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## Knowledge and Awareness of Interrelationship of Periodontal Diseases and Systemic Health

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**Abstract**

**Background:** Ensuring overall systemic well-being is crucial, and it hinges on maintaining proper oral health. Various systemic diseases and conditions can affect the periodontium, or conversely, poor periodontal health can impact the overall health of an individual. Despite the known link between oral diseases and numerous non-oral systemic conditions such as cancer, cardiovascular disease, type 2 diabetes, respiratory tract infections, and adverse pregnancy outcomes, this connection often goes overlooked.

**Aim:** This study aimed to assess the knowledge and awareness regarding the interplay between periodontal disease and systemic health among the general population.

**Material & Methods:** A total of 552 individuals participated in the survey. Data collection involved distributing a questionnaire consisting of 15 questions pertaining to general awareness about periodontitis and its implications on systemic health. Participants were asked to select from options of yes, no, or don't know. Awareness levels were analyzed based on age and gender categories.

**Results:** The findings revealed heightened awareness among females and individuals aged between 35 to 50, based on their gender and age group respectively.

**Conclusion:** From this study we can conclude that 42.90% people were aware that good oral health can lead to improvement in the overall health of an individual and we can also conclude that people were least aware about the relationship of periodontal diseases with heart diseases compared to various other systemic diseases. The connection between oral health and overall systemic well-being is frequently disregarded despite its significant influence. Oral health plays a crucial role in maintaining the overall health of individuals. More extensive research on large population is necessary, along with increasing public awareness through organized campaigns about periodontal diseases and their effects on systemic health.

**Keywords:** Awareness, General public, Interrelationship, Oral health, Periodontitis, Systemic health

**Introduction:** Periodontal disease is widespread and contributes significantly to the global burden of chronic illnesses, posing a significant public health challenge. Oral health, including periodontal health, is crucial for overall well-being. There are strong connections between periodontitis and various systemic conditions like heart disease, diabetes, and adverse pregnancy outcomes. Periodontitis can trigger systemic inflammation, affecting overall health. Effective prevention and management of periodontal disease rely on awareness, understanding of its causes, early symptom detection, and proper treatment<sup>[1]</sup>

The main cause of periodontal disease is the buildup of dental plaque, which creates pockets in the gums and eventually damages the gum tissues. Without treatment, periodontal disease can lead to tooth loss and has been linked to several systemic health issues<sup>[2]</sup>

Research indicates that the persistent inflammation and bacterial infections linked to periodontitis may heighten the likelihood of developing atherosclerosis and experiencing cardiovascular incidents like heart attacks and strokes.<sup>[2]</sup>

Diabetic individuals face an increased risk of severe periodontitis because their impaired wound healing, weakened immune response, and altered collagen metabolism make them more vulnerable. Conversely, periodontal disease can exacerbate glycemic control in diabetics, potentially leading to more severe complications.<sup>[2]</sup>

Research utilizing both cross-sectional and longitudinal data consistently confirms that smoking is associated with a higher risk of developing periodontal disease, indicated by clinical attachment loss and alveolar bone loss. Furthermore, smoking can also diminish the likelihood of treatment success.<sup>[3]</sup>

Numerous studies have noted the crucial link between maintaining healthy gingiva and a well-rounded diet. Investigations have sought to establish connections between tooth loss, gingival health, and dietary factors. Furthermore, various vitamins, minerals, and trace elements have been found to influence bone development and the regeneration of periodontal tissues.<sup>[4]</sup>

Despite the growing evidence backing the connection between periodontal disease and overall health, there is still a notable lack of awareness about this relationship among individuals.

The objective of this study is to evaluate the level of awareness regarding the connection between periodontal disease and overall health among individuals visiting the outpatient department (OPD) of the Faculty of Dental Science, Dharmsinh Desai University, Nadiad, Gujarat, India.

### **Materials and methods**

**Inclusion criteria:** A total of 552 individuals outpatients aged 20 years and above, visiting the outpatient department (OPD) of Faculty of Dental Science, Dharmsinh Desai University, Nadiad, Gujarat, India, were enrolled in the study.

### **Exclusion criteria**

(a) Patients lacking formal education and (b) individuals with medical, dental, or paramedical backgrounds were excluded.

