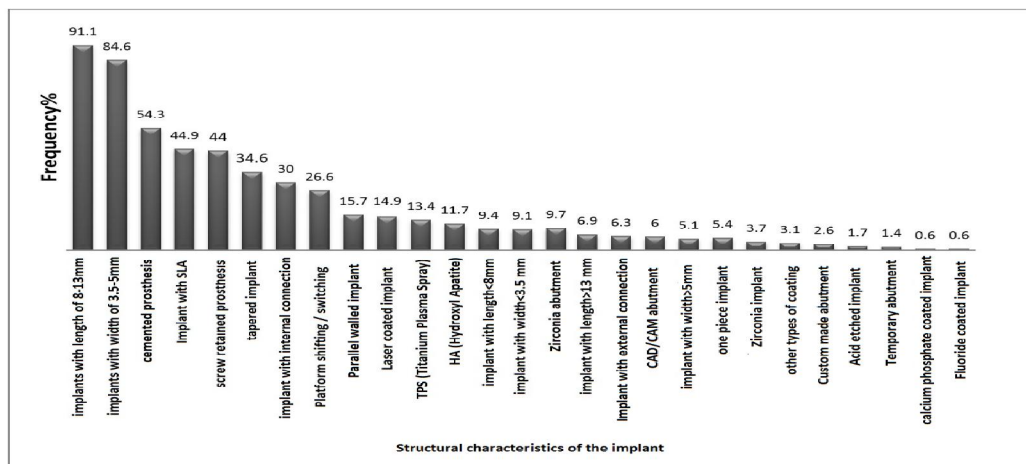


Figure 9. Evaluation of participants in the research differentiated by structural characteristics of the implant

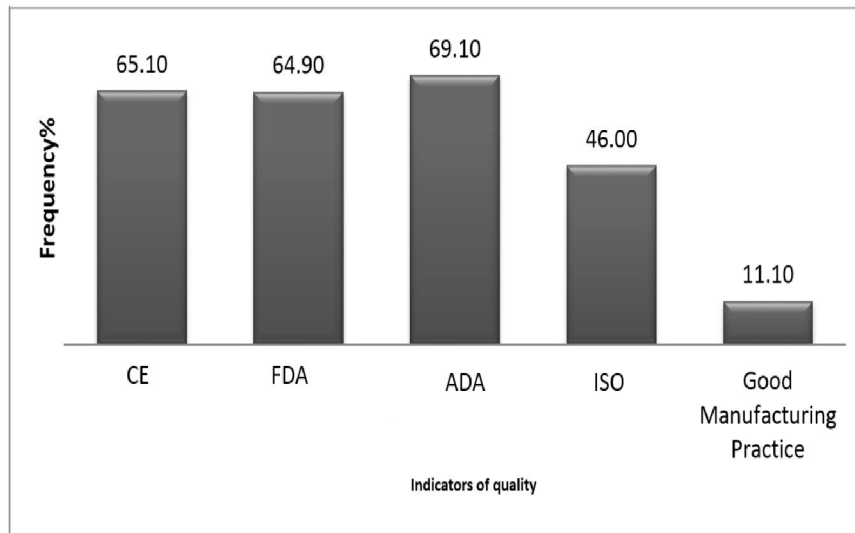


Figure 10. Evaluation of participants in the research differentiated by indicators of quality

4. Discussion

In this study, with sample size of 350 Dentists, we have tried to standardize questions, and finding the selection criteria for implant treatment among Iranian dentists. Results of the study were demonstrated, most dentists participating in the study were male 268(76.6%) and 229(65.4%) general dentists. Dentists' age range was from age 41 to 50 mostly (36.6%) and in second place was the age group of 40 to 31 years (32%). Most years of practicing dentistry were less than 5 years (56.3%) which shows majorities of participant in the study were young.

Answering to the asked main source of the implants question, about 70 percent have chosen university courses which were significantly different from other resources and it was compliance with the new designed implant topics for surgical and prosthetic courses in recent years versus young people's occupation in terms of Implant Dentistry. Internet and expert courses resources were also ranked in the next stages.

