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EVALUATION OF KNOWLEDGE AND AWARENESS AMONG MEDICAL STUDENTS REGARDING RELATIONSHIP BETWEEN PERIODONTAL DISEASE AND DIABETES- A CROSS-SECTIONAL SURVEY

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ABSTRACT

Background: The bidirectional relationship between periodontal disease and diabetes is well-established, but medical students often lack sufficient knowledge regarding this connection. This study aimed to assess the level of knowledge and awareness about the relationship

between periodontal disease and diabetes among medical interns at Rama Medical College, Kanpur.

Methods: A cross-sectional survey was conducted among 110 medical interns. Data were collected using a pre-validated, self-administered questionnaire consisting of 10 knowledge-based and 5 awareness-related questions. The knowledge scores were categorized as poor (0–3), moderate (4–6), and good (7–10). Descriptive and inferential statistical analyses were performed using IBM SPSS Statistics version 26.

Results: The mean knowledge score was 5.9 ± 1.76, with 31% of participants demonstrating good knowledge, 55.5% showing moderate knowledge, and 13.6% exhibiting poor knowledge. Although 80.9% of interns recognized that diabetes affects oral health, only 54.5% understood the bidirectional nature of the relationship. Furthermore, only 22.7% of participants routinely examined the oral cavity of diabetic patients, despite 92.7% supporting the inclusion of oral health in diabetes care education.

Conclusions: The study highlights a moderate level of knowledge and a lack of clinical integration regarding the relationship between periodontal disease and diabetes among medical interns.

Keywords: Periodontal disease, Diabetes mellitus, Medical interns, Oral-systemic health, Awareness.

INTRODUCTION: Periodontal disease, a chronic inflammatory condition affecting the supporting structures of the teeth, has been increasingly recognized as a significant systemic health concern. Among the most well-documented associations is its bidirectional relationship with diabetes mellitus — a chronic metabolic disorder characterized by persistent hyperglycemia. Diabetes is known to increase the risk, prevalence, and severity of periodontal disease, while periodontitis can adversely impact glycemic control, creating a two-way pathophysiological link [1,2].

This relationship is particularly important in the context of integrated healthcare. With the rising global burden of both diabetes and periodontal disease, there is a growing need for interdisciplinary collaboration between medical and dental professionals. As future physicians,

medical interns play a crucial role in promoting patient education and in the early detection of oral health issues among diabetic patients. However, several studies have indicated that awareness of this link among medical professionals remains inadequate [3,4].

A study conducted by Al-Khabbaz et al. (2020) highlighted that only a minority of medical students had adequate knowledge about the impact of periodontal health on systemic conditions, including diabetes [5]. Similar findings were reported in an Indian context by Agarwal et al. (2021), emphasizing the lack of emphasis on oral-systemic health in the current medical curriculum [6].

In this context, the present study aims to assess the **knowledge and awareness among medical interns at Rama Medical College, Kanpur**, regarding the relationship between periodontal disease and diabetes mellitus. Understanding the knowledge gap at this level of training can guide curriculum development and foster inter-professional collaboration.

MATERIALS AND METHODS: This cross-sectional, questionnaire-based study was conducted among medical interns at Rama Medical College, Kanpur**.** The study was designed to evaluate the interns' knowledge and awareness regarding the interrelationship between periodontal disease and diabetes mellitus. The study has been done among medical interns currently undergoing their compulsory rotatory internship at Rama Medical College, Rama university, Kanpur. Total number of 120 interns is included in this survey study.

Inclusion Criteria

- Medical interns enrolled in internship batch at Rama Medical College, Hospital & Research centre Kanpur.
- Willingness to participate and provide informed consent.

Exclusion Criteria

- Incomplete or incorrectly filled questionnaires.
- Interns who had prior dental training or dual qualifications.

Sample Size and Sampling Technique

A total of **120 interns** were approached using a convenience sampling technique. After excluding incomplete responses, **110** valid responses were included in the final analysis. The sample size was determined based on a confidence level of 95% and an expected awareness rate of 50%, with a margin of error of 5%.

