

Integration of Pedagogic Knowledge concerning Periodontitis in Clinical Practices: A cross sectional study on Dentists' Implementation

SANIA RIAZ¹, MAAZ ASAD², MUHAMMAD TAQI³, ASAAD JAVAID⁴, NIDA TARIQ⁵, FIZZA KHALID⁶

¹Assistant Professor of Periodontology, Baqai Dental College, Baqai Medical University. Karachi, Pakistan.

²Associate Professor of Periodontology, Baqai Dental College, Baqai Medical University. Karachi, Pakistan.

³Assistant Professor of community Dentistry, Dow Dental College, Karachi, Pakistan

⁴Dean, Faculty of Dentistry, Baqai Dental College, Baqai Medical University. Karachi, Pakistan

⁵Lecturer, Department of Periodontology, Baqai Dental College, Baqai Medical University. Karachi, Pakistan

⁶Senior Registrar/Lecturer, Department of Periodontology, Baqai Dental College, Baqai Medical University. Karachi, Pakistan.

Correspondence to Dr. Maaz Asad Javaid, Email: maazasad@live.com

ABSTRACT

Aim: To determine the knowledge of dentists regarding periodontitis with its application in their clinical practices.

Method: A descriptive cross-sectional study was conducted at Baqai Medical University A content and face validated self-administered questionnaire was distributed electronically and physically, and no personal identifying information was collected from the respondents to maintain their concealment and anonymity. All practicing graduate dental practitioners, including general dentists and postgraduates, were approached. The questionnaire was divided into three sections. The first section covered the participants' demographic data, including gender, designation, and clinical experience. In the second section, dentists were given a 3-point Likert scale ranging from disagree, undecided, and agree to mark their knowledge regarding the most prevalent periodontal condition, and it contained seven close-ended questions. The remaining seven close-ended questions in the last section covered the practices and attitudes of dentists, correlating with the knowledge asked in the first section. The responses to practice questions ranged from never, sometimes, and always. The data was analyzed by using a chi-square test. Responses to a three-point Likert scale related to knowledge and practice were recorded.

Results: Out of 323 dentists who received the questionnaire, 100% filled the survey form correctly requiring no rejection. With the correlation coefficient, it is understood that there is a positive response to the knowledge of treating periodontitis patients as compared to their clinical implications.

Conclusion: It was analyzed that most of the dental clinicians showed profound theoretical knowledge on the subject but regrettably not all of them applied their knowledge to clinical practice for improving patients' oral hygiene or awareness about the relevant issues.

Keywords: Periodontitis, Knowledge, attitude, clinical implication

INTRODUCTION

Periodontitis is the most common infection of the oral cavity interpreted as an inflammatory disorder of soft and hard tissues that results in loss of supporting structures of a tooth¹. Initially inflammation is confined to soft tissues only which if left untreated, progresses over the time and leadsto periodontitis². According to the Global Burden of Disease Study (2016), periodontal disease is the 11th most prevalent condition. It affects about 20% - 50% of the population worldwide³ involving approximately 743 million individuals. It has been reported that periodontal disease increases with age⁴ and owing to improved life expectancy, 70% of the current world population is above 65years of age⁵. The frequency of the periodontal diseases in Pakistani population is no exemption. Its prevalence in Punjab is estimated to be 37%, 40% in Sindh, 20% in Khyber Pakhtunkhwa and 3% in Baluchistan⁶.

According to the World Health Organization, periodontal health is an integral component of general health and quality of life has a synergic relationship between periodontal disease and systemic conditions that have been established and well documented⁷. Clinical studies have shown that patients suffering from diabetes have a greater chance of periodontal destruction, including redness of gingiva, deep periodontal pockets (PPD), clinical attachment loss (CAL), bone resorption and tooth loss^{8,9,10}. Severe periodontitis may increase the risk of number of systemic conditions¹¹. According to studies there is a potential link between periodontitis and cardiovascular system (CVS), which is found associated with specific bacteria including *Porphyromonas gingivalis* and *actinomycescomitans*. These bacteria use pathways to cause endotoxins to disseminate pathologically throughout the body and are transported in blood with the help of erythrocytes. These Pathogenic effects in bacteremia have also been observed in CVS patients after dental procedures¹². Similarly,

smoking causes altered immune response, increases release of MMPs and affects fibroblast migration and collagen synthesis in periodontium, hence makes an individual susceptible to periodontal disease¹³. A study on Japanese cohort reported that the subjects were free of periodontal disease initially but later developed the disease due to their smoking habit¹⁴.

The interproximal areas have the greatest risk of developing periodontal disease because of the plaque predilection towards these sites. Hence for reducing inflammation, the interdental plaque control through interdental cleaning aids as well as debridement with ultrasonic scaler is of paramount importance. It is also well reported that the tooth brushing can only remove 1mm of subgingival plaque and is ineffective in interproximal region. Therefore, it becomes the site of progression of disease and should be cleaned thoroughly¹⁵.

To combat bacterial challenge associated with periodontal disease, dentists commonly prescribe systemic antimicrobial therapy, which remains under a vigorous debate. According to some systemic reviews¹⁶ adjunct antimicrobials along with scaling and root planing (SRP) is more beneficial clinically and microbiologically. However the adverse effects of antimicrobials is its side effects and increased bacterial resistance¹⁷. Clinicians should prescribe only in specified patients under specific conditions and not in routine practice¹⁸. If systemic antimicrobials are indicated they should be used as an adjunct to mechanical debridement and not as a monotherapy. Keeping in mind the significance and importance of both therapies, variability and fluctuation in clinical decision making among dental practitioners have been observed that may impact on the outcome of the treatment².

