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Periodontal medicine at the crossroads of education and practice: Insights from a student survey

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Abstract

AIM. The objective of this study is to understand the knowledge of periodontal medicine among third year, final year and dental interns.

MATERIALS AND METHODS. This cross-sectional questionnaire-based study was conducted among dental students in Chengalpattu district, Tamil Nadu – India, belonging to third year, final year and Interns. A total of 15 questions about the prevalence, etiology, signs, association, risk factors, and treatment of periodontal medicine were included in the questionnaire.

RESULTS. Based on our study findings, a Moderate level of overall periodontal medicine knowledge was found. Although there were differences between genders in years of study in regards to disease prevalence / reasons / associations – there were statistically significant differences ($p < 0.05$) regarding the clinical signs of periodontal disease (i.e., clinical signs of scurvy). A few associations were also identified as having a relationship between periodontal disease as well as two or more systemic diseases i.e., atherosclerotic heart disease. In each domain of knowledge there were identifiable risk factors associated with periodontal disease – while low-dose doxycycline was found by essentially all participants to be the best treatment of periodontitis for diabetic patients in comparison to other medications. There was no statistically significant difference found for either gender or the year of study.

CONCLUSION. Among the dental students, there is a good amount of knowledge regarding the relationship between periodontal disease and various systemic illnesses. Further, knowledge should be spread on anticipatory guidance to patients on periodontal disease and its association with systemic illnesses.

Keywords: periodontal medicine; dental students, systemic diseases, questionnaire, knowledge, periodontal disease

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Пародонтальная медицина на стыке образования и клинической практики: результаты опроса студентов

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Резюме

ЦЕЛЬ. Оценить уровень знаний по пародонтальной медицине среди студентов третьего курса, выпускного курса и врачей-интернов стоматологических факультетов.

МАТЕРИАЛЫ И МЕТОДЫ. Поперечное исследование, основанное на анкетировании, было проведено среди студентов стоматологических факультетов округа Ченгалпатту (штат Тамилнад, Индия), обучающихся на третьем курсе, выпускном курсе и проходящих интернатуру. Анкета включала 15 вопросов, посвященных распространенности, этиологии, клиническим признакам, взаимосвязям, факторам риска и лечению заболеваний в рамках пародонтальной медицины.

РЕЗУЛЬТАТЫ. По результатам исследования был выявлен умеренный уровень общих знаний в области пародонтальной медицины. Несмотря на различия между мужчинами и женщинами, а также между студентами разных годов обучения в вопросах, касающихся распространенности заболеваний, их причин и ассоциаций, статистически значимых различия ($p < 0,05$) были обнаружены в отношении знаний о клинических признаках заболеваний пародонта (в частности, признаках цингии). Также была установлена осведомленность о связи заболеваний пародонта с двумя и более системными заболеваниями, включая атеросклеротическую болезнь сердца. В каждом из изучаемых разделов знаний участники смогли определить факторы риска, связанные с заболеваниями пародонта. Кроме того, практически все респонденты считали низкодозированную терапию доксициклином наиболее предпочтительным методом лечения пародонтита у пациентов с сахарным диабетом по сравнению с другими лекарственными средствами. Статистически значимых различий по полу и году обучения выявлено не было.

ЗАКЛЮЧЕНИЕ. Среди студентов стоматологических факультетов отмечен достаточно высокий уровень знаний о взаимосвязи заболеваний пародонта с различными системными заболеваниями. Вместе с тем необходимо расширять образовательную работу, направленную на повышение осведомленности будущих специалистов о профилактическом консультировании пациентов по вопросам заболеваний пародонта и их связи с системной патологией.