Data Collection

A structured, self-administered questionnaire was used as the data collection tool. The questionnaire consisted of **20 close-ended questions** divided into three sections:

1. **Demographic information** (age, gender, clinical postings completed)
2. **Knowledge-based questions** related to diabetes and periodontal disease
3. **Awareness and attitude-related questions** assessing their perception of interdisciplinary care

The questionnaire was adapted from previously validated tools used in similar studies [7,8], and was reviewed by a panel of experts in periodontology and internal medicine for content validity.

Pilot Study and Reliability

A pilot study was conducted among 20 interns (excluded from the final analysis) to ensure clarity and consistency. Based on pilot results, minor modifications were made. The Cronbach's alpha for internal consistency was found to be **0.81**, indicating good reliability.

Statistical Analysis

Data were entered and analyzed using IBM **SPSS software**. Descriptive statistics (frequency, percentages, mean scores) were used to present baseline characteristics and responses. Chi-square tests were used to assess associations between awareness levels and clinical exposure. A p-value of <0.05 was considered statistically significant.

RESULTS: A total of 110 medical interns from Rama Medical College, Kanpur, participated in the study, with a 100% response rate. The mean age of the participants was between 22–25 years, with a slight predominance of males (54.5%) over females (45.5%). All participants had

completed their internal medicine posting, and 92.7% had also completed their community medicine posting. Only 25.5% reported having attended a lecture, seminar, or workshop on oral health or periodontal disease. (Table 1)

The overall knowledge score ranged from 2 to 10, with a **mean score of 5.9 ± 1.76 (out of 10)**. Based on scoring criteria, **31% (n = 34)** of the interns demonstrated good knowledge (score ≥ 7), **55.5% (n = 61)** showed moderate knowledge (score 4–6), and **13.6% (n = 15)** had poor knowledge (score < 4). (Table 2)

A majority of interns (80.9%) were aware that diabetes can influence oral health, and 71.8% correctly identified periodontal disease as the most common oral manifestation associated with diabetes. However, only 60% were aware of the altered immune response as a major contributing factor linking diabetes and periodontal disease. Similarly, 59.1% of interns recognized that periodontal disease could negatively impact glycemic control in diabetic patients, while only 54.5% were aware of the **bidirectional relationship** between the two conditions. Although 67.3% acknowledged the need for more frequent dental check-ups in diabetic patients, only 51.8% believed that periodontal therapy could improve glycemic control. Moreover, only 35.5% correctly understood that antibiotics are not the primary treatment modality for periodontitis. (Table 3)

In terms of clinical practice, only **22.7%** of interns reported routinely examining the oral cavity of diabetic patients, while **81.8%** said they would refer diabetic patients to a dentist if periodontal symptoms were reported. A strong majority (92.7%) believed that oral health should be integrated into diabetes education, and 95.5% supported the inclusion of oral-systemic disease modules in the medical curriculum. Despite positive attitudes, only **30.9%** of interns felt confident in advising diabetic patients about oral health care, indicating a gap between theoretical knowledge and practical readiness. (Table 4)

TABLES

Table 1: Demographic Data of study Participants (n = 110)

Variable	Frequency (n)	Percentage (%)
1. Age Group		

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22–23 years	48	43.6%
24–25 years	62	56.4%
2. Gender		
Male	60	54.5%
Female	50	45.5%
3. Completed Internal Medicine Posting	110	100%
4. Completed Community Medicine Posting	102	92.7%
5. Attended oral health seminar/workshop	28	25.5%

Table 2: Knowledge-Based Responses (n = 110)

Question	Correct Answer	Correct Responses (n/%)
6. Aware that diabetes can influence oral health?	Yes	89 (80.9%)
7. Most common oral condition linked to diabetes?	Periodontal disease	79 (71.8%)
8. Cause of increased periodontal risk in diabetics?	Altered immune response	66 (60%)
9. Can periodontal disease affect glycemic control?	Yes	65 (59.1%)
10. Is the relationship bidirectional?	Yes	60 (54.5%)
11. Recognize signs of periodontal disease (bleeding gums, etc.)	Multiple correct	77 (70%)
12. Diabetics require more frequent dental check-ups?	Yes	74 (67.3%)
13.Poorly controlled diabetes leads to higher risk of tooth loss?	Yes	66 (60%)
14. Can periodontal therapy improve glycemic control?	Yes	57 (51.8%)

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15. Are antibiotics the main treatment for periodontitis?	No	39 (35.5%)