It is mandatory that every professional dentist and practitioner should interact with the patient, take detailed medical history and consult their physician where needed and maintain adequate patients' record for future reference⁸. Likewise, many other disorders and diseases like respiratory and kidney diseases, metabolic syndrome, arthritis and low-birth weight of neonates

Received on 07-02-2024

Accepted on 14-05-2024

have been documented to be frequently associated with Periodontal ailments¹⁹.

Much data in clinical research is available regarding the assessment of level of knowledge about periodontal diseases amongst practising dentists(8). Despite having updated theoretical knowledge about subject but evidence suggests that most dentists involved in general dentistry don't implement it in their clinical practices^{8,20}. It is very rare to find a study that has reported or compared the dichotomy of the dentists' knowledge versus their clinical practices. This study has therefore, been planned to assess whether or not, the practicing dentists implement their pedagogic knowledge regarding periodontitis in their general practices. Findings of the study will help us bring necessary alterations or modifications required in the clinical training of undergraduate dentistry students.

METHODOLOGY

A descriptive quantitative cross-sectional survey was conducted from March 2022 to November 2022, using a non-probability convenience sampling technique. The sample size of 323 was determined using PASS version 15 with a 95% confidence interval, and 308 practitioners returned the filled form after obtaining verbal consent. The questionnaire was distributed electronically and physically, and no personal identifying information was collected from the respondents to maintain concealment and anonymity. All qualified practising dentists, including general dentists and postgraduates, were approached, while undergraduate dental students, dental hygienists, and dental technicians were excluded.

The survey questionnaire was developed by postgraduate faculty members specializing in Periodontics in the Department of Periodontology, Baqai Medical University, and a subject specialist working at a public university in Karachi. The questionnaire was divided into three sections. The first section covered the participants' demographic data, including gender, designation, and clinical experience. In the second section, dentists were given a 3-point Likert scale ranging from disagree, undecided, and agree to mark their knowledge regarding the most prevalent periodontal condition, and it contained seven close-ended questions. The remaining seven close-ended questions in the last section covered the practices and attitudes of dentists, correlating with the knowledge asked in the first section. The responses to practice questions ranged from never, sometimes, and always.

A questionnaire pre-test was conducted on 20 participants not part of the main study to determine reliability, validity, comprehension, and the time it takes to complete. The form took an average of six minutes to fill out. An analysis of Cronbach's alpha was performed to determine the internal consistency between responses to the questions in both domains shown in Table 1.

Table 1 Cronbach's alpha (α) coefficient for the knowledge and practice questions (n = 20)

	Items	Cronbach's Alpha
Knowledge	7	0.74
Practice	7	0.77

An expert health professional assessed the content and face validity of the questionnaire, while another expert evaluated the construct validity of the pre-final version of the questionnaire. The final version questionnaire was drafted using the pilot data. The construct validity of questions in both domains was determined by calculating the Pearson's correlation coefficient *r* of respondents' responses for each item with their total scores, as shown in Table 2. The questions with correlation scores greater than 0.44 were considered valid. The critical value was obtained from the Pearson correlation table.

Data analysis: The data were analyzed using the Statistical package for social sciences version 21. The frequency distribution of dental practitioners according to gender in each dental speciality was assessed using the chi-square test (Table 3). For further analysis, responses to a three-point Likert scale related to

knowledge and practice were recorded and re-categorized into two groups. The "Undecided" category was merged with "Disagree" to form group 1, and group 2 was kept original with the response "Agree." Similarly, the "Sometimes" category was merged with "Never" to form group 1, and group 2 was kept original with the response "Always." Later, a cross tab was used to compare practitioners' responses regarding knowledge and their practices. A level of significance was set at less than 0.05.

Table 2: Pearson correlation coefficients for questions in both domains using a degree of freedom two and Critical value (.44)

Knowledge	Obtained value	p- value
Smoking is a major risk factor for periodontitis	.68	.001
Site of progression of periodontal disease is the interdental plaque	.57	.001
Periodontitis is an irreversible disease but largely preventable	.66	.001
Adjunct periodontal therapies bring an additional clinical advantage compared to scaling and root planing alone	.75	.001
Periodontal diseases is a risk factor for systemic conditions like CVD, diabetes, adverse pregnancy outcome	.63	.001
Diabetes has a bidirectional relationship with periodontal health	.54	.001
Correct diagnosis and treatment of periodontal problems rely on the clinical & radiographic assessment	.53	.002
Practice		
I provide smoking cessation counselling to known smokers	.68	.001
I thoroughly debride interdental areas while scaling and advise my patients to use interdental cleaning aids	.58	.007
I regularly provide oral hygiene motivation along with frequent maintenance to my patients in order to prevent periodontitis to occur	.56	.010
I provide adjunctive therapy along with scaling and root planing in moderate to severe cases of periodontitis	.45	.043
I provide local drug delivery	.55	.012
I educate my patients about the role of systemic disease in periodontitis and how directly it can worsen the disease status	.73	.001
I regularly maintain the systemic records of all my patients	.75	.001
I provide non- surgical periodontal therapy to controlled diabetic patients	.49	.026
I provide non-surgical periodontal therapy to uncontrolled diabetic patients and refer them to their diabetologist for evaluation.	.45	.043
I record clinical and radiographic parameters in patients with poor periodontal health	.68	.001

RESULTS

In response to a question regarding smoking as a major risk factor for Periodontitis, majority of the respondents 248(80.5%) believed that smoking is a risk factor for occurrence of periodontal ailments. Among the rest, 18 disagreed and 42 had no idea about it. Despite the majority agreed with the statement but in clinical practices, merely half of them 154(50%) used to give smoking cessation advice to their patients suffering from Periodontitis. The other half 154 (50%) either did this practice rarely or not at all (Fig. 1).