Ключевые слова: пародонтальная медицина, студенты стоматологических факультетов, системные заболевания, анкетирование, уровень знаний, заболевания пародонта

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INTRODUCTION

Periodontal disease is one of the common oral microbial diseases affecting the world population. The complex nature of periodontitis is influenced by race, socioeconomic level, education, gender, age, and risk factors such as cigarette smoking and oral hygiene. In India, the incidence of affected individuals is 66.2% for those under the age of 15, and 89.2% for those between 35 to 44 years [1]. However, it is important to assess other medical conditions of the individuals along with it because of the relationship between the systemic disorders and periodontal diseases that is well documented all over the world since 1990. This creates

a two-way relationship between the periodontal diseases and overall health [2]. This clearly demonstrates that diagnosing and treating periodontal disorders not only improves oral health but also has a substantial impact on an individual's overall health [3]. Several studies have provided numerous theories that explain the association between periodontal illnesses and systemic disorders, including as bacteraemia, release of inflammatory mediators, and acute-phase response [4].

It has been documented those 57 different systemic diseases are associated with periodontal disease. Among all the systemic disorders, studies revealed cardiac disorders, diabetes mellitus and pregnancy

outcome have more prevalence of association with periodontal diseases [5]. Cardiac diseases have significant correlation with periodontal diseases as it is one of the potential risk factors having odds ratio of 3.85 and 2.99 [6]. The prevalence of occurrence of periodontal problems in pregnant women ranges from 35% to 100% [7]. As per the literature, periodontal disease impacts glycaemic control, as well as the problems associated with diabetes, and encourages the onset of type 2 diabetes [8]. Other illnesses that are linked with periodontal disease include respiratory disorders, musculoskeletal disorders, immunological disorders, blood dyscrasias, bacterial and viral infections.

Dental students who interact with a large number of patients per day not only examine them but also record their medical history in order to make a final diagnosis based on the regulations of the institution where they are enrolled. After assessing dental students' capacity to recognize and treat periodontal diseases, it was discovered that just 38% of students had diagnosed the oral condition [9]. Another cross-sectional study revealed that dental students had limited understanding of the origins, symptoms, and treatments of gum disease [10]. This brings the need for the dental students to concentrate on the medical history while diagnosing the periodontal status of the patient. But the question still prevails whether the dental curriculum is designed efficiently to comprehend this knowledge while diagnosing and treating the oral diseases of the patient. The study's findings further demonstrate that periodontal disease is prevalent among the Indian population. There are very few studies in India that evaluate dentistry students' knowledge of periodontal medicine. Therefore, the current study aimed to better understand the knowledge of periodontal medicine among dental students of third year, final year and interns.

MATERIALS AND METHODS

This cross-sectional study included students in their third and final years, as well as internship participants. The study received ethical approval after the objective and significance of the research was explained to the appropriate institutional authorities. The main goal of the study was explained to the participants, and their confidentiality was assured. Informed consent was obtained from the students following the proper instruction and enrolled them into the study.

In order to overcome the bias, the dental students in their third year, final year and Internship period who attended the clinical posting from 10 am to 2 pm in one particular day and was asked to fill out a multiple-choice questionnaire on the spot.

A self-prepared structured questionnaire with 15 questions were prepared in English language. A pilot study was conducted using the proposed questionnaire, which was subsequently administered to the final study group. The questions addressed prevalence, etiology, signs, association, risk factors, and treatment. Except for the year of study, no other academic information was obtained. The first seven questions were closed ended questions with true / false options. The rest of the 8 ques-

tions were multiple-choice open-ended questions with 4 options. There was no time limit for the students to fill the questionnaire.

The data comprises of answers to questions, which were recorded in a Microsoft Excel sheet. SPSS version 20.0 was used to execute the statistical tests. To measure dental students' knowledge about periodontal medicine, the responses were graded on a scale of 0 to 15 based on the correct answers. Participants who received scores of 0–3, 4–6, 7–9, 10–12, and 13–15 were given the following grades: poor, fair, good, very good, and excellent. Values and percentages were used to represent the results. The categorical data were analysed using the chi square test. Statistical significance was defined as a *p* value of 0.05 or less.