A questionnaire comprising of 15 questions regarding the correlation between periodontal health and overall well-being, along with demographic information, was administered to the patients. The questions were categorized based on awareness levels regarding periodontitis and its association with various factors such as smoking, nutrition, diabetes, cardiovascular disease, and pregnancy. Participants were given three response options: YES, NO, and DON'T KNOW. Subsequently, their responses were evaluated.

The questions were divided into six groups:

- Group A: General awareness about periodontitis
- Group B: Relationship between smoking and periodontitis
- Group C: Impact of nutrition on periodontium
- Group D: Influence of diabetes on periodontium
- Group E: Effects of cardiovascular system on periodontium
- Group F: Effects of pregnancy on periodontium.

Participants were analyzed based on age and gender demographics.

**Statistical analysis:** The current study employed both descriptive and inferential statistical analyses. Continuous measurements were summarized using Mean  $\pm$  SD, while categorical measurements were expressed as number (%). A significance level of p=0.05 was set, with values equal to or below considered statistically significant. Chi-square analysis assessed the significance of categorical study parameters. Data analysis was conducted using IBM SPSS Statistics 20.0, while Microsoft Word and Excel were utilized for generating graphs and tables.

**Results:** The study comprised of 552 general population attending the OPD of Faculty of Dental Science, Dharmashinh Desai University, Nadiad, Gujarat, India. Out of 552 individuals, according to gender specification, 284 were females and 268 were males. According to agegroup, 209 individuals were <35 years, 203 individuals were 35–50 years, and 140individuals were >50 years.

Out of 552 participants, 42.60% were aware of gum disease (periodontitis), while 30.80% were unaware, and 26.80% had no knowledge of it.Regarding symptoms, 45.10% were aware of bleeding gums, loose teeth, and pus discharge, while 33.20% were unaware, and 21.70% had no idea.

In terms of prevention, 46.90% knew gum diseases were preventable, 22.80% thought it was not possible, and 30.30% were unaware.

Regarding hereditary factors, 29% believed gum diseases were hereditary, 36.40% didn't believe, and 34.60% didn't know.

46.70 %participants were aware that gum disease is a leading cause of bad breath, while 25.70 % disagree and 27.50% were unaware.

Regarding the relationship between good oral health and overall health, 42.90% were aware, 26.80% disagree, and 30.30% were unaware.

45.80% participants were aware that most smokers have severe gum disease, 27.90% disagree, and 26.30% were unaware. 37% were aware that nutritional deficiencies in the diet can lead to oral ulcers and bleeding gums, while 32.40% disagreed, and 30.60% were unaware.

37.90% knew that patients with high sugar levels have a higher incidence of tooth loss, while 31.90% disagreed, and 30.30% didn't know.35% knew that high blood sugar levels can increase the risk of infection in the oral cavity, while 28.60% disagreed, and 36.40% were unaware.36.40%are aware that gum disease can affect blood glucose levels in diabetic patients, while 30.60% disagree and 33% don't know.

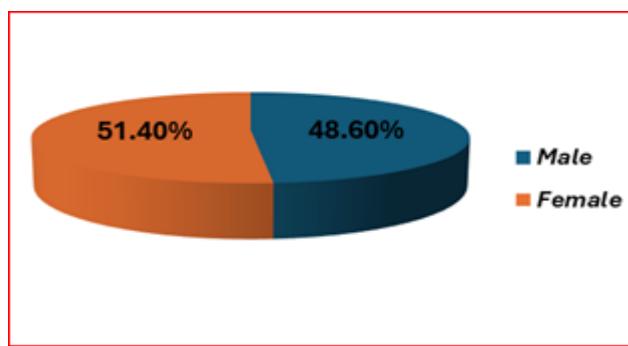
30.10% know that gum diseases can lead to various heart diseases, while 37.10% disagree and 32.80% were unaware. 28.40% know that certain tablets given for blood pressure can increase the size of the gums, while 32.80% disagree and 38.80% were unaware.26.80% were aware of the increased tendency for bleeding gums and gum enlargement during pregnancy, while 31.50% disagree and 41.70% were unaware.