Regarding progression of the disease, half of them 252(82%) knew that interdental plaque is the cause and therefore, 211(68%)used to thoroughly debride the area during scaling. It is surprising to mention that very few 24 responded negatively but good number of them 97(32%) don't remove the interdental plaque thoroughly (Fig. 1).

"Periodontitis is an irreversible but largely preventable". This statement was backed by 235(76%) respondents whereas 37 disagreed and 36 didn't respond to this explicit item of the questionnaire. It is heartening to note that majority of responding dentists 224(73%) frequently motivate their patients to maintain

their oral hygiene that helps in preventing the disease however 84(27%) never or rarely provide OHI motivation (Fig. 1).

The most of the dentists 249(81%) were mindful of the fact that adjunct therapies, along with scaling and root planing play advantageous role in the management of the disease. Among them, 96(31%) dentists always used to prescribe antibiotics in moderate to severe patients but 212(69%) rarely or never prescribe antibiotics as an adjunct therapy. Regarding local drug therapy, least number 90(29%) was found giving it as adjunct whereas most of them 218(71%) used it rarely or didn't use it ever (Fig. 2).

A high number of the responders 218(71%) were found aware of the fact that persistent Periodontal disease may be the source of systemic diseases like CVD, diabetes etc. 37 dentists didn't agree with the statement. Those who were aware of this fact, 171(56%) always used to educate their patients with the role and consequences of the situation whereas 119 (39%) rarely bother to do it. To avoid any future complication from periodontal treatment, it is obligation of a dentist to maintain the records of systemic diseases of his/her patients. 169(55%) of the dentists mentioned that they maintain the complete history record of the patients but 107(35%) seldom do this mandatory exercise (Fig. 3).

Regarding Diabetes have bidirectional relationship 198(64.2%) responded that they know about it. Providing periodontal treatment to diabetic patients, 160(52%) dentists responded that they always perform scaling/ polishing under controlled glycaemic levels whereas 136 (44.1%) occasionally or never does the treatment. 184(60%) of the responders used to get a diabetologist's evaluation in uncontrolled glycaemic levels right after providing them with initial periodontal therapy while 114(37%) rarely refer for further evaluation (Fig. 4).

Last question in the survey was about correct clinical and radiographic assessment and recording of the patient. Except few, all of the dentists 264(86%) were in agreement that correct clinical assessment is essential for patients suffering from poor periodontal health. It is unpromising to mention that merely 160(52%) dentists note and keep the record of clinical and radiographic parameters of the existing oral condition of the under-treatment patient. The rest of the 148(48%) dentists either record patient's clinical data rarely or don't keep any record (Fig 1).

Table 3: Gender wise distribution of the participants

Gender	General dentist	Specialist	Total
Male	96(78.7)	26(21.3)	122(100)
Female	159(85.5)	27(14.5)	186(100)

P value .126

Chi square test

Figure 1. Knowledge concerning Q1, Q2, Q3 & Q7 vs clinical implementation

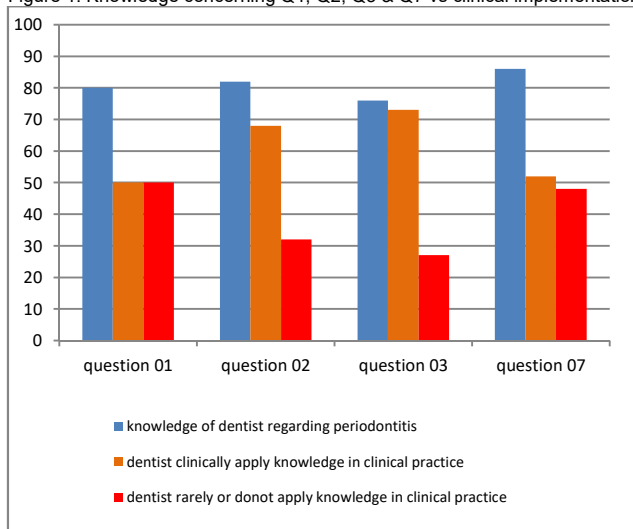


Figure.2 Adjunctive therapy along SPT in severe periodontitis.

