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Assessment of Knowledge of Peri-Implant Diseases And Implant Maintenance Programs Among Dentists in three Implantology Centers in Khartoum-Sudan

Elaf Mamoun Abbas KhalfAllah [1]Abdalla Salih Aljabry[2]*
Department of periodontology, Faculty of Dentistry, University of Medical Sciences andTechnology- Khartoum-Sudan.

This work was carried out in collaboration between both authors. Authors E.M.A K, and A.S.A. designed the Study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author RIAM managed the analyses of the study and the literature searches. Both authors read and Approved the final manuscript.

Address For Correspondence: *Dr. Abdalla Saleh Aljabry, dean faculty of dentistry and head department of periodontology, University of Medical Sciences and Technology.*

Abstract

Background: *Dental implants are the new modalities for replacement of missing teeth. Dentists should have the basic knowledge relevant to periimplant diseases and implant maintenance programs.*

Aim*: As dental implants are becoming an important treatment for replacing teeth these days, it's beneficial for the dental practitioners to have some kind of knowledge on dental implant pathologies and maintenance programs.*

Objectives*: The main purpose of this study was to assess the knowledge of peri-implant diseases and implant maintenance programs among a sample of dentists in the state of Khartoum.*

Materials and Methods: *246 modified questionnaires were distributed to dentists working in three Implantology centers in the state of Khartoum- Sudan. Questions targeted the periimplant diseases knowledge and maintenance program knowledge. Analysis was done using SPSS version 21, by use of Chi-square test for categorical variables.*

Results*: Most of the participants included in the study were house officers. The study showed that 91.9% had moderate knowledge about peri-implant diseases and (89.4) % had poor knowledge regarding implant maintenance program. The specialists were the majority of those with good knowledge in the peri-implant diseases (16.3%). Regarding the implant maintenance program the greater part of those with poor knowledge were the general practitioners (97.3%).*

Conclusion*: Dentist's knowledge regarding peri-implantitis diseases and their knowledge of treatment and maintenance programs were average. Dentists experience has an influence in knowledge of peri-implant diseases and maintenance program, although years of experiences do not reflect the level of knowledge.*

Keywords*: Knowledge of Peri-Implant Diseases and Implant Maintenance, Dentists Khartoum-Sudan.*

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I. Introduction

In the last decade, Implantology has become an essential part of mainstream dentistry, helping dentists to improve the quality of life of their patients. While implant treatment could often be a convenient alternative to conventional treatment options, in certain cases, it is the first treatment of choice for the rehabilitation of severe functional, anatomical or aesthetic problems arising from tooth loss (1). Dental implantology is the field of dentistry that is concerned with the replacement of missing teeth and their supporting structures with artificial prostheses anchored to the jawbone. Modern implants consist of an osseous part that interacts with the bone, a transmucosal component that interacts with the mucosa and then the restoration; this can be a crown or bridge abutment, or anchors for dentures. The materials used commonly for implants include commercially pure titanium, titanium alloys or occasionally ceramic materials (e.g. zirconium dioxide or aluminum oxide). Surfaces are normally roughened (microporous) through use of surface preparation (e.g. sand blasting and acid etching) rather than being coated to increase the surface area available for osseointegration (1). Strong data of successful implant therapy for patients who receive this treatment and the increasing number of patients who depend on their dentists to contribute more decent information, measure that students graduating from dental schools should have solid knowledge and extensive intellect of the implant treatment protocol (2). Many factors