31.70 % participants were aware that gum disease in pregnant women can cause premature deliveries and low birth weight babies, while 34.40% disagree and 34.20% do not know.

#### A. Figures

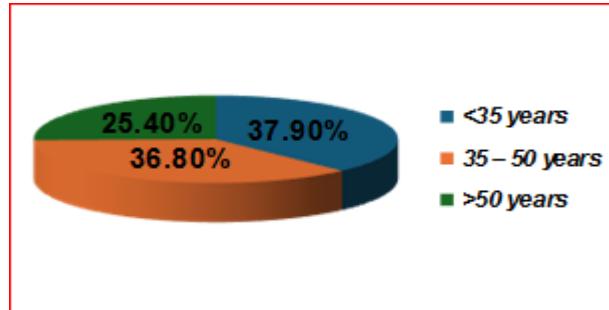
**Figure 1: Demographic characteristics of the study participants (N=552)**

Females were found to have higher level of awareness than males



Awareness based on gender. Females have higher awareness than males in all question categories.

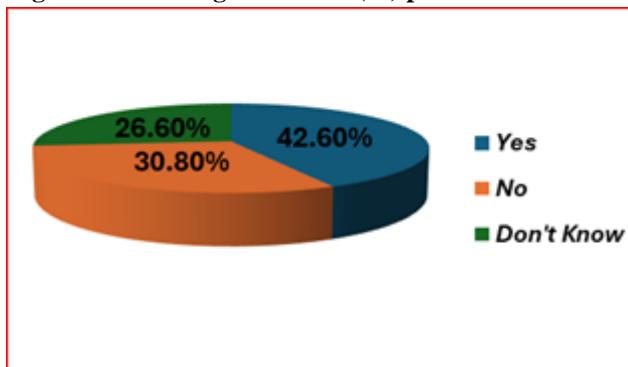
Based on the age group on an average, the group of individuals 35–50 years were found to have higher awareness level than the other two groups



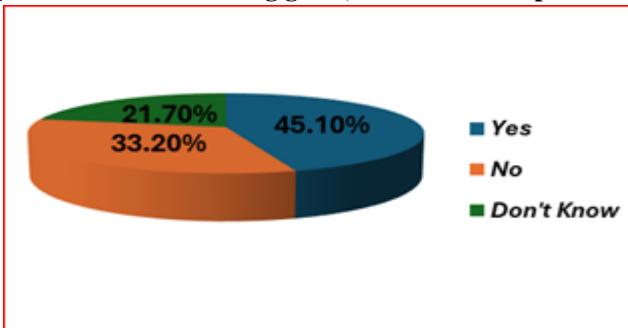
Awareness based on age group. 35–53 year age group have higher awareness level in all question categories

**Figure 2: Descriptive statistics (N=552)**

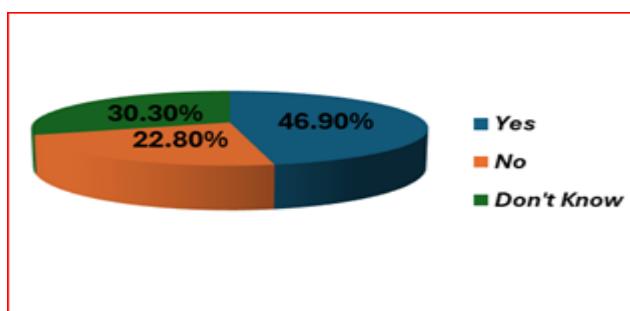
1) Are you aware of disease affecting the gums known as gum disease (or) periodontitis?



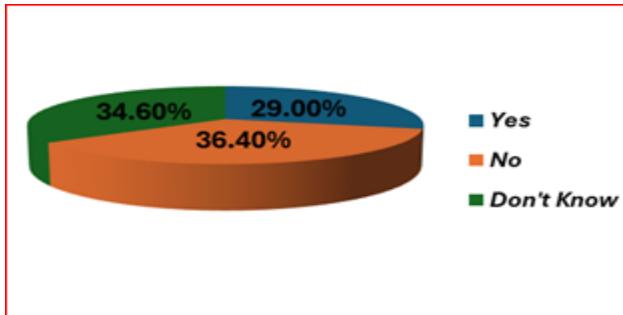
2) Are you aware of the symptoms of gum disease like bleeding gums, loose teeth and pus discharge?