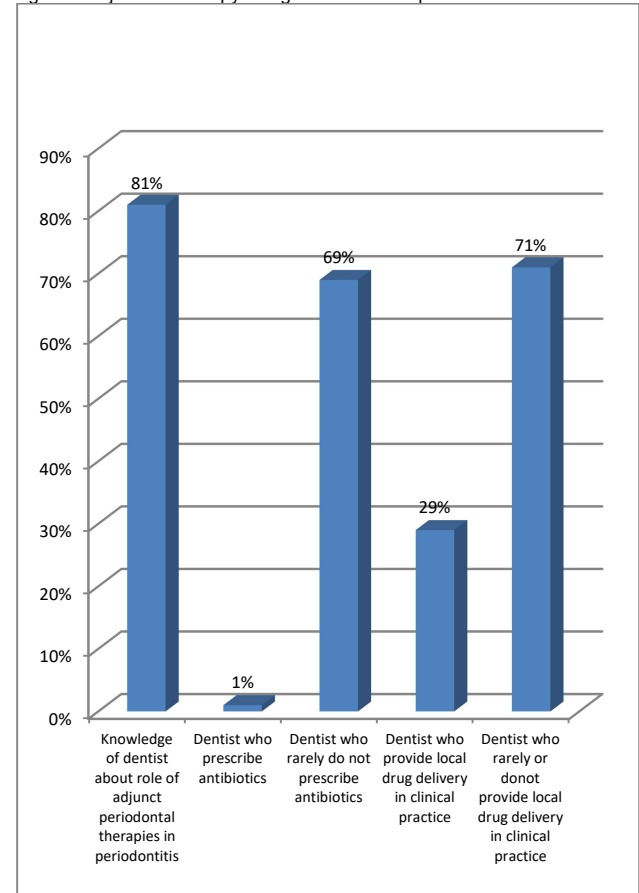


Figure 3. Awareness of dentists regarding Periodontal diseases and its risk factors.

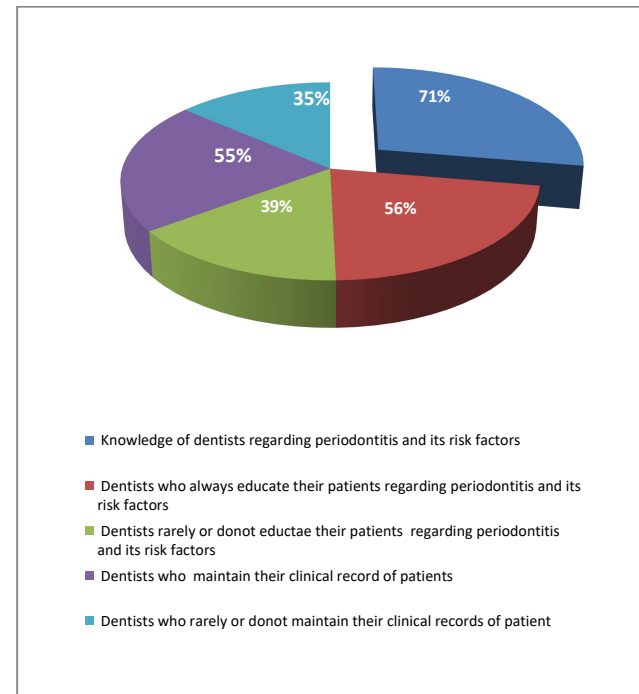
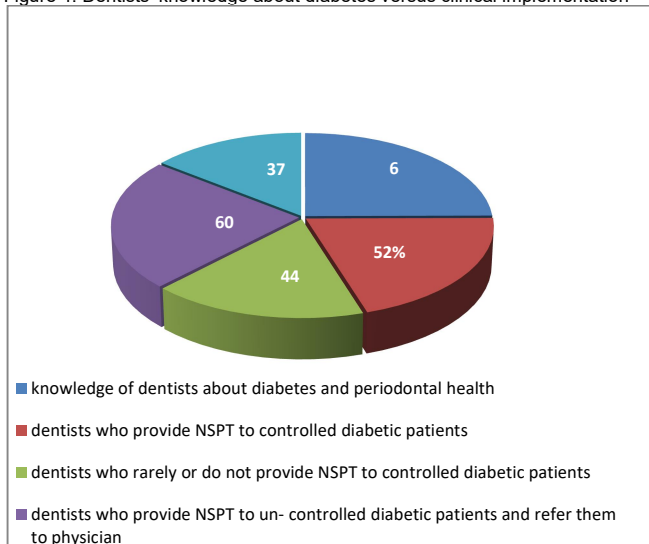


Figure 4. Dentists' knowledge about diabetes versus clinical implementation



DISCUSSION

In this study majority of the general dentist and subject specialists were having good knowledge that smoking is the main risk factor for causing the periodontal tissue destruction. 50% of the responding clinicians used to implement the knowledge in their clinical practices and counselled smoking patients for discontinuing the habit by explaining the hazards and adverse effects on oral health while rest of the 50% didn't find it useful to counsel the patients on smoking cessation. Similar findings were observed in a study conducted in Australia where majority of the professionals (90%) screened the patients for smoking while 51% advised patients on smoking cessation²¹. In contrast to our study, a survey conducted to assess the attitudes of Yemeni dental professionals, majority of the dentists (85%) were found inquiring their patients about tobacco use and assisted them in quitting²². The reason behind this disinterest from the dental clinician, shown in our study, may be attributed to their mind set. Their majority believes that dentists' role in smoking cessation is ineffective²³. Lack of training to undergraduate dental students, during curricular activities, is another major cause of the clinicians' apathetic attitude towards counselling against smoking²⁴. A separate investigative study on this issue will be recommended to determine the actual cause.