influence clinical success and longevity of implants and implant restorations, including; the patient's systemic health, implant site, type of supra-structure, biomechanical considerations, occlusal loads, and oral hygiene maintenance. Long-term success and prognosis often depends on successful management of a variety of risk factors (e.g. smoking, diabetes, history of periodontal disease, poor oral hygiene, bruxism, occlusal trauma, etc.) that may be present in each individual case. Also, there are certain complications associated with improper treatment planning, surgical and prosthetic execution, material failure, and maintenance. Included in the latter are the biologic complications of peri-implant mucositis and peri-implantitis. Both of these are characterized by an inflammatory reaction in the tissues surrounding an implant (1). Peri-implant mucositis has been described as a disease in which the presence of inflammation is confined to the soft tissues surrounding a dental implant with no signs of loss of supporting bone following initial bone remodeling during healing. Peri-implantitis has been characterized by an inflammatory process around an implant, which includes both soft tissue inflammation and progressive loss of supporting bone beyond biological bone remodeling (1). From a clinical standpoint, signs that determine the presence of peri-implant mucositis include bleeding on probing and/or suppuration, which are usually associated with probing depths ≥4 mm and no evidence of radiographic loss of bone beyond bone remodeling. However, when these same parameters are present with any degree of detectable bone loss (for example radiographic radiolucency) following the initial bone remodeling after implant placement, a diagnosis of peri-implantitis is made (1). Studying the prevalence of peri-implant diseases is of critical importance for the progression of dental implant maintenance programs and to set up prevention and treatment protocols. One of the major disagreements in the study of peri-implantitis prevalence is the description of peri-implant diseases itself. Due to this disagreement the literature for the prevalence of this inflammatory condition varies from author to author. For example in Brazil, Ferreira et al stated that peri-implantitis prevalence to be 7.44% at implant level and 8.9% at patient level. While, Roos Jansaker et al reported the prevalence of peri-implantitis to be 16% of patients and 6.6% of implants. In 2012, Albrektsson et al concluded that peri-implantitis prevalence statistics for modern implants were less than 5%. But then Atieh et al recently justified that a summary of systematic review estimates the frequency of peri-implantitis to be 18.8% of patients and 9.6% of implants (3). Practical maintenance of implant patients r equires a well-organized recall system with appropriate manpower (4). The protocol for the maintenance of dental implants is a topic of much formal discussion and recorded research. There are two components for the maintenance of dental implants; home care and office care. The common threads for home care aids are; tooth brushing, home irrigation systems, floss, and interdental picks and brushes. The tooth brush used should be soft or extra soft to provide satisfactory breakup of the biofilm surrounding the dental implant, as well as being a means of cleaning safely. Irrigation systems are best provided that they are non alcoholic. The common threads for office care aids are: visual inspection, debridement of hard and soft deposits, scalers and curettes, and final polish. It is better to use plastic or carbon-tipped scalers to protect the implant surface from damage (5). As more dentists are starting to place dental implants in Sudan, it is essential to establish clear guidelines regarding knowledge and maintenance programs of dental implants among dentists so as to get an acceptable success rate.

Justification: Dental implants are becoming an important and ideal treatment for replacing missing teeth; therefore, it is beneficial for the dental practitioners to have some kind of knowledge on dental implant pathologies and maintenance program. Lack of knowledge of peri-implant diseases and important maintenance instructions following implant treatment that should be given by dentists, could increase its occurrence.

Aim: The aim of this study is to assess the knowledge of peri-implant diseases and implant maintenance program among dentists working at the three implantology centers in Khartoum.

Objectives:

General Objective: To study and assess the knowledge of peri-implant diseases and implant maintenance program among dentists working in three Implantology centers in Khartoum state- Sudan.

Specific Objectives:

1. To assess the knowledge of dental implants and peri- implant diseases and maintenance program among dentists in three Implantology centers.
2. To compare between specialists, consultants, house officers and general practitioners regarding the degree of knowledge of peri-implant diseases and implant maintenance program.
3. To determine the impact of experience on the level of knowledge of dental implants, peri-implantitis and implant maintenance program.

II. Literature Review

In 2000, Kronström M et al (6), conducted a cross-sectional study, through a questionnaire, discussing the Prosthodontics decision making among 2,059 general dentists in Sweden: the choice between fixed partial dentures and single implants. The results showed that the items evaluated as most important were "prognosis for delivered treatment" and "patient's wish." In conclusion, differences between individuals were great, but between groups of dentists the differences were minor. In another study, in 2003, S Chen and I Darby published

an article on the maintenance, care of dental implants and treatment of peri-implant infection(7).The article discussed the background, aetiology, diagnosis and management of osseointegrated implants. The three cases illustrate a number of points that should be considered in the treatment of peri-implant mucositis and implantitis, and are those that one may see in practice. The increasing acceptance of implant placement as a standard treatment option for patients will mean that more and more dentists will be involved in the long term care and maintenance of these implants.

