INTRODUCTION

Within the last few years, it seems that dentistry has recorded its most remarkable progress and dental implantology emerging as a contemporary and essential component of dentistry around the globe. Dental implants use the process of Osseointegration to be fixed in the jaw bone and a large number of clinical studies support their long term prognosis. Using dental implants avoids the biological complications associated with fixed partial denture that requires adjacent teeth to be prepared and serve as an abutment for the bridge, since it may lead to a long term poor prognosis.

With increasing demands of the patients for implant supported prostheses, dental practitioners dealing with this field of dentistry have to face with patients' high expectations concerning excellent esthetics and function. In addition, a dental practitioner's knowledge and attitude towards the treatment can influence the treatment planning and ultimately the oral health of an individual. The Dental practitioners...
play a vital role in educating the patients regarding their treatment needs, thus, it is essential for them to have an ample knowledge about dental implantology. In a study by Rathod et al in 2017, it was found that the knowledge and attitude of dental practitioners was limited, and it was concluded that the dental education programs could be helpful to update the knowledge regarding dental implantology.

Furthermore similar results were found by other studies including Sheth et al and Dhami et al in which general practitioners had limited knowledge and majority showed an increased desire for knowledge in the field of implants and welcomed the suggestion of introducing implantology as a separate subject in the BDS curriculum. Moreover, till now only one study evaluated the knowledge of Dental implants amongst the dental practitioner at the national level which also showed limited knowledge and awareness about dental implants.

To the best of authors’ knowledge there is paucity of information regarding the perception and knowledge of dental implants in dental practitioners of Pakistan. Therefore, the present study was executed with the chief aim to assess the knowledge, attitude, and practice of dental implants among dental practitioners of Karachi, Pakistan.

**METHODOLOGY**

This cross-sectional study was conducted with informed consent, from May 2019 to October 2019. The study was approved by ethics and review committee of AIDM/EC/05/2019/15. Both male and female dental practitioners inclusive of all ages, who were currently practicing were included in the study. All those having a clinical postgraduate qualification were excluded. The sample size was calculated with Open-Epi software. Considering (55%) prevalence of knowledge amongst dental practitioners. The estimated sample size at 3% margin of error and 97% confidence interval was n = 667 dentists for considering the 30,000 population. The figure achieved was later overestimated to 800 participants, to attain maximum responses.

A well-structured questionnaire comprising of knowledge and attitude based questions was distributed among the dental practitioners of different dental colleges of Karachi, Pakistan. The questionnaire was divided into two sections. Section one included the demographic details. Section two was comprised of 15 close ended questions regarding Knowledge, Attitude and Practices of the participants towards dental implants. The validity of the questionnaire was checked with Cronbach’s Alpha ( = 0.7). Responses were collected through both, the hard copy and an online google form link.

SPSS-25 was used for analyzing the data and descriptive analysis was performed to determine the mean, standard deviation, frequency and percentages. Spearman correlation test was used to find the relationship of gender with knowledge, practice and attitude level of participants. The P ≤ 0.05 was considered statistically significant.

**RESULTS**

In this study, out of 800 distributed questionnaires, 752 were included. 48 questionnaires were excluded based on partially filled status and repetition of response. The total number of dental practitioners targeted was 752 out of which 204 (27%) were males and 548 (73%) were females, with majority 717 (95.3%) belonging to age bracket of 22-31 years. 631(83.9%) were graduates, 121(16.1%) were postgraduate trainees. The results were determined, and it was found that 609 (80.9%) dental practitioners were well aware of the appropriate material (Titanium) of a dental implant. 436 (57.9%) had knowledge about all the types of implant. 421 (55.9%) of the dental practitioners were aware of the screw-shaped dental implants, however only 228 (30.3%) knew about the various surface modifications, as shown in (Table I).