In our study 82% responders knew that interdental plaque is the cause of periodontal inflammation and current literature suggests that the unhindered deposition of plaque occurs on all surfaces of the teeth and is recognizable clinically within 24 hours. At this stage the predilection is for accumulation in the interproximal areas of the molars and premolars followed by accumulation in the interproximal surfaces of the anterior teeth and the facial surfaces of the molars and premolars²⁵. Likewise, another study suggests that interdental cleaning accompanied by tooth brushes and interdental brushes are cornerstones in achieving plaque control in daily oral care as interdental plaque is predominantly the cause of gingival and periodontal lesion²⁶. Moreover, another study claims that interdental cleaning is essential as these particular areas have a high risk of developing periodontal lesions as the accumulation of microbial plaque is one of the prerequisites for periodontitis¹⁵.

According to findings of this study, 68% of the dentist used to thoroughly debride the area during scaling while it is surprising that 32% don't remove the interdental plaque properly. These results are contradicting with a study conducted among Lithuanian general dentists in which majority of respondents claimed to provide Oral Hygiene Instructions, taught how to floss and showed how to use interdental brushes to most of their patients²⁷. It requires exploration as to why do 32% responding dentists do not clean the most vulnerable for plaque accumulation. A study,

however, suggests to motivate the patients for use of Interdental brush to keep the interdental hygiene index stretched out to minimum and found good compliance and outcomes²⁸. One more study on interdental hygiene measures adds recommendation of other interdental hygiene aids by the dentists, like dental floss, wood sticks and oral irrigators²⁹.

"Periodontitis is irreversible but largely preventable". This statement was backed by 235 (76%) respondents whereas 37 disagreed and 36 didn't respond to this explicit item of the questionnaire. In agreement to the results of our research, a study conducted in Poland on Outpatient clinic concluded that most respondents (90%) admitted that they brushed their teeth at least twice a day to prevent periodontal disease. Moreover, the authors also concluded that manual toothbrush was used by 78% of the participants, flossing was reported by 64% of the patients and interdental brushes were used by 26% of the respondents to prevent periodontal disease²⁸. Another study conducted in Saudia Arabia seconds the results of our study regarding prevention of periodontal diseases³⁰.

It is heartening to note that the majority of responding dentists (73%) frequently motivate their patients to maintain their oral hygiene that helps in preventing the disease. However, (27%) dentists never or rarely provide OHI motivation. A study which is in agreement to our results showed that 36% dentists working in academic institutes did not prescribe OHI or maintenance procedures routinely to avoid periodontitis to reoccur. The failure to highlight this obligatory aspect may be the lack of time. A couple of studies done by same authors and published separately link it to absence of services of Oral Hygienists in the dental clinics. Their findings suggest that dentist working without dental hygienist show non-compliance in this regard³¹. The scarcity of chances of employment for Dental Hygienist and non-recognition of the existence of this profession in Pakistan may be the reason for not motivating the patients for OHI.

Regarding the question that adjunct periodontal therapies bring an additional clinical advantage compared to scaling and root planning alone most of the dentists (81%) in this study were mindful of the fact that adjunct therapies, along with scaling and root planning play advantageous role in the management of the disease. An electronic literature search was carried out by Ramanaukaite in which he concluded that sustained released delivery of antiseptics have significant clinical benefits compared to SRP alone³². Aliew in his study compared the response of periodontal tissues to SRP alone with adjunctive azithromycin, amoxicillin and metronidazole combined in moderate to severe periodontitis patients. He concluded that the adjunct antibiotics showed greater clinical benefits than SRP alone in terms of CAL and probing depths³³. However, in a systematic review and meta-analysis conducted by Kenneth Chou et al, on intake of adjunct systemic doxycycline with SRP in diabetic patients, it was concluded that there is no significant improvement in clinical attachment level among the test groups³⁴.

Findings of this study reveal that 96(31%) dentists always used to prescribe adjunct antibiotics in moderate to severe periodontitis patients but (69%) rarely or never prescribe antibiotics as an adjunct therapy. Our findings contradict the findings of another study conducted in Pakistan. It showed that (71%) of the respondents provided adjunct antibiotics to SRP in periodontitis patients and (81%) used combination therapy for moderate to severe periodontitis cases³⁵. The logical reason for the mismatch in the findings of the two studies from the same country may be the superfluous use of antibiotics by dentists, although majority of periodontal diseases may be corrected without using systemic antibiotic³⁶. It demands framing of guidelines and strict compliance with regards to prescribing antibiotics in dentistry and that should be an integral part of the undergraduate curriculum.

Regarding local drug therapy (LDD), the least number 90(29%) was found giving it as adjunct whereas most of them (71%) used it rarely or didn't use it ever. The local drug therapy has gained popularity in many countries but it, despite its known huge benefits, couldn't receive the same acceptance in Pakistan. It

is therefore, suggested that it should be introduced to dental students during their BDS teaching and training.

