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Awareness of the Association Between Oral Health, Diabetes Mellitus, and Cardiovascular Disease Among Dental Patients

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Abstract

Growing clinical and epidemiological evidence supports a meaningful association between periodontal disease and systemic conditions such as diabetes mellitus and cardiovascular disease. Periodontal inflammation has been implicated in metabolic dysregulation and vascular pathology through inflammatory and microbial pathways[1–3]. However, awareness among patients regarding these interrelationships remains inadequate, particularly in developing countries[4,5]. The present cross-sectional study evaluated awareness among 200 adult dental patients attending a tertiary care institution. Less than half of the participants (46.5%) demonstrated awareness of a relationship between oral and systemic health. Knowledge of the diabetes–periodontal connection (39%) was higher than awareness of cardiovascular implications (29%). Educational status showed a statistically significant association with awareness ($\chi^2 = 9.62$; $p = 0.02$), whereas age and gender were not significantly associated. These findings suggest that although scientific understanding has advanced considerably, translation of this knowledge to patients remains insufficient. Strengthening chairside education and interdisciplinary collaboration may improve oral and systemic health outcomes.

Keywords: Periodontal disease, Diabetes mellitus, Cardiovascular disease, Oral health literacy, Patient awareness

1. Introduction

Oral health is increasingly recognized as an integral component of overall health and well-being[1]. Periodontal disease, a chronic inflammatory condition affecting the supporting tissues of the teeth, is among the most prevalent oral diseases worldwide[2]. Historically regarded as a localized infection, periodontal disease is now understood to exert systemic effects through inflammatory mediators and microbial dissemination[3].

Among systemic conditions associated with periodontal disease, diabetes mellitus has been extensively investigated[4–6]. The relationship is bidirectional: hyperglycemia increases susceptibility to periodontal destruction, while periodontal inflammation adversely affects glycemic control[7,8]. Elevated levels of pro-inflammatory cytokines and advanced glycation end products contribute to tissue breakdown and impaired healing[9]. Evidence suggests that periodontal therapy may result in modest improvement in glycemic control[10].

Similarly, periodontal disease has been linked to cardiovascular disease (CVD) through inflammatory and microbiological mechanisms[11]. Chronic inflammation plays a central role in atherosclerosis[12]. Periodontal pathogens such as *Porphyromonas gingivalis* have been identified in atherosclerotic plaques[13]. Elevated systemic markers including C-reactive protein and interleukin-6 further support this association[14]. Consensus reports acknowledge a significant association between periodontitis and cardiovascular diseases[11,15].

Despite strong scientific evidence, patient awareness of these interrelationships remains limited, especially in developing nations[4,16]. In India, where both diabetes and cardiovascular disease prevalence is high[17], understanding patient awareness becomes particularly

important. The present study was therefore undertaken to assess awareness among dental patients regarding associations between periodontal health, diabetes mellitus, and cardiovascular disease.

2. Materials and Methods

2.1 Study Design and Setting

A descriptive cross-sectional study was conducted in the outpatient department of a tertiary care dental institution over three months.

2.2 Study Population

A total of 200 adult patients aged ≥18 years were included after obtaining written informed consent.

2.3 Inclusion Criteria

• Patients aged ≥18 years
• Willing to participate

2.4 Exclusion Criteria

• Patients unwilling to participate
• Patients unable to complete the questionnaire

2.5 Data Collection Tool

A structured and prevalidated questionnaire was used(APPENDIX 1). It included demographic details and awareness-related questions regarding:

- Oral health–systemic disease association
- Diabetes–periodontal disease relationship
- Cardiovascular disease–periodontal disease relationship

2.6 Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee.

2.7 Statistical Analysis

Data were analyzed using descriptive statistics. The Chi-square test assessed associations between awareness and demographic variables. A p-value <0.05 was considered statistically significant.