RESULTS

A total of 152 dental students completed the questionnaire, which included 15 questions about periodontal medicine. Table 1 summarizes the demographics of the participants.

Prevalence

The total number of Indians suffering from periodontal disease is quite small, and 76.3% of respondents agreed that this is a false statement. There was a statistically significant difference between genders on this question (Table 2).

Table 1. Demographic details of the study participants

Таблица 1. Демографические данные участников исследования

Category	Variable	n (%)
Gender	Male	36 (23.7)
	Female	116 (76.3)
Year of study	Third year students	51 (33.6)
	Final year students	49 (32.2)
	Dental Interns	52 (34.2)

Table 2. Knowledge on prevalence of periodontal medicine

Таблица 2. Уровень знаний о распространенности заболеваний пародонта

Category	Independent variable	Number of responses		p-value
		True	False*	
Gender	Male	10	26	0.007**
	Female	27	89	
	Total	37	115	
Year of study	Third year students	13	38	0.798
	Final year students	13	36	
	Dental Interns	11	41	
	Total	37	115	

Note. * Correct answer; ** Statistically significant (*p* < 0.05).

Примечание. * Правильный ответ; ** статистически значимо (*p* < 0,05).

Aetiology

64.5% of respondents correctly identified the rise in Von Willebrand factor antigen and factor VIII that occurs when thrombus formation is caused due to poor dental hygiene. For this question, a statistically significant difference was found between the genders and the study year (Table 3).

Signs

With symptoms including bleeding gums, enlarged gingiva, and loose or mobile teeth, nearly 89.5% of respondents correctly identified scurvy. For this question, there was a statistically significant difference between the genders (Table 4); 60.5% of participants answered "bleeding from probing is indicative of periodontal disease" as true, whereas 39.5% of individuals answered "false" (Table 4).

Association

According to 86.8% of respondents, patients with diabetes-related periodontal disease are most likely to

experience periodontal abscesses. For this question, a statistically significant difference was found between the study years. There is an association between poor oral hygiene and atherosclerosis and the statement is correct, 73% answered as true. Statistically significant difference was observed between the genders for this question (Table 5). Nearly 77% of participants rejected the claim that periodontal disease has no influence on the other organs in the human body. A statistically significant variation was seen for this question between the study years (Table 3). Blood dyscrasias, such as leucocyte production and function, have no effect on the periodontium. The correct response is incorrect, and 77% of respondents agreed. Systemic problems have an impact on the development and course of gingivitis and periodontitis, according to 89.5% of participants. The consequences of periodontal disease on preterm birth and low birth weight in pregnant women were acknowledged by 57.2% of students. Gender disparities for this question were statistically significant (Table 5).

Table 3. Knowledge on etiology of periodontal medicine

Таблица 3. Уровень знаний об этиологии заболеваний пародонта

Question	Response	Male n (%)	Female n (%)	3 rd year n (%)	Final year n (%)	Interns n (%)	p-value	
							gender	year
Factors associated with thrombus formation due to poor oral hygiene	Factor VIII	4 (11.1)	13 (10.6)	7 (14.6)	4 (9.1)	6 (8.6)	0.029**	0.025**
	Von Willebrand factor antigen	3 (8.3)	16 (13.0)	4 (8.3)	9 (20.5)	6 (8.6)		
	Both a and b*	27 (75.0)	71 (57.7)	31 (64.6)	32 (72.7)	35 (50.0)		
	None of the above	2 (5.6)	16 (13.0)	9 (18.8)	4 (9.1)	5 (7.1)		
Causes of non-hemorrhagic shock	Thromboembolic events	7 (19.4)	35 (32.8)	15 (31.3)	16 (36.4)	11 (15.7)	0.269	0.200
	Cerebrovascular atherosclerosis	2 (5.6)	8 (7.5)	5 (10.4)	5 (11.4)	0 (0.0)		
	Congestive heart failure	6 (16.7)	11 (10.3)	3 (6.3)	5 (11.4)	9 (12.9)		
	All of the above*	21 (58.3)	62 (58.0)	28 (58.3)	23 (52.3)	32 (45.7)		

Note. * Correct answer; ** Statistically significant ($p < 0.05$).