In our study a high number of the responders 218(71%) were found aware of the fact that persistent Periodontal disease may be the source of systemic diseases like CVD, diabetes, arthritis etc, while 37 dentists didn't agree with the statement. A U.S. Surgeon general signified a link between chronic oral infections and diabetes, heart and lung diseases, low birth weight and stroke³⁷. In a study, knowledge and opinion about the evidence on oral –systemic relationship was assessed, majority of the North Carolina dentists rated a strong link between periodontal disease and diabetes and CVS. 88% strongly agreed that they discuss oral –systemic risks to patients with diabetes having periodontal disease as well. Moreover 71% of the dentists agreed that their patients appreciate when they ask more about their systemic health in their practices²¹. Among those who were aware of this fact in our study, (56%) always used to educate their patients with the role and consequences of the situation whereas 39% rarely bother to do that. Diabetes is highly prevalent endocrinal disorder in Pakistan and WHO has placed on 7th place among the countries in the world. It is presumed that by 2025, Pakistan will jump to 4th place if it prevails at the same rate. Findings of this study should be considered disgusting owing to failure of (39%) dentists to educate their diabetic patients. Practicing dentists will perform this exercise gleefully if during their training they learn it, especially in the circumstance when a current study done in Pakistan, reports that oral hygiene practices of diabetic patients are inadequate³⁸.

To avoid any future complication from periodontal treatment, it is obligation of a dentist to maintain the records of systemic diseases of his/her patients. 169(55%) of the dentists mentioned that they maintain the complete history record of the patients but 35% seldom do this mandatory exercise. In a study, clinical record keeping samples from 47 general dental practitioners in U.K were assessed in a quality assurance program. The overall record keeping quality was poor and complete medical histories were present in only (44.6%) cases³⁹. Similar findings are reported in an Indian study where record keeping of the patients was found fairly inadequate⁴⁰. Teaching and training of record keeping is another weak part of our undergraduate studies that requires improvement and stringent monitoring.

Regarding the question that diabetes has a bidirectional relationship with periodontitis, (64.2%) of the responding dentists were found aware about the positive relationship. In a study, a survey was conducted among dental professionals practicing in Saudi Arabia. The participating dentists were inquired about the link between periodontitis and diabetes. 85% of the responders strongly agreed about the association between diabetes and periodontal diseases⁴¹. Similarly, in another study conducted in Kuwait, (58.6%) of the dental professionals knew about the association between diabetes and periodontal health⁸. These findings are similar to findings of the present study.

Providing periodontal treatment to diabetic patients, (52%) dentists responded that they always perform scaling/ polishing under controlled glycemic levels whereas (44.1%) occasionally or never do the treatment. In one study, it was found that only (42%) of the general dentists in California felt well prepared to intervene with patients having diabetes⁴². In another study the authors found that (59.5%) physicians recommend that patients with poorly controlled diabetes should have more frequent scaling⁸. 184(60%) of the responders used to get a diabetologist's evaluation in uncontrolled glycemic levels right after providing them with initial periodontal therapy while (37%) rarely refer for further evaluation. In a study, a total of 632 currently working dentists participated in the study out which (73.7%) used to refer the patients to physician⁴³. In a cross-sectional survey of 265 general dentists from California, merely 22% of the dentists consult with a physician for evaluation before treatment⁴². The findings of our study in this regard seem to be matching with the USA study.

Last question in the survey was about correct clinical and radiographic assessment and recording of the patient. Except a

few, all the dentists (86%) agreed that correct clinical assessment is essential for patients suffering from poor periodontal health. A comprehensive patients' record should be maintained by the attending dentist and a good dental record must consist of date of patients' appointment, personal particulars, presenting complaints, medical /dental history, clinical findings, imaging, tracings, Periodontal chart, photographs, lab reports, diagnosis and treatment done and future work plan. It is unpromising to mention that merely (52%) dentists note and keep the record of clinical and radiographic parameters of the existing oral condition of the under-treatment patients. These results are identical with another study done on the same issue. It mentions that majority of the participating dentist fail miserably to maintain the patients' record⁴⁴. In another study done in Pakistan, study participants were found unable to maintain adequate patients' record and feels the need of developing measures to promote dental record keeping in Pakistan⁴⁵.

Like other survey -based studies, limitation of the study includes limited depth of information from the responders as questionnaire -based studies rely on structured and predefined response options, which can restrict participants' ability to provide in-depth responses.

CONCLUSION

It was analyzed that mostly the dentists showed profound knowledge on this subject but unfortunately not all applied their knowledge to their clinical skills for improving patients' oral hygiene or awareness about the relevant issues.

Ethics approval and consent to participate: This study was approved by the Ethical Review Board of Baqai Dental College (Ref # BDC/ERB/2023/019). Informed consent was obtained from all participants to participate in this study. All methods were carried out in accordance with the Helsinki Declaration.

Consent for publication: Not applicable.

Availability of data and material: The datasets used and/or analysed during the current study are available from the corresponding author on request.

Competing interests: The authors declare that there is potentially no conflict of interest related to the article.

Funding: This study is not funded by any agencies in the public, commercial or not-for-profit sectors.

Authors' contributions:

1. S.R helped in data collection, result writing, manuscript writing, figures and tables
2. M.A.J conceived the idea, helped in data collection and analysis, manuscript writing, editing and proof reading
3. T.M helped in data analysis, proof reading and methodology writing
4. A.J.M helped in manuscript writing, proof reading, and critical analysis
5. N.T helped in data collection, figures, tables,
6. F.K Helped in discussion writing, figures and tables

Acknowledgement: I would like to acknowledge all the dental colleges and dental clinics for facilitation in data collection.