**Table I: Responses regarding the Knowledge of Participants (n=752)**

<table>
<thead>
<tr>
<th>Implant Material</th>
<th>Implant Type</th>
<th>Implant Shape</th>
<th>Surface Texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions</td>
<td>%</td>
<td>Questions</td>
<td>%</td>
</tr>
<tr>
<td>Titanium</td>
<td>405 (53.8%)</td>
<td>Abutment</td>
<td>251 (33.5%)</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>68 (8.8%)</td>
<td>Sub-perforated</td>
<td>36 (4.8%)</td>
</tr>
<tr>
<td>Cobalt</td>
<td>0 (0%)</td>
<td>Endoosteal</td>
<td>28 (3.7%)</td>
</tr>
<tr>
<td>All</td>
<td>473 (62.8%)</td>
<td>All</td>
<td>328 (43.5%)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>0 (0%)</td>
<td>Don’t know</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

346 (46.1%) dentists were well aware of all the possible implant placement approaches. Out of all the participants, 371 (49.3%) believed the distance between two dental implants to be 3mm and distance between a dental implant and a natural tooth to be 1.5mm as presented in (Table II).

**Table II: Responses regarding the Knowledge of Participants (n=752)**

<table>
<thead>
<tr>
<th>Implant Loading</th>
<th>Distance between Implants</th>
<th>Distance between implant and natural tooth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions</td>
<td>%</td>
<td>Questions</td>
</tr>
<tr>
<td>One stage</td>
<td>45 (5.9%)</td>
<td>1 mm</td>
</tr>
<tr>
<td>Two stage</td>
<td>331 (43.9%)</td>
<td>2 mm</td>
</tr>
<tr>
<td>Immediate restoration</td>
<td>24 (3.2%)</td>
<td>3 mm</td>
</tr>
<tr>
<td>All</td>
<td>346 (46.1%)</td>
<td>4 mm</td>
</tr>
<tr>
<td>Don’t know</td>
<td>91 (12.1%)</td>
<td>Don’t know</td>
</tr>
</tbody>
</table>

The Table III showing that more than 88% of the dentists said that implant supported prostheses have better aesthetic
and functional efficiency though they believed that it needs more oral hygiene maintenance. n=573 (76%) of the dentists claimed that dental implants have certain biological and technical complications. Whereas 510 (67.8%) knew about the Branemark's theory of osseointegration as described in (Table III).

Table III: Responses regarding the Knowledge of Participants (n=752)

<table>
<thead>
<tr>
<th>Aesthetic restoration</th>
<th>Functional restoration</th>
<th>Hygiene maintenance</th>
<th>Biomechanical failures in implants</th>
<th>Branemark's protocol of Osseointegration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>667 (88.0%)</td>
<td>88 (11.2%)</td>
<td>644 (85.9%)</td>
<td>88 (11.8%)</td>
<td>510 (67.8%)</td>
</tr>
</tbody>
</table>

Regarding the attitude of dental practitioners towards a dental implant, only 218 (28.9%) received implant hands on trainings. 223 (29%) felt competent enough to place an implant and 668 (88.8%) were the ones who attended lectures on dental implants as mentioned in (Table IV).

Table IV: Responses regarding the Attitude of Participants (n=752)

<table>
<thead>
<tr>
<th>Implant lecture attended</th>
<th>Competency to place an implant</th>
<th>Implant hands-on received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>668 (88.8%)</td>
<td>88 (11.2%)</td>
<td>223 (29.0%)</td>
</tr>
</tbody>
</table>

No significant relationship was found between gender with knowledge and attitude of participants regarding dental implants (rho =0.016), (p= 0.939).

Though significant relationship was found between knowledge and attitude of participants regarding dental implants (rho =0.9), (p= 0.025).

DISCUSSION

Literature reveals that conventional methods like removable dentures failed to satisfy the patients. But now, with dental implants, missing teeth can be replaced with substantial, comfortable and aesthetically pleasing artificial alternatives.14-17 According to our study, 81% of dental practitioners assured that titanium is the best material which is in accordance with Parr et al, which states that titanium is extremely stable when used in human body.18 Although Titanium has been widely used in dentistry as it is biocompatible and has excellent mechanical properties, the incidence of hypersensitivity and allergic reactions is still unknown.19 Furthermore, various dental implant types, body designs and surface modifications have been reported in the literature.1,8,15,19 In this study, 57.9% had knowledge about all the types of implant. 55.9% of the dental practitioners were aware of the screw-shaped dental implants, however only 30.3% knew about the various surface modifications.