There is a significant relationship between number of used implant systems and dentists' educational level ($P = 0.000$). It shows experts use a variety of implant systems in comparison to general dentists. In addition, between age of dentist and number of used implant systems, significant relationship was showed ($P = 0.000$); this means that dentists who are younger than 50 years are more likely to use multiple systems. Graduate Level of dentists and number of used implant systems show significant relationship ($P = 0.000$); as oral and maxillofacial surgeons, prosthodontics and periodontics are more interested in variations in the number of implant

systems to general dentists and other professionals. Between the years of experience in field of dental implants with implant systems that uses, significant relationship has been seen ($P = 0.000$) so that increasing experience in dental implant systems lead to more interest in the diversity of number of implant systems.

Kronstrom et al. (2000) evaluated relationship between gender and decision on the treatment of Implant among Sweden dentists. He realized male dentists gave significantly greater importance to the "health" factor compared to female dentists. but in another study was showed age, sex and place of dentists don't influence in dentist on selection of implant (Pournasrollah et al.; 2015).

In this study, in term of important factors in implant selection criteria, Cost was considered the most common reason to choose implants among the participants. Dentist and patient tendency both could be effective in the importance of this factor. Simplicity of surgical and prosthetic steps was also ranked in the next stages.

Other studies consider the disease of patients as an important factor for decision making in implant. The most common cause of not using implants is uncontrolled diabetes which effect dentist decisions about the implant surgery so that rehabilitative considerations for dental implants in the diabetic patient is a must (Haghighat et al.; 2009).

Implant design and surface texture, quality and quantity of bone, surgery and other considerations play an important role in implant survival and implant success. Lots of studies about diameter and length of implant has been shown huge impact on the primary

stability, placement, and removal torque values of dental implant (Yadav et al., 2016).

Ting et al. (2015) in a meta-analysis study said that the location, length, and surface of the wide-diameter implant did not change its survival so choosing a wide-diameter implant in the posterior mandible or maxilla, where implant length may be restricted by nerve or sinus, using short implant regardless of its surface would not affect survival.

In this study the parameters of the implant with length of 8 to 13 mm and a width of 3.5 to 5mm, cemented prostheses and implants and prostheses with SLA (sandblasted large gritted acid etched) level have significant difference with the other factors mentioned early.

Horiuchi et al. (2000) suggested that implants should be at least 10 mm long to guarantee a high survival rate. Chiapasco et al. (2001) proposed that it is better to use implants more than 14 mm in length and more than 4 mm in diameter.

At least 3.25 mm in diameter is necessary to guarantee acceptable implant strength and most implants are about 4 mm in diameter (Lee et al.;2005) increasing diameter will make greater percentage of bone contact by increasing surface area of the implant. In a study showed that increasing diameter in a 3mm implant by 1 mm would increase surface area by 35% over the equal length in whole surface (Misch, 2007).

J. M. Mahon et al. (2000) show increasing implant diameter would decrease abutment strain for a given load; in another word an implant will improve strength and resistance to fracture by increasing implants diameter.

Increasing implant diameter will reduce crestal strain to 3.5-fold, increasing length will make a reduction to 1.65-fold, while taper increased crestal strain, in narrow and short implants to 1.65-fold. All Diameter, length, and taper have interactive effects on crestal bone strain. If It is to minimize peri-implant strain in the crestal alveolar bone, a wide and long, un tapered implant is the best selection. Narrow and short implants with taper in the crestal region must be avoided, mainly in low dense bone (Petrie et al.; 2005).

In a study, effects of implant surface roughness on bone response and implant fixation was investigated and relationship of push-out strength and surface roughness as well as the bone-to-implant contact with surface roughness was reported (Shalabi et al.; 2006).

There exists significant relationship between years of dentists' implant experiences with factors in selection criteria for implant ($P = 0.046$); so that, for people who have more than 5 years of experience in the field of implants, cost factors, implant level and the geometry of the implants have higher priority than any

other factor. But dentists, who are under 5 years of implant experience, give priority to easy steps in surgery, prosthetics and cost of dental implants.

5. Conclusion

This survey, completed by 350 dentists, showed that implant treatment is common, but there was great variation among the respondents regarding amount of treatments performed, design, and materials used for the implant prostheses. Providing an adequate education about selecting dental implants maybe change the attitude towards them.

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