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Research Article

Criteria of Choice of Dental Implant Systems among Tunisian Dentists

Sarra Nasri[1]*, Ines Azouzi[3], Sabra Jaâfoura[2], Yosra Gassara[1], Dalenda Hadyaoui[1], Zohra Nouira[1], Jilani Saafi[1], Belhassan Harzallah[1] and Mounir Cherif[1]

[1]Fixed Prosthodontics Department, Faculty of Dental Medicine, University of Monastir, Avicenna Avenue, Monastir, Tunisia

[2]Department of Dental Biomaterials, Faculty of Dental Medicine, University of Monastir, Avicenna Avenue, 5000 Tunisia

[3]Laboratory of Dento-Facial, Clinical and Biological Approach (ABCDF) LR12ES10, University of Monastir, Avicenna Avenue, Monastir, Tunisia

***Corresponding Author:** Sarra Nasri, Fixed Prosthodontics Department, Faculty of Dental Medicine, University of Monastir, Avicenna Avenue, Monastir, Tunisia.

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Abstract

Introduction: This study has for purpose to report a comprehensive description of dental implant system selection criteria among a sample of dentists practicing implantology in Tunisia.

Materials and Methods: A questionnaire was developed and sent to 120 dentists independently of their specialty. Responses were compiled and analyzed using the SPSS 21 Software.

Results: Among 120 questionnaires distributed, we had 94 responses. Practically, half of the sample was composed of general practitioners. Clinical track record was the most important factor (86%), in addition to brand image (61, 16%). The compatibility with CAD/CAM system used in laboratory and technician's recommendations were the least important.

Conclusion: according to the results of this survey, most respondents agreed on the importance of clinical track record, the variety of implant dimensions and prosthetic accessories proposed, and the type of implant/abutment connection in addition to scientific evidence available on implant systems.

Keywords: Oral Health Surveys; Dental Implant; Implant System

Introduction

Implantology, nowadays, is the solution of choice to replace missing teeth. The majority of clinical studies published in recent years report a success rate up to 95% [1,2].

Consequently, dentists are increasingly aware of the importance of mastering this therapeutic procedure.

Despite the practical skills learned and the theoretical education received, the majority of dentists remain confused in front of the huge number of implant systems availabale. Each firm puts forward multiple implants with different micro and macrostructural properties [2,3].

The aim of this work was to describe the criteria that Tunisian dentists refer to when selecting an implant system, and to guide the young dentist planning to take up dental implant surgery.

Materials and Methods

A descriptive cross-sectional study was conducted. It consists of a KAP survey (Knowledge- Practice and Attitude).

A simple questionnaire (Appendix.) was produced. It consists of two pages of short questions. It was distributed to a convenience sample of 120 Tunisian dentists practicing implantology in different regions of Tunisia.

In Tunisia, there is no actual census system that offers an exhaustive list of dentists who are able to perform implant procedures. So, we have established a primary list composed of our personal circle and direct acquaintances.

Then, in order to complete our list, we reported to tunisian dental forums and groups in social networks. Questionnaires were handed out to participants while respecting the anonymity of the respondents.

The questionnaire was written using the Google Form Tool available on the Google Drive Application. It consisted of two parts. The first part included 11 questions regarding the general profile of the practitioner and his/her experience in implantology.

The second part consisted of a table of eight criteria with four Lickert Scale Response items : « not important », « not very important », « important » and « very important ».

This table was followed by six questions with binary answers (Yes/No) and a free question concerning the choice of the type of implant/abutment connection.

The questionnaire was validated by three dentists outside the study.

The dissemination of the questionnaire began with close acquaintances by email or through the social network «Facebook®». Copies were also printed and distributed.

We sent out 120 questionnaires in total. Twenty copies were printed and hand-delivered. The results were then entered and processed with SPSS 21 software (IBM Corporation).

Results

Our study is a descriptive cross-sectional study.

Out of 90 questionnaires sent by digital messaging tools (Mail, Messenger), we obtained 82 responses. As for the hand-to-hand distribution, we distributed 30 questionnaires, and we had 16 responses. Four responses were eliminated because of blanks.

That left us with a sample of 94 dentists practicing implantology.