Around 49.3% of the dental practitioners opted 3mm as inter-implant distance and 1.5mm as normal distance between a tooth and an implant. Whereas in a research carried out by Ramanaurkaite, A. et al, in 2018 states that the normal inter-implant distance can be from 2mm to 4mm depending on the reference points.20 Similarly, Jose et. al in 2004 concluded that the average distance between two implants and the average distance between an implant and a natural tooth range from 3mm to 4mm. The research we carried out among 752 dental practitioners, only included the horizontal distance between two dental implants, unlike, the research carried out by Jose et. al, who focused not only the horizontal distance but also the vertical distance and lateral spacing.21

Taking the bio-mechanical failure of a dental implant into consideration, 76.3% of our dental practitioners reflected that an implant can surely have certain biological and technical complications if a proper diagnosis is not made and the proper technique is not used. Similarly, in a study by Liaw, K. et al, stated that with increased use of dental implants comes an increased risk of complications, given the fact that an implantologist should be able to diagnose and recognize the complications.22 Likewise, a study done by Porter Ja, et al, on success and failure of implant showed that, there are certain primary predictors, pre and post operatively, that lead to the failure of implant. Thus, admitting the fact that loading a dental implant can surely have bio-mechanical complications.23 Another study focused on the complications associated with dental implants, i.e. mechanical complications (screw loosening, screw fracture, cement failure), technical complications (fracture of veneering porcelain, fracture of the framework in implant-supported fixed partial dentures) and biologic complications (adverse soft tissue reactions, sensory disturbances, progressive marginal bone loss, loss of integration).24

It was suggested by 88.2% of our respondents that the patients who received an implant should be more keen in maintaining their oral hygiene, this is in harmony with the study carried out by Arati Sharma et al, where 58.4% candidates also felt the need to follow oral hygiene protocols by people with implants in their oral cavity.25

Assessing the knowledge on the basis of implant training received, we deduced that 29% of our candidates received hands-on trainings, whereas in a survey carried out by Vickie et al, in 2004 suggested that 86% of their respondents had received the training, revealing how the knowledge and attitude changed if implant dentistry curriculum was introduced as a predoctoral program.26 Regarding the competency to place an implant we concluded that 29.6% of our respondents felt competent enough to place an implant whereas in a study published by D. J. Schonwetter, stated that many of their respondents did not feel confident enough to place an implant because the respective field was given the least importance as a learning criteria.27 This is supported
by a study conducted in various dental institutions in Pakistan regarding oral implantology education which concluded that Implant education has been introduced in most institutions during past 5-10 years only and topics such as implant prosthetics, bone regeneration and grafting are not adequately covered in implant curriculum.\(^2\) Although majority of respondents in this study (73%) were females but there was no significant relationship found between gender with knowledge and attitude regarding dental implants; this was in line to a cross sectional study in which no significant effect of gender could be highlighted, however male respondents predominated (54.6%). However, it has been reported that dental practitioners with implant training have an edge over those with no professional training, as it enhances the knowledge with a positive attitude and practice of dental implants.\(^2\)

Since this is an era of social media and implantology is an emerging field of dentistry with widespread awareness amongst the general population, there are several aspects that need to be worked upon on part of dental professionals themselves so that better health-care services could be provided to the masses.

**LIMITATIONS OF THIS STUDY**

This study doesn’t provide an insight regarding awareness of the distance of a dental implant to the other vital structures in oral cavity (like maxillary sinus, inferior alveolar canal, etc). Taking implant loading into consideration, one should be well aware of all the parameters which could lead to its success and failure. Future research with a larger sample size could be focused on pre-treatment evaluation and predictors of success and failure to overcome the knowledge gap.

**CONCLUSION**

This study describes that dental practitioners had an appropriate knowledge of each aspect of implantology. Moreover despite the fact majority felt that they are not competent enough to practice it. Therefore, the curriculum, teaching standards and methods regarding dental implants need reconsideration, exposures to hands-on workshops are necessary for the graduates and also for undergraduate students during their clinical learning.

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**CONFLICT OF INTEREST**

The authors declared no conflict of interest

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