3. Results

Table 1: Demographic Characteristics of Study Participants (n = 200)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	112	56.0
	Female	88	44.0
Age (years)	18–24	46	23.0
	25–44	92	46.0
	≥45	62	31.0
Education	Primary	50	25.0
	Secondary	70	35.0
	Higher	80	40.0

Table 2: Awareness Regarding Oral–Systemic Associations

Awareness Parameter	Aware n (%)	Not Aware n (%)
Oral health–systemic disease link	93 (46.5)	107 (53.5)
Diabetes–periodontal disease	78 (39.0)	122 (61.0)
Cardiovascular disease–periodontal disease	58 (29.0)	142 (71.0)

Table 3: Association Between Educational Status and Awareness

Education Level	Aware n (%)	Not Aware n (%)	Total
Primary	12 (24.0)	38 (76.0)	50
Secondary	28 (40.0)	42 (60.0)	70
Higher	53 (66.3)	27 (33.7)	80
Total	93	107	200

Chi-square = 9.62; p = 0.02 (Statistically Significant)

4. Discussion

The present study revealed that fewer than half of the participants were aware of the association between oral and systemic health. These findings align with previous Indian studies reporting inadequate oral health literacy[4],[16].

Awareness of the diabetes–periodontal association was comparatively higher, which may reflect widespread diabetes education initiatives[17]. However, knowledge regarding cardiovascular implications was markedly low. Given the established inflammatory mechanisms linking periodontal disease with atherosclerosis[11],[12], limited patient awareness represents a missed preventive opportunity.

Educational status showed a statistically significant association with awareness. Similar findings have been reported in population-based studies demonstrating the influence of education on health literacy and preventive behavior[18],[19]. No significant association was observed with age or gender, suggesting that knowledge gaps are broadly distributed.

Dentists play a crucial role in bridging this gap. Chairside education, interdisciplinary referrals, and collaboration between dental and medical professionals are essential for translating scientific knowledge into patient understanding.

5. Conclusion

Awareness regarding associations between periodontal disease, diabetes mellitus, and cardiovascular disease remains inadequate among dental patients. Educational interventions and interdisciplinary healthcare strategies are necessary to enhance patient knowledge and improve overall health outcomes.

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APPENDIX I

Questionnaire: Awareness of the Association Between Oral Health, Diabetes Mellitus, and Cardiovascular Disease

Instructions to Participants:

This questionnaire is intended to assess awareness regarding the relationship between oral health and systemic diseases. Your responses will remain confidential and will be used only for research purposes. Kindly tick (✓) the most appropriate option.

Section I: Sociodemographic Details

1. Age (in years):

☐ 18–24

☐ 25–44

☐ ≥45

2. Gender:

☐ Male

☐ Female

☐ Prefer not to say

3. Educational Qualification:

☐ Primary school

☐ Secondary school

☐ Higher secondary

☐ Graduate

☐ Postgraduate

4. Occupation:

☐ Student

☐ Employed

☐ Self-employed

☐ Homemaker

☐ Retired

☐ Other: _____

5. Do you have diabetes?

☐ Yes

☐ No

☐ Not sure

6. Do you have any diagnosed heart disease?

☐ Yes

☐ No

☐ Not sure

Section II: Awareness of Oral–Systemic Link

7. Do you think oral health is related to general body health?

☐ Yes

☐ No

☐ Not sure

8. Have you heard about gum disease (periodontal disease)?

☐ Yes

☐ No

9. Do you think diabetes can affect gum health?

☐ Yes

☐ No

☐ Not sure

10. Do you think gum disease can worsen blood sugar control in diabetic patients?

☐ Yes

☐ No

☐ Not sure

11. Do you believe poor oral hygiene can increase the risk of heart disease?

☐ Yes

☐ No

☐ Not sure

12. Have you ever been informed by a dentist that gum disease may be linked to systemic diseases?

☐ Yes

☐ No

13. Have you ever been informed by a physician about the importance of oral health in systemic disease management?

☐ Yes

☐ No

14. How often do you visit a dentist?

☐ Only when in pain

☐ Once a year

☐ Every 6 months

☐ Never

15. Would you like to receive more information about the relationship between oral health and systemic diseases?

☐ Yes

☐ No

Scoring Criteria (For Research Use Only)

Each correct awareness response = 1 point

Incorrect / Not sure = 0 points

Questions considered for awareness scoring:

Q7, Q9, Q10, Q11

Maximum Score = 4

Awareness Classification:

0–1 = Inadequate awareness

2–4 = Adequate awareness