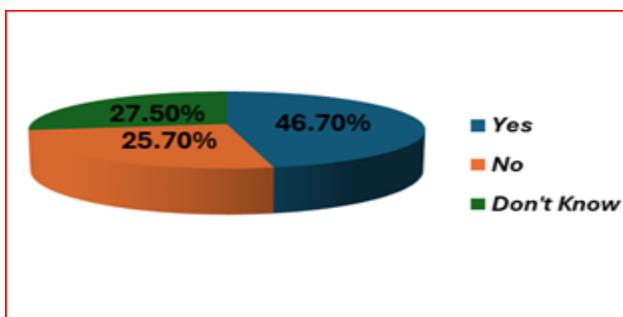
3) Do you think gum diseases are preventable?



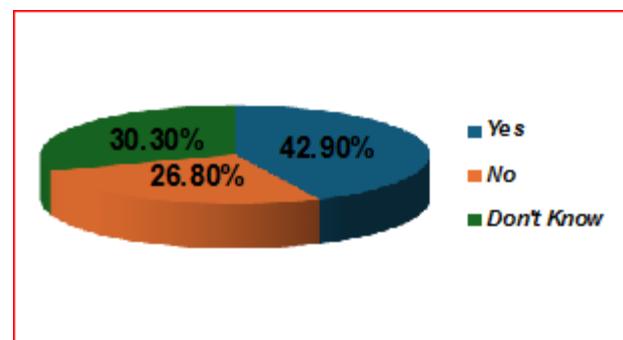
4) Do you think gum diseases are hereditary?



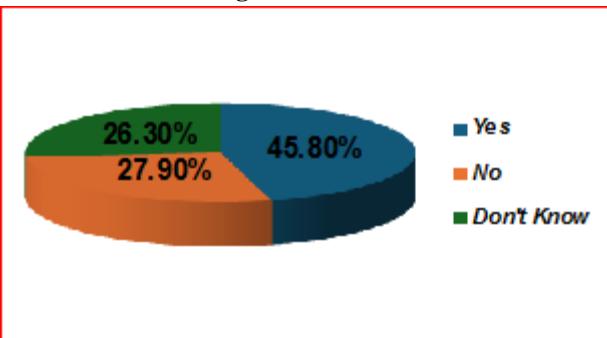
5) Do you know that gum disease is one of the main reasons for causing bad breath?



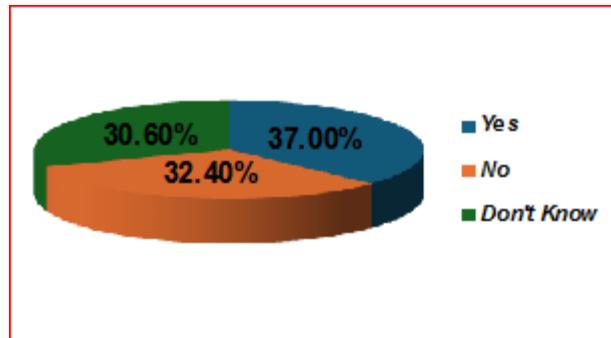
6) Are you aware that good oral health can lead to improvement in the overall health of an individual?



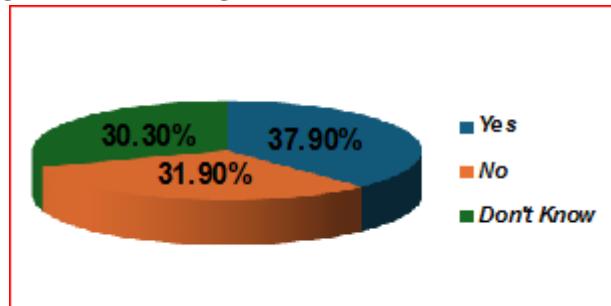
7) Are you aware that a majority of smokers have severe gum disease?