In 2006, R.L. Gibson and C.W. Barclay (8) in a cross-sectional study, studied the opinions of 106 general dental practitioners from Northwest of England and experience regarding dental implantology education through a questionnaire. The study concluded that there was agreement between general dental practitioners about many aspects of dental implant education, practice and regulations. In 2008, H. De Bryun et al (9) conducted a cross-sectional study through distributing a questionnaire among 73 workshop participants to assess undergraduate implant dentistry education in Europe. In conclusion, the study found that the findings are consistent with other studies and pointed to a large diversity in implant dentistry education within undergraduate curricula at various European universities. Also, in 2008, L.D. Addy et al (10), made a cross-sectional study by distributing an online questionnaire targeting the teaching of implant dentistry in undergraduate dental schools in the United Kingdom and Ireland. The questionnaire was distributed among 15 dental schools. The results of the survey concluded that while this study has revealed variation in the amounts of teaching of dental implants between individual dental schools, it appears that the overall amount of teaching has increased since the time of previous surveys. In 2010, Nicola U. Zitzmann et al (11), made a cross-sectional questionnaire based study to assess the preference of dental care providers to maintain compromised teeth in relation to professional status. The questionnaire was distributed among 969 dentists in Switzerland and Germany. The results indicated that although evidence-based dentistry has been a standard approach in treatment planning for several years, the patient's choice of care provider will influence the selection of therapeutical options.

III. Material And Methods

Study design: This was a descriptive cross sectional study to assess the knowledge of peri-implant disease among dentist working at three Implantology centers.

Study area: The study was conducted in three Implantology centers (Khartoum dental teaching hospital, Dandra and Alrafaa implantology centers) due to the large number and availability of dentists with different degrees in these centers.

Study Population: All general dental practitioners, house-officers, specialists and consultants in the three mentioned centers during time of data collection.

Inclusion Criteria: The study included all house officers, general dental practitioners, specialists and consultants that have a BDS and are currently working at the three Implantology centers at the time of data collection.

Exclusion Criteria: Undergraduates, technicians, patients.

Sample size: convenient sample = 242

Khartoum dental teaching hospital: 232 dentists

Dandara: 6 dentists

Alraffa: 4 dentists

Sampling Technique: convenient sample; all dentists in the three centers will be asked to participate.

Data collection methods tools: A self-administered close-ended questionnaire including demographic data and a group of questions to assess the level of knowledge of peri –implant diseases.

-Dependant variable: peri-implant diseases and Implant Maintenance Program

-Independent variable: occupation, year of experience.

Data analysis:

Data was Analyzed using frequencies and percentages using (SPSS) software version 17. The final results were grouped in the form of tables, figures, and charts. Comparison was done using Chi-square test used for association of variables with a P value of <0.05 considered significant.

Ethical consideration:

The study was approved by ethical Committee in the University of Medical Sciences and Technology and permission was obtained from the administration of the KDTH dental hospital. Participant's privacy was insured and the collected data was only used for research purposes. Participants were requested to participate voluntary after explanation of the purposes of the study.

IV. Results

The female participants represented 65.8% and the male participants represent 34.2%.

The age group that was frequently found ranged from 20 to 30 years making up about 66.7% of the respondents. Among the respondents 44.7% were house-officers, 30.1 % were general dental practitioners and 16.3 % were specialists and 8.9% were consultants (Table 1). The majority of the participants (91.9 %) had moderate knowledge regarding peri-implant diseases (Table: 2). The majority of the participants (89.4 %) had poor knowledge regarding dental implant maintenance (Table: 4). Out of the 47.4% with those of poor knowledge, the P value was significant; (0.001) that there is a relationship between position and general knowledge of peri-implant diseases table 6. The results showed that 85.5% out of 100 were house officers and have a poor knowledge of implant maintenance program, where 16 out of 44 were specialists and have good knowledge of peri-implant disease. P value was significant. (0.003). so, there is a relationship between positions of the dentist and level of implant maintenance programs. Table7. The results showed that, 56% of those with good knowledge of dental implant regardless of their years of experiences; P value was insignificant (0.0137).
The results showed that years of experiences do not add to knowledge of dental implant maintenance program. P value was insignificant (0.101).

Table 1: Ranking of participants.

Occupation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dental practitioner	74	30.1	30.1	30.1
	House Officer	110	44.7	44.7	74.8
	Specialist	40	16.3	16.3	91.1
	Consultant	22	8.9	8.9	100.0
	Total	246	100.0	100.0	

Table 2: general knowledge about implants:

General knowledge of implant					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	76	30.9	30.9	30.9
	Moderate	120	48.8	48.8	79.7
	Good	50	20.3	20.3	100.0
	Total	246	100.0	100.0	

Table 3: Knowledge about maintainenace programs.