REFERENCES

1. Nocini R, Lippi G, Mattiuzzi C. Periodontal disease: the portrait of an epidemic. *J Public Health Emerg.* 2020;4(10).
2. Lanning SK, Pelok SD, Williams BC, Richards PS, Sarment DP, Oh TJ, et al. Variation in periodontal diagnosis and treatment planning among clinical instructors. *Journal of Dental Education.* 2005;69(3):325-37.
3. Nazir M, Al-Ansari A, Al-Khalifa K, Alhareky M, Gaffar B, Almas K. Global prevalence of periodontal disease and lack of its surveillance. *The Scientific World Journal.* 2020;2020.
4. Ercan E, Uysal C, Uzun C, Yılmaz M. Periodontal examination profiles and treatment approaches of a group of Turkish general dentists. *Oral Health Prev Dent.* 2015;13(3):275.
5. Eke PI, Dye B, Wei L, Thornton-Evans G, Genco R. Prevalence of periodontitis in adults in the United States: 2009 and 2010. *Journal of dental research.* 2012;91(10):914-20.

6. Fahim A, Shakeel S, Shahid TN, Anwar HM, Raja AA, Khan A. Prevalence of Periodontitis in Pakistan: a Systematic Review. *Journal of University College of Medicine and Dentistry*. 2022;1(1):30-4.
7. Nordin NN, Vaithilingam RD, Saub R, Nasir NH, Asari ASM, Bashah B, et al. Awareness, knowledge, attitudes and practices on the management of diabetes mellitus patients with periodontitis amongst Malaysian primary care practitioners. *Malaysian family physician: the official journal of the Academy of Family Physicians of Malaysia*. 2021;16(3):44.
8. Al-Khabbaz AK, Al-Shammari KF, Al-Saleh NA. Knowledge about the association between periodontal diseases and diabetes mellitus: contrasting dentists and physicians. *Journal of periodontology*. 2011;82(3):360-6.
9. Polak D, Sanui T, Nishimura F, Shapira L. Diabetes as a risk factor for periodontal disease—plausible mechanisms. *Periodontology* 2000. 2020;83(1):46-58.
10. Iacopino AM. Periodontitis and diabetes interrelationships: role of inflammation. *Annals of periodontology*. 2001;6(1):125-37.
11. Saher F, Saghir T, Hosein M, Bashir R. Periodontitis, Cardiovascular Disease and Fetuin A: A Triad. *Journal of Advances in Medicine and Medical Research*. 2021;33(8):61-9.
12. Larvin H, Kang J, Aggarwal VR, Pavitt S, Wu J. Risk of incident cardiovascular disease in people with periodontal disease: a systematic review and meta-analysis. *Clinical and experimental dental research*. 2021;7(1):109-22.
13. Puzhankara L, Janakiram C. Common risk factor approach to limit noncommunicable diseases and periodontal disease—the molecular and cellular basis: A narrative review. *Journal of International Society of Preventive & Community Dentistry*. 2021;11(5):490.
14. Okamoto Y, Tsuboi S, Suzuki S, Nakagaki H, Ogura Y, Maeda K, et al. Effects of smoking and drinking habits on the incidence of periodontal disease and tooth loss among Japanese males: a 4-yr longitudinal study. *Journal of periodontal research*. 2006;41(6):560-6.
15. Claydon NC. Current concepts in toothbrushing and interdental cleaning. *Periodontology* 2000. 2008;48(1):10-22.
16. Herrera D, Sanz M, Jepsen S, Needleman I, Roldán S. A systematic review on the effect of systemic antimicrobials as an adjunct to scaling and root planing in periodontitis patients. *Journal of clinical periodontology*. 2002;29:136-59.
17. Herrera D, Alonso B, León R, Roldán S, Sanz M. Antimicrobial therapy in periodontitis: the use of systemic antimicrobials against the subgingival biofilm. *Journal of clinical periodontology*. 2008;35:45-66.
18. Hooton TM, Levy SB. Antimicrobial Resistance: A Plan of Action for Community Practice. *American family physician*. 2001;63(6):1087.
19. Otomo-Corgel J, Pucher JJ, Rethman MP, Reynolds MA. State of the science: chronic periodontitis and systemic health. *Journal of Evidence Based Dental Practice*. 2012;12(3):20-8.
20. Tarannum F, Prasad S, Vivekananda L, Jayanthi D, Faizuddin M. Awareness of the association between periodontal disease and pre-term births among general dentists, general medical practitioners and gynecologists. *Indian journal of public health*. 2013;57(2):92.
21. Paquette DW, Bell KP, Phillips C, Offenbacher S, Wilder RS. Dentists' knowledge and opinions of oral-systemic disease relationships: relevance to patient care and education. *Journal of Dental Education*. 2015;79(6):626-35.
22. Al-Maweri SA, Al-Soneidar WA, AlMaqtari A, Hunaish A, Al-Sufyani G, Halboub E. Tobacco cessation counseling: Attitudes and practices among Yemeni dental professionals. *Journal of Cancer Education*. 2018;33:1088-93.
23. John J, Yudkin P, Murphy M, Ziebland S, Fowler G. Smoking cessation interventions for dental patients—attitudes and reported practices of dentists in the Oxford region. *British dental journal*. 1997;183(10):359-64.