Примечание. * Правильный ответ; ** статистически значимо ($p < 0,05$).

Table 4. Knowledge on signs of periodontal medicine

Таблица 4. Уровень знаний о клинических признаках заболеваний пародонта

Question	Response	Male n (%)	Female n (%)	3 rd year n (%)	Final year n (%)	Interns n (%)	p-value	
							gender	year
Bleeding on probing is an indicative sign of periodontal disease	True	23 (63.9)	69 (59.0)	22 (43.1)	31 (63.3)	39 (75.0)	0.077	0.001**
	False*	13 (36.1)	47 (41.0)	29 (56.9)	18 (36.7)	13 (25.0)		
Bleeding gums, swollen gingiva, and loosened or mobile teeth are seen in	Beri beri	2 (5.6)	9 (7.8)	3 (5.9)	5 (10.2)	3 (5.8)	0.014**	0.260
	Ariboflavinosis	0 (0.0)	1 (0.9)	0 (0.0)	0 (0.0)	1 (1.9)		
	Scurvy*	31 (86.1)	105 (90.5)	46 (90.2)	42 (85.7)	48 (92.3)		
	Pellagra	3 (8.3)	1 (0.9)	2 (3.9)	2 (4.1)	0 (0.0)		

Note. * Correct answer; ** Statistically significant ($p < 0.05$).

Примечание. * Правильный ответ; ** статистически значимо ($p < 0,05$).

Risk Factor

While acquired pneumonia is the right response (40%) for hospitalized individuals with COPD, 44.1% of participants said that periodontal disease is a risk factor. For women with periodontal disease during pregnancy, 35% of respondents said that *Fusobacterium* is detected in significantly larger numbers with low-birth-weight infants; nevertheless, the accurate response is aggregate bacteria (32.9%). Subjects with cardiovascular disease associated with periodontitis have

higher levels of C-reactive protein and fibrinogen than those without the condition, and 54.6% of individuals correctly answered the questions. Table 6 shows that there was a statistically significant difference between the genders and the year of study for this question.

Treatment

Low doses of doxycycline are used to treat periodontitis in diabetic patients, according to 61.8% of respondents, and Table 7 shows that this is accurate.

Table 5. Knowledge on associations of periodontal medicine

Таблица 5. Уровень знаний о взаимосвязях в пародонтальной медицине

Question	Response	Male n (%)	Female n (%)	3 rd year n (%)	Final year n (%)	Interns n (%)	p-value	
							gender	year
Association between poor oral hygiene and atherosclerosis	True*	30 (83.3)	81 (69.8)	33 (64.7)	37 (75.5)	41 (78.8)	0.012**	0.108
	False	6 (16.7)	35 (30.2)	18 (35.3)	12 (24.5)	11 (21.2)		
Association between periodontal disease and other organ diseases	True	6 (16.7)	29 (25.0)	12 (23.5)	11 (22.4)	12 (23.1)	0.301	0.030**
	False*	30 (83.3)	87 (75.0)	39 (76.5)	38 (77.6)	40 (76.9)		
Association between periodontal disease and blood dyscrasias	True	11 (30.6)	24 (20.7)	9 (17.6)	11 (22.4)	15 (28.8)	0.221	0.178
	False*	25 (69.4)	92 (79.3)	42 (82.4)	38 (77.6)	37 (71.2)		
Systemic conditions affect initiation and progression of gingivitis and periodontitis	True*	31 (86.1)	105 (90.5)	46 (90.2)	45 (91.8)	45 (86.5)	0.317	0.368
	False	5 (13.9)	11 (9.5)	5 (9.8)	4 (8.2)	7 (13.5)		
Association between periodontal disease and preterm birth/low birth weight	True*	19 (52.8)	68 (58.6)	26 (51.0)	29 (59.2)	32 (61.5)	0.026**	0.392
	False	17 (47.2)	47 (41.4)	25 (49.0)	20 (40.8)	20 (38.5)		
Periodontal abscesses occur more commonly in periodontal disease associated with	Hypothyroidism	4 (11.1)	10 (8.6)	7 (13.7)	6 (12.2)	1 (1.9)	0.461	0.023**
	Hypopituitarism	1 (2.8)	2 (1.7)	2 (3.9)	1 (2.0)	0 (0.0)		
	Diabetes*	31 (86.1)	101 (87.1)	41 (80.4)	41 (83.7)	50 (96.2)		
	Starvation	0 (0.0)	3 (2.6)	1 (2.0)	1 (2.0)	1 (1.9)		