Dental Implant Maintenance					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	220	89.4	89.4	89.4
	Moderate	12	4.9	4.9	94.3
	Good	14	5.7	5.7	100.0
	Total	246	100.0	100.0	

Table 4: Cross-Tab between the Positions and Knowledge of peri-implant diseases.

Knowledge of peri-implantitis * Occupation							
			Occupation				Total
			Dental practitioner	House Officer	Specialist	Consultant	
Knowledge of peri-implantitis	Poor	Count	32	36	4	4	76
		% within General Information implant	42.1%	47.4%	5.3%	5.3%	100.0%
	Moderate	Count	32	52	28	8	120
		% within General Information implant	26.7%	43.3%	23.3 %	6.7%	100.0%
	Good	Count	10	22	8	10	50
		% within General Information implant	20.0%	44.0%	16.0 %	20.0%	100.0%
Total		Count	74	110	40	22	246
		% within General Information implant	30.1%	44.7%	16.3 %	8.9%	100.0%

- Level of significance 0.001

Table 5: knowledge about peri-implant disease.

			Per-implant Diseases			Total
			Poor	Moderate	Good	
Occupation	Dental practitioner	Count	72	2	0	74
		% within Occupation	97.3%	2.7%	0.0%	100.0%
	House Officer	Count	94	2	14	110
		% within Occupation	85.5%	1.8%	12.7%	100.0%
	Specialist	Count	20	8	16	44
		% within Occupation	90.0%	5.0%	18.7%	100.0%
	Consultant	Count	22	0	14	18
		% within Occupation	95.5%	0.0%	12.7%	100.0%
Total		Count	226	10	44	246
		% within Occupation	91.9%	2.4%	5.7%	100.0%

Table 6: Cross-tab for Experience and Peri-implant Knowledge.

General Information implant * Experience						
			Experience			Total
			(Lowest thru 5)	(5 thru 10)	(11 thru Highest)	
General Information implant	Poor	Count	48	14	14	76
		% within General Information implant	63.2%	18.4%	18.4%	100.0%
	Moderate	Count	64	20	36	120
		% within General Information implant	53.3%	16.7%	30.0%	100.0%
	Good	Count	28	4	18	50
		% within General Information implant	56.0%	8.0%	36.0%	100.0%
Total		Count	140	38	68	246
		% within General Information implant	56.9%	15.4%	27.6%	100.0%

V. Discussion

Despite the high success rate of implants, the increasing rate of peri-implantitis disease has been reported in the literature [(7)], hence it can be concluded that general practitioners have to increase their knowledge on prevention, diagnosis, and treatment of those diseases. Therefore, continued learning is essential to their professions. In a 2002 study by Heubener in the United States, the pattern of using implant education in dentistry graduates of Creight University over a period of 10 years (1988 - 1997) was assessed, results showed that those who passed the implant training in laboratories and workshops had a greater knowledge about implants, did additional implant therapy in their offices and also spent more time on implant education than those who did not pass such courses. These findings indicate that, "scientific and practical implant workshops can substantially improve their practical implementation". [(8)] Most et al. (2013) studied the impact of a dental implant training program to improve knowledge of dental students; the results showed that scores of basic implant information and implant design in the 3-year group were higher than in the 3-day group which is consistent with the results of this study which are also in accordance with the conclusions of [(9)] Poorsamimi et al. (1390) who studied general dentists' knowledge and practice about dental implants in the Qazvin province and concluded that there was no significant correlation between sex, age, job, experience, history, and dentists' knowledge; however, there was a significant relation between dentists' knowledge and their practice. This study reported that, despite adding implant training courses to the student curricula, there was no significant difference between younger and older dentists. This can be interpreted as dental schools and implant re-training courses were not a great success in the field of implants which agrees with the results of Highlight et al [(10)] 2011 who conducted a study in the city of Isfahan, to assess the knowledge of dentists after implant re-training workshops and concluded that general practitioners' and specialists' knowledge was very far from the ideal. It is essential that the dental student curriculum be planned and implant re-training courses be tailored accordingly.[(11)] According to this study, there was significant relationship between age, job, experience, and dentists' knowledge about peri-implant inflammatory diseases. The questionnaire was divided into 3 parts: Knowledge, Peri-implant diseases and Information on the Dental Implant Maintenance Programs. In the field of knowledge, 30%, 48% and 20% had good, average, and poor knowledge respectively ". 91% of dentists had good knowledge of treatment, and, 5.7% had an average or poor knowledge". In terms information on the dental implant maintenance programs, 89% of dentists had good knowledge. Greater knowledge of dental implant maintenance programs requires higher levels of education in this field.