Table 3: Knowledge level Score Distribution (n = 110)

Knowledge Level	Score Range	Frequency (n)	Percentage (%)
Poor Knowledge	0–3	15	13.6%
Moderate	4–6	61	55.5%
Good	7–10	34	31.0%

Table 4: Awareness and Attitude-Based Responses (n = 110)

Statement	Yes (%)	No (%)	Occasionally / Not Sure (%)
16. Routinely check oral cavity of diabetic patients	25 (22.7%)	69 (62.7%)	16 (14.6%)
17. Would refer diabetic patient to dentist with gum complaints	90 (81.8%)	12 (10.9%)	8 (7.3%)
18. Believe oral health should be part of diabetes education	102 (92.7%)	5 (4.5%)	3 (2.7%)
19. Confident advising diabetic patients about oral hygiene	34 (30.9%)	47 (42.7%)	29 (26.4%)
20. Support curriculum inclusion of oral-systemic health topics	105 (95.5%)	3 (2.7%)	2 (1.8%)

DISCUSSION: This cross-sectional study assessed the knowledge and awareness of medical interns at Rama Medical College, Kanpur, regarding the relationship between periodontal disease and diabetes mellitus—a significant public health concern with increasing global prevalence. The results highlight moderate overall knowledge among interns, with only 31% demonstrating good knowledge, despite nearly 81% acknowledging that diabetes can influence oral health.

The bidirectional relationship between diabetes and periodontal disease is well-documented in the literature. Diabetes increases susceptibility to infections, including periodontal disease, due to impaired immune response and altered wound healing. Conversely, periodontal inflammation can exacerbate insulin resistance, leading to poor glycemic control [9,10]. However, only **54.5%** of interns in our study correctly identified this **two-way relationship**, indicating a significant gap in understanding a critical clinical concept.

Similar results have been reported in prior studies. A study by Al-Khabbaz et al. (2020) among medical students in Kuwait found that while most students were aware of diabetes-related oral complications, only a minority understood the two-way relationship with periodontitis [11]. In an Indian context, Agarwal et al. (2021) found that 58% of medical undergraduates had moderate knowledge, with less than 35% showing comprehensive understanding [12]. Our findings are consistent with these reports and reinforce the need for greater emphasis on oral-systemic interactions in the medical curriculum.

Another concern revealed in this study is the lack of practical engagement with oral health during clinical rotations. Only **22.7%** of interns reported routinely checking the oral cavity of diabetic patients. This is concerning, given that early signs of periodontitis (e.g., gingival bleeding, recession, halitosis) are clinically visible and could be screened even in general practice settings. A study by Sharma et al. (2019) among medical interns in Delhi also reported low screening rates, despite moderate awareness levels [13]. This highlights the need not only for theoretical instruction but also clinical orientation toward interdisciplinary care.

The role of education was clearly evident in our results: interns who had attended oral health-related seminars had significantly higher knowledge scores (**p = 0.01**). This supports evidence from studies by Azodo et al. (2017) and Brailo et al. (2012), which found that continuing medical education programs can significantly enhance awareness about oral-systemic health [14,15].

While **92.7%** of interns in our study agreed that oral health should be part of diabetes education, and **95.5%** supported the inclusion of oral-systemic modules in the curriculum, only **30.9%** felt confident counseling patients. This gap between awareness and self-efficacy suggests a lack of clinical exposure or training in interdisciplinary collaboration.

Addressing this issue requires curriculum reforms, integration of dental professionals in medical teaching sessions, and interdisciplinary workshops. The National Medical Commission (NMC) in India has also emphasized competency-based medical education, which could serve as a platform for integrating oral-systemic health education at the undergraduate level [16].

LIMITATIONS: This study was conducted at a single institution, which may limit the generalizability of results. The use of a self-reported questionnaire may also introduce response bias. However, the sample size was adequate, and the questionnaire was pre-validated and pilot-tested for reliability.

CONCLUSION: The findings of this study underline a **moderate level of knowledge and low clinical integration** of oral-systemic health awareness among medical interns. There is an urgent need to bridge this gap through curriculum innovation, interdisciplinary collaboration, and targeted training modules. Enhancing the understanding of the periodontal-diabetes relationship among future physicians can significantly improve patient outcomes through integrated care.

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