Our sample was predominantly male with a percentage of 53.2% men and 46.8% women. The age of our sample ranged from 27 to 58 years with an average of 37 years and a mean age of 36 years table 1.

Age (years)	< 35	>35	Average value	Mean value
Group headcount	50	44	37	36

Table 1: Distribution of the sample according to age.

Our sample was varied. It was made up of general practitioners, specialists in oral surgery, periodontists and prosthodontists. The majority were general practitioners accounting to 52.1% figure 1.

The participating dentists operated in 12 different governorates of Tunisia (Tunis, Mannouba, Nabeul, Sousse, Monastir, Gabes, Sidi Bouzid, Béja, Medenine, Kairouan, Siliana, Jendouba, Mahdia).

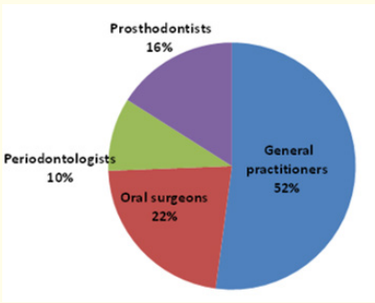

Figure 1: Distribution of the sample according to speciality.

Our sample consisted of practitioners practicing for less than 5 years (58%), between 5 and 10 years (25%), between 10 and 15 years (12%) and over 15 years (5%). There is a predominance of practitioners practicing with a five-year experience reaching 58%.

According to our study, 48% of the practitioners questioned placed more than 15 implants per year.

The systems used by our sample were indeed varied, with a preference for these systems: Osstem®, Eurotechnika®, and Easy implant® with 35.1%. Nevertheless , it should be noted that a large number of practitioners used two or even three different systems in their practice (Figure 2).

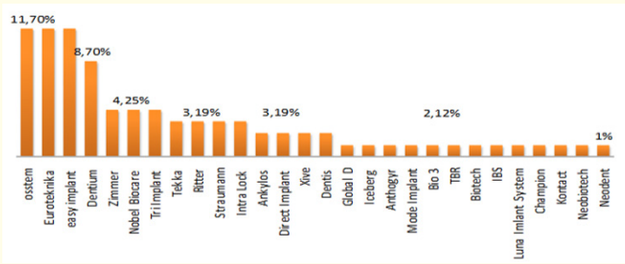

Figure 2: Implant systems used by dentists of our sample.

We asked participants about eight criteria for choosing implant systems and the suggestions were coded according to the Lickert scale : "not important", "not very important", "important" and "very important". figure 3.

The clinical follow-up was considered very important for 50% (N = 47) of the practitioners questioned. While recommendations from the lab technician were deemed unimportant for 45% (N = 42) of practitioners.

We asked the participants whether they had received a university or private training in implantology and the answers were as follows

- Concerning university complementary learning, most of them (N = 55) answered yes with a percentage of 58.5%.

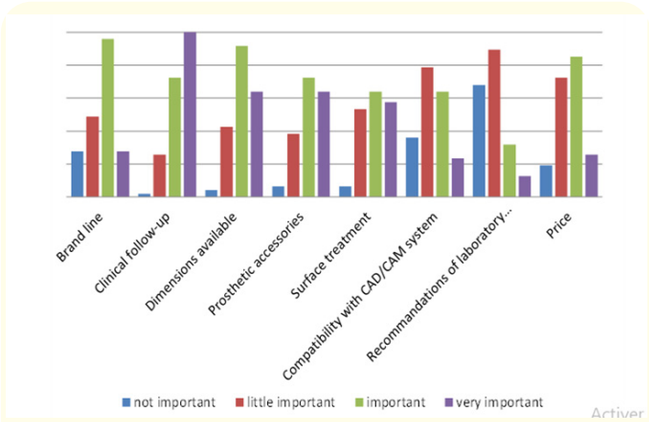

Figure 3: The criteria of choice of dental implant system.

- However, a greater number of practitioners (N = 84) affirmed having followed associative training in implantology with a percentage of 89.4%.

We asked participants if they had the habit of checking the type of implant/abutment connection before choosing an implant system and 83% answered "yes" while 17% answered "no".

Then we asked what type of connection they preferred. Several types of connections were mentioned but the internal connection was the most popular with 65%.