Note. * Correct answer; ** Statistically significant ($p < 0.05$).

Примечание. * Правильный ответ; ** статистически значимо ($p < 0,05$).

Table 6. Knowledge on risk factors of periodontal medicine

Таблица 6. Уровень знаний о факторах риска в пародонтальной медицине

Question	Response	Male n (%)	Female n (%)	3 rd year n (%)	Final year n (%)	Interns n (%)	p-value	
							gender	year
Factors elevated in subjects with cardiovascular disease associated with periodontitis	C-reactive protein levels	11 (30.6)	27 (23.3)	16 (31.4)	12 (24.5)	10 (19.2)	0.004**	0.035**
	Fibrinogen levels	1 (2.8)	11 (9.5)	8 (15.7)	3 (6.1)	1 (1.9)		
	Both a and b*	17 (47.2)	66 (56.9)	20 (39.2)	31 (63.3)	32 (61.5)		
	None of the above	7 (19.4)	12 (10.3)	7 (13.7)	3 (6.1)	9 (17.3)		
Organism found in significantly higher numbers in low-birth-weight infants of women with periodontal disease	Aggregatibacter*	10 (27.8)	40 (34.5)	11 (21.6)	17 (34.7)	22 (42.3)	0.013**	0.006**
	Eikenella	0 (0.0)	9 (7.8)	4 (7.8)	1 (2.0)	4 (7.7)		
	<i>Fusobacterium</i>	13 (36.1)	40 (34.5)	16 (31.4)	19 (38.8)	18 (34.6)		
	<i>Streptococcus</i>	13 (36.1)	27 (23.3)	20 (39.2)	12 (24.5)	8 (15.4)		
Periodontal disease is a risk factor for hospitalized patients with	COPD	17 (47.2)	50 (43.1)	22 (43.1)	21 (42.9)	24 (46.2)	0.161	0.551
	Acquired pneumonia*	17 (47.2)	44 (37.9)	18 (35.3)	21 (42.9)	22 (42.3)		
	Emphysema	2 (5.6)	18 (15.5)	11 (21.6)	5 (10.2)	4 (7.7)		
	Carcinoma of lung	0 (0.0)	4 (3.4)	0 (0.0)	2 (4.1)	2 (3.8)		

Note. * Correct answer; ** Statistically significant ($p < 0.05$).

Примечание. * Правильный ответ; ** статистически значимо ($p < 0,05$).

Table 7. Knowledge on treatment of periodontal medicine**Таблица 7.** Уровень знаний о лечении в пародонтальной медицине

Category	Independent variable	Number which drug is used in the treatment of periodontitis in patient with diabetes				p-value
		Low dose doxycycline*	High dose doxycycline	High dose tetracycline	Low dose tetracycline	
Gender	Male	20	6	6	4	0.205
	Female	74	19	18	5	
	Total	94	25	24	9	
Year of study	Third year students	27	9	10	5	0.156
	Final year students	32	10	6	1	
	Dental Interns	35	6	8	3	
	Total	94	25	24	9	

Note. * Correct answer.

Примечание. * Правильный ответ.