VI. Conclusion

Implants are considered a useful treatment for replacement of lost teeth. Although the success rate and durability of implants are high, the prevalence of peri-implantitis is high as well. The rate of dentist's knowledge regarding peri-implant diseases and their knowledge of treatment and maintenance programs were average. Dentist's position has an influence in knowledge of peri-implant diseases and maintenance program, although years of experiences do not reflect the level of knowledge; thus continuous training sessions and workshops regarding peri-implant diseases are suggested for their improvement. Furthermore, a large proportion of dentists are not satisfied with the undergraduate Implantology curriculum and are eager for more guidance in this field

VII. Recommendations

1. Dental implantology should be an important part of the dental undergraduate curriculum to improve the knowledge of our future dentists.
2. It is necessary that all dentists should have basic knowledge on peri-implant diseases and the protocol for maintaining implants.
3. Dentists should have better access to the postgraduate implant courses. For example by lowering the expenses.
4. Dentist who do provide dental implant treatment should essentially provide a maintenance program and educate the patient sufficiently, not leaving the patient to their own devices after providing the implant i.e. should be obligated to see them for a follow up.
5. Further research should be done on this subject.

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Annexure:

1- Questionnaire

Assessment of Knowledge of Peri-Implant Diseases and Implant Maintenance Program among Dentists in three implantology centers In Khartoum, Sudan, 2016

Personal Data:-

1. Gender :

- M
- F

2. Age: _____

3. What is your position?

- General Dental Practitioner
- House Officer
- Specialist
- Consultant

4. experience :_____

Knowledge:-

General Information on Dental Implants:

1. Do you know dental implants and the various systems of dental implants?

- Yes
- No

2. Are you know what is immediate and delayed implant placement?

- Yes
- No

3. Can you place dental implants in smokers, diabetic patients, patients with poor oral hygiene, and patients prone to dental caries?

- Yes
- No

4. Regarding the advantages of dental implants, please answer the following: (more than one answer can be chosen)

- Less invasive procedure.
- More conservative; does not require any adjacent tooth reduction.
- Longevity; lasts longer.
- Implant construction is less time consuming

5. What do you think is the most important factor for implant success?

- Case selection
- Implant type and material
- Patient compliance
- Experience of operator

Peri-implant diseases:

6. Peri-implantitis is an inflammatory reaction of hard and soft tissue around implant?

- Yes
- No

7. Does failure rate of peri-implant Osseointegration vary according to the surface, shape and material of the implant?

- Yes
- No

8. Is bone loss a symptom of peri-implant mucositis?

- Yes
- No

9. Bacterial plaque is the main factor of peri-implantitis development.

- Yes
- No

10. Factors such as history of periodontitis, diabetes mellitus, oral health, smoking, and alcohol can increase the incidence of peri-implantitis.

- Yes
- No

11. Probing around implants compared to the teeth, requires less than normal force.

- Yes
- No

12. 1.5 mm Bone loss at first year of implant is not a symptom of peri-implantitis.
- Yes
- No

13. Loosening of implant is not a diagnostic criteria for early detection of peri-implant diseases.
- Yes
- No

14. How do you diagnose peri-implantitis?

a. Probing depth is:
- 4 mm
- 5 mm
- 3 mm

b. Radiographic bone loss around the implant is observed:
- Within the first year
- After the first year

Information on the Dental Implant Maintenance Program:-

1. Do you feel that dental implants require additional oral hygiene maintenance and care by the patient and dentist?
- No, are cleaned like natural teeth
- Yes, need more care than natural teeth
- No, need less care than natural teeth
- Do not know

2. Appropriate Recall period for patients receiving the implant after insertion of the prosthesis is:
- 1 Month
- 3-4 months
- 4-6 months

3. Do you know how to use fine prophy pastes for polishing the implant/crown?
- Yes
- No

4. Do you think you need to polish the implant post if it was visible?
- Yes
- No

5. Has it come to your knowledge that the use of extra soft brushes is a means to clean implant safely?
- Yes
- No

6. do you have an idea about the use of Teflon coated scalers during debridement around the tooth?
- Yes
- No

7. Regarding maintenance by curettage, which instruments do you commonly use?
- Carbon fiber or plastic curettes.
- Jet spray of bicarbonate.
- Periodontal curettes.

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