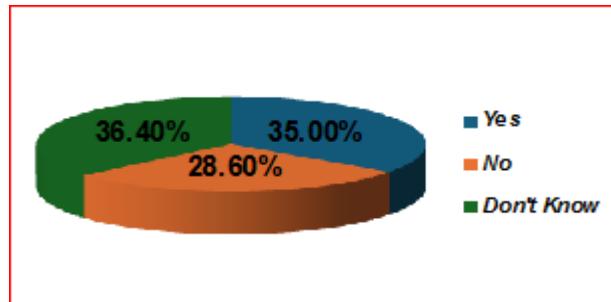
8) Are you aware that nutritional deficiencies (vitamins) in the diet can lead to oral ulcers and bleeding gums?



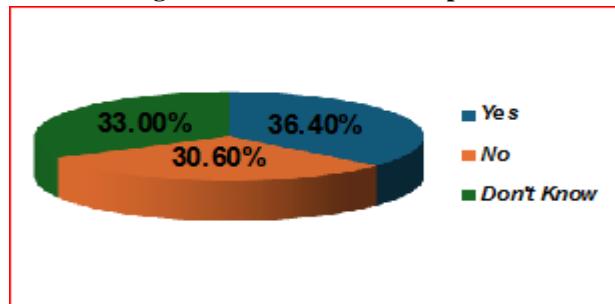
9) Do you know patients with high sugar levels have a higher incidence of tooth loss?



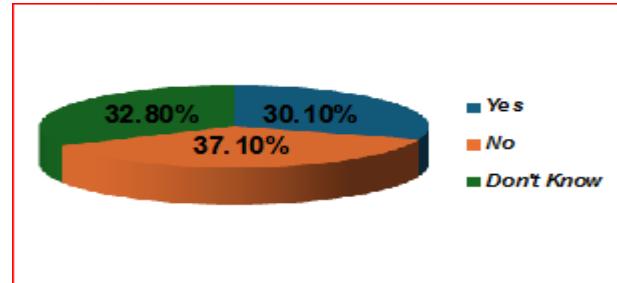
10) Do you know that high blood sugar levels can increase the risk of infection in the oral cavity?



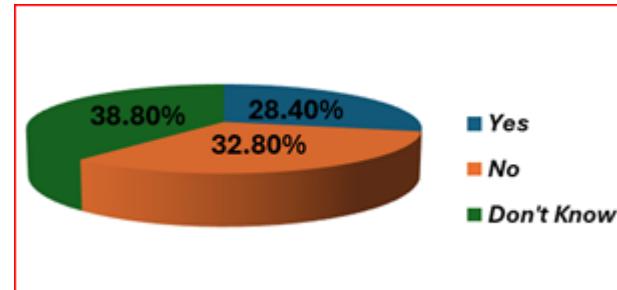
11) Do you think gum disease can affect blood glucose level in a diabetic patient?



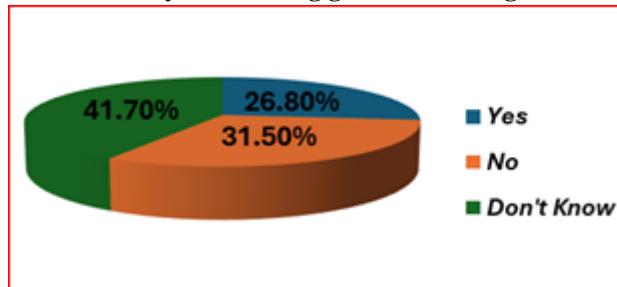
12) Are you aware that gum diseases can lead to various heart diseases



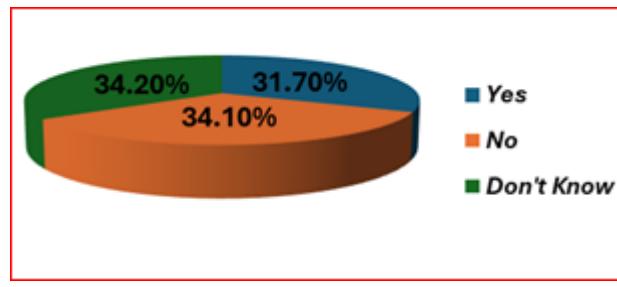
13) Do you know certain tablets given for blood pressure can increase the size of the gums?



14) Do you know that there is an increased tendency for bleeding gums and enlargement of