Then we asked binary answer questions (yes/no) and we got the following answers

- About choosing the same system for a plural or single prosthesis : 75.5% answered "yes".
- About using the same system for a screw-retained or sealed prosthesis : 77.7% answered "yes".

Finally, we ended by asking the practitioners if they regularly consult the published scientific data on implant systems and 79.8% answered positively.

Discussion

Ours is a KAP study. This acronym stands for « Knowledge, Attitudes and Practices ». This type of study is a strategic tool when it comes to assessing the educational need of a specific target in relation to their skills. Indeed, the appropriate or inappropriate practices of a population arise from correct or erroneous attitudes resulting from the level of knowledge on the phenomenon studied [4,5].

Our sample consisted of a small number of dentists practicing implantology but with a varying profile. We had received 94 responses. So, we had a response rate of 78.33%.

The number of general practitioners was predominant with a percentage of 52.1%. Accordingly, the practice of implantology is not the exclusive domain of specialists.

In 1996, Watson [8] found that 65% of general dentists practiced implantology. In Tunisia, studies are lacking on the number of implantologists.

The implantology experience of our practitioners ranged from less than 5 years to more than 15 years. So, our sample takes into account beginners and experienced implantologists..

We listed 24 implant systems used by our practitioners which is a large number considering the smallness of the sample. The most popular systems were Osstem®, Eurotecnika® and Easy Implant® with a percentage of 11.7% each. The presence of reputed international trade marks such as Nobel Biocare®, Zimmer®, Straumann® was noted but with a low percentage. We noted the presence of French systems (TEKKA®, TBR®, Global D®), American systems (Ritter®), German systems such as Xive® and Megagen® from Dentsply-Maillefer. Turkish systems such as Mode implant® and Korean systems such as Osstem® and Luna® were also mentioned by the dentists in our sample.

Some practitioners claimed to have used more than one system. We can conclude that one system is not enough to meet their expectations.

The dentists participating in our study had benefited from post-university training.

In comparison with other countries such as France, postgraduate training courses are really lacking. So private training cycles present another learning opportunity. On the other hand, a general practitioner can collaborate with a specialist colleague, who is more experienced in implantology. Many corresponding surgeons can help beginners by introducing them to implantology. This procedure is known as «companionship». In some countries such as France, it is law-organized and ultimately based on the spirit of imparting knowledge.

By studying the responses of colleagues to the criteria for choosing implant systems, certain trends may emerge despite the small size of the sample.

We observed that 50% of the practitioners affirmed that the brand image is an important element to consider and 13.8% as an unimportant element. When a medical device is used for its patient, practitioners generally tend to approach the manufacturer who has a good reputation in the market with a proven clinical track record.

Regarding clinical follow-up, 50% saw it as very important and only 1% considered it not important.

The results concerning the range of dimensions and the variety of prosthetic accessories offered by the manufacturer show that these two criteria are very important to take into account. Respectively, 45.7% and 36.7% of dentists of our sample rated these criteria as important, and 31.9% as very important.

In fact, there are no standard solutions for all clinical situations, so we need a system that offers a wide variety of sizes. Regarding prosthetic accessories, it is important that the chosen system ensure the simplicity of the prosthetic steps. In the study of Ng., *et al*. [9] carried out in 2006 on a sample of dentists from Hong Kong, the convenience of prosthetic steps, in addition to the simplicity of the surgical phase, were the most determining factors.

On the market, there are several types of implant surface treatments produced by several manufacturers; all claim that their systems give better clinical results. The surface condition of implants plays a mechanical role in primary stability in addition to a biological role. However, Esposito., *et al*. [10] studied the survival rate of implants according to their surface treatment and they found a high success rate for all surfaces studied.

As for the compatibility of the implant system with the CAD/CAM system available on the market, 39.36% considered it as not very important.

Indeed, several manufacturers now offer abutment systems machined by CFAO. For example, Procera (Nobel Biocare, Yorba Linda, CA) has machined implant abutments in its CAD/CAM component line [11].

In the study by AL Wahadni., *et al*. [6], approximately two-thirds of practitioners had previously used machined abutments. According to Nazarian [12], this technique has multiple advantages for the clinician and for the dental technician. For example, cases of complex restorations with several implant-supported prostheses require great precision of parallelism to ensure the principle of passivity [13].