DISCUSSION

Despite the fact that dental health is a crucial component of overall wellbeing, many people believe that only dentists can cure oral diseases. There is a lack of integration between dentists and other medical specialists in the academic, scientific, and professional domains. In order to avoid and manage periodontal disease through self-care and professional assistance, patients must be self-aware of the condition and the public must be well-informed about it [11]. Diabetes, pregnancy complications, heart, kidney, and respiratory diseases are among the medical conditions that have been connected to periodontal disease [12]. Periodontitis affects 42.3% of the adult population in India [13; 14]. It is believed that more than 500 different bacterial species can colonise the mouth of an adult [15; 16]. There is a significant vascular response to the potential vascular spread of bacteria and their products, including lipopolysaccharides (LPS), throughout the body (through the sulcular epithelium) [15]. Thus, this bacterial spread gives us clear interaction between periodontal diseases and other systemic diseases [15]. Hence all the medical practitioners should be aware and be able to educate the patient regarding it.

This survey found that 76.3% of participants had an adequate understanding of periodontitis as a serious condition. Periodontitis may act as a risk factor for systemic disorders on its own in individuals who are susceptible [16; 17]. Fortunately, it is a risk factor that is easily treated. According to published statistics, medical students were unaware of the systemic implications of periodontal disease [18]. Other locations have also reported similar findings [19]. Diabetes can cause periodontal changes in the oral cavity, including gingival inflammation and bleeding, and vice versa [20]. Hence treatment of the same is mandatory immediately with appropriate regimens. In this study, 61.8% were answered correctly to the treatment this condition. The fact that periodontitis may result in unfavourable pregnancy

outcomes, including as premature labour and low birth weight, is another startling feature of the condition [21]. About 57.2% of participants in this research knew about this condition. There is a strong correlation between cardiovascular diseases and periodontitis. Not surprisingly, atherosclerotic plaque has been found to include bacterial DNA and a wide range of bacterial illnesses [22]. 54.6% of the participants in this survey were aware of it. According to published research, blood dyscrasias may potentially affect periodontitis [23]. 77% of the participants in this study are aware of this.

Modern-day literature reviews confirm the two-way nature or “bidirectionality” between periodontitis and certain systemic diseases including chronic low-grade inflammation, and microbial translocation (the movement of bacteria through tissues) and immune dysregulation [24]. Additionally, periodontal inflammation has the potential to create systemic disease processes, as well as affect other systemic diseases related to end stage organ or body systems such as cardiometabolic disorder, endocrine dysfunction, pregnancy-related disorders (i.e., pre-term labor), and respiratory disease [25]. In summary, periodontal disease creates an overall increased level of systemic inflammation. Recent analysis of the global burden of disease indicates that periodontitis is a highly prevalent risk factor for many diseases and disorders that can be modified / controlled by identifying and implementing [26] routine detection protocols and preventive practice [27] in conjunction with collaboration between dental and medical professionals. Therefore, updated periodontal medicine concepts must be incorporated into undergraduate dental curriculum in order to provide a complete patient care approach [27; 28].

The limitation of this study is that time limit was not given to the students while answering the questionnaire. Another drawback is that only a limited sample of students was used in this study. The study's strength is that as much as we are aware, it is the first periodon-

tal medicine knowledge survey of students in Chengalpattu area. Due of periodontal disease's widespread prevalence, detrimental effects on oral health, and connections to systemic illness, patients who seek care from other medical experts may not receive the information and support they require. At every healthcare interaction, whether with a dentist, a doctor, or any other healthcare practitioner, patients should get counselling on some characteristics of periodontal disease and its connection to systemic disorders [29; 30].

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CONCLUSION

Among the dental students, there is a good amount of knowledge regarding the relationship between periodontal disease and various systemic illnesses. Further scope is to spread knowledge on providing anticipatory guidance to patients on periodontal disease and its association with systemic illnesses. Awareness must be spread among every health care provider and physician who can educate the patient on their well-being.

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