24. Omaña-Cepeda C, Jané-Salas E, Estrugo-Devesa A, Chimenos-Küstner E, López-López J. Effectiveness of dentist's intervention in smoking cessation: A review. *Journal of Clinical and Experimental Dentistry*. 2016;8(1):e78.
25. Hoenderdos N, Slot D, Paraskevas S, Van der Weijden G. The efficacy of woodsticks on plaque and gingival inflammation: a systematic review. *International journal of dental hygiene*. 2008;6(4):280-9.
26. Mazhari F, Boskabady M, Moeintaghavi A, Habibi A. The effect of toothbrushing and flossing sequence on interdental plaque reduction and fluoride retention: A randomized controlled clinical trial. *Journal of periodontology*. 2018;89(7):824-32.
27. Puriene A, Gelaziene D, Dudaite A, Zekoniene J. Knowledge of Lithuanian General Dentists of Periodontal Disease Diagnostics, Management and Risk Assessment. *Health, Food & Biotechnology*. 2019;1(1):46-52.
28. Subramanya AP, Prabhuji MLV. Interdental hygiene index—A proposal of dual-purpose tool for patient assessment and motivation. *Journal of Indian Society of Periodontology*. 2021;25(6):532.
29. Mani A SS, Gholap S, Manaktala HS, Vora, H SJ. Interdental Aids – A review. *IP Int J Periodontol Implantol*. 2021;6(4):201-3.
30. Al-Zarea BK. Oral health knowledge of periodontal disease among university students. *International journal of dentistry*. 2013;2013.
31. Thevissen E, De Bruyn H, Koole S. The provision of oral hygiene instructions and patient motivation in a dental care system without dental hygienists. *International journal of dental hygiene*. 2017;15(4):261-8.
32. Ramanauskaite E, Machiulskiene V. Antiseptics as adjuncts to scaling and root planing in the treatment of periodontitis: a systematic literature review. *BMC Oral Health*. 2020;20(1):1-19.
33. Liaw A, Miller C, Nimmo A. Comparing the periodontal tissue response to non-surgical scaling and root planing alone, adjunctive azithromycin, or adjunctive amoxicillin plus metronidazole in generalized chronic moderate-to-severe periodontitis: a preliminary randomized controlled trial. *Australian Dental Journal*. 2019;64(2):145-52.
34. Yap KCH, Pulikkotil SJ. Systemic doxycycline as an adjunct to scaling and root planing in diabetic patients with periodontitis: a systematic review and meta-analysis. *BMC oral health*. 2019;19:1-10.
35. Jamelle AN, Askary G, Baig H. Knowledge, Attitude and Practice of Dentists Prescribing Antibiotics in Periodontal diseases in Dental Colleges of Karachi. *JPDA*. 2020;29(03).
36. Rahman U, Jamelle AN, Ansari Y, Nasrullah N, Askary G, Baig H. Knowledge, Attitude and Practice of Dentists Prescribing Antibiotics in Periodontal diseases in Dental Colleges of Karachi. *Journal of the Pakistan Dental Association*. 2020;29(3).
37. General USPHSOotS, Dental Nlo, Research C. Oral health in America: a report of the Surgeon General: US Public Health Service, Department of Health and Human Services; 2000.
38. Khan J, Mahmood H, Riaz M, Manzoor T, Shaheen DY, Zulfiqar S. Oral health status of diabetic patients: A cross sectional study in a tertiary care hospital of Rawalpindi. *Pakistan Armed Forces Medical Journal*. 2022;72(SUPPL-1):S60-3.
39. Morgan R. Quality evaluation of clinical records of a group of general dental practitioners entering a quality assurance program. *British dental journal*. 2001;191(8):436-41.
40. Mian RI, Siddiqui AA, Alam MK, Mirza AJ, Ammar Z, Gillani SW, et al. Adequacy of Record Keeping: A Retrospective Study to Assess Practices of Dentists Working in Kashmir, India. *International Medical Journal*. 2017;24(6):492.
41. AlShwaimi E, Idrees M, Berri Z, El-Sakka H, Kujan O. Association between diabetes mellitus and periodontal diseases: a survey of the opinions of dental professionals. *Medical Principles and Practice*. 2019;28(2):141-9.
42. Esmelli T, Ellison J, Walsh MM. Dentists' attitudes and practices related to diabetes in the dental setting. *Journal of public health dentistry*. 2010;70(2):108-14.
43. Tantipoj C, Sirichanyaphong T, Nuntachurat J, Ruetaijetjaroen K, Hiransuthikul N, Pujarern P, et al. Dentists' Attitudes toward Diabetes Mellitus Screening in Thai Dental Clinics. *International Journal of Environmental Research and Public Health*. 2022;19(6):3341.
44. Ayesha B, Syed Muzzamil Ali S, Afey Ahmed J, Hammad A. Evaluation of dental record keeping at Hamdard university dental hospital. 2016.
45. Tahir F, Raja HZ, Saleem MN, Iqbal A, Ullah MS, Yasser F. Awareness of Forensic Odontology among Dentists in Pakistan and its Impact on Dental Record Keeping. *Pakistan Journal of Medical & Health Sciences*. 2022;16(08):92.

This article may be cited as: Riaz S, Asad M, Taqi M, Javaid A, Tariq N, Khalid F: Integration of Pedagogic Knowledge concerning Periodontitis in Clinical Practices: A cross sectional study on Dentists' Implementation. *Pak J Med Health Sci* 2024;18(6): 17-22.