The machining, fitting and polishing qualities vary according to the CAD/CAM processes used. It seems reasonable to choose implant and machining system of the same firm when possible, in order to optimize and ensure the reliability of the parts produced.

The recommendations of the dental technician are "not very important" according to 44.6% of the practitioners questioned and " not important" at all for 36% of them.

Dentists in our study claimed to be independent of the laboratory technician in the choice of their implant system. However, since he ensures an important step in the implant treatment plan and handles certain accessories such as analogs or abutments, his opinion concerning a system can only be of some importance.

It is therefore recommended to work as a team with the laboratory technician.

Concerning the price of the proposed systems, a divergence of opinions was observed with 36.17% considering it as not very important and 44.2% as important. These results were the same as those of Al Wahadni's study which described that 47.3% considered it an important choice criterion [6].

Then we asked the practitioners if they had checked the types of implant/abutment system connections they were using and 83% answered yes.

Most respondents (75%) said they preferred the internal connection.

Indeed, external connections were used first in implantology. But, in the long run, several complications such as incidents of unscrewing of the abutment, fracture as well as micro-movements at the implant/abutment interface, were revealed [14]. Since their inception, internal connections have proven their effectiveness and all implant manufacturing companies have adopted this type of connection.

It is widely accepted in the literature that "platform switching" preserves peri-implant tissues. The degree of marginal bone resorption was inversely proportional to the degree of shift in the implant/abutment gap [15].

Since their appearance, this type of connection has therefore gained popularity among manufacturers of implants. In our sample, only 4.2% used this type of connection despite its countless advantages. This goes against the study of Cheung., *et al*. [16] carried out in Hong Kong in 2016, which noted that 86.3% used «platform switching».

When we asked participants if they generally used the same system in plural fixed prostheses as in single tooth implants, 75.5% answered yes. However, plural prosthetic reconstructions require more precision. Therefore, a preliminary study on the suitability of one system or another to meet the requirements of these complex cases, must be carried out.

According to our study, 77.7% of participants claimed to use the same system for a screw-retained or sealed prosthesis.

Meta-analyzes [17,18] attribute more biological complications with the sealed prosthesis and more mechanical complications with the screw-retained prosthesis. Mechanical complications are less serious for our patients and more easily manageable.

As for anterior implant-supported prosthesis, and in order to ensure immediate esthetics, the chosen system should offer temporary prosthetic abutments. These temporary abutments offer an economical modality that can be easily adjusted at the same session of implant placement [19]. In addition, they provide soft tissue support during the healing period [20].

On the other hand, with the introduction of zirconia in implantology, some firms propose aesthetic zirconia abutments or even zirconia implants [21].

We also asked if the participants regularly consulted scientific publications on the different implant systems, 79.8% answered yes. This is of great importance since clinicians must assess the strength of the scientific evidence related to the system they choose to use, even if the latter have already obtained the certificates of acceptance (FDA, ADA, ISO, THIS). Indeed, several implant systems accepted by the authorities lack clinical documentation [22].

This study has some limitations to note. First, the sample is narrow. In addition, there is a selection bias due to the way in which the questionnaire was distributed. Out of curiosity, practitioners who do not practice implantology can answer this questionnaire once it is posted on social networks. Therefore, we tried to send it by email or private messaging before posting it.

Our study focused on several criteria for choosing implants, but it was not exhaustive. Other important criteria related to the general condition of the patient, the services offered by manufacturers such as free training or others, could have an impact on the choices of the dentist.

Conclusion

Nowadays, we can enumerate dozens of implant systems proposed by manufacturers. Everyone praises his own system.

Since, the implantation procedure engages the practitioner's responsibility in the long term, the choice of the implant system is therefore of paramount importance. Several criteria must be taken into account. Proven clinical track record and scientific proof are fundamental elements of choice according to our study. The simplicity of the surgical as well as the prosthetic phases are desirable criteria.

The prosthetic options offered by an implant system should not escape the dentist's attention as they could restrict or enrich prosthetic rehabilitation options.

A well-studied and well-established initial prosthetic project guided by future restoration, helps to determine the needs of the practitioner in terms of implants, prosthetic accessories, materials, etc.

Finally, the practitioner must choose a scalable, traceable, internationally recognized system to deal with complications that may arise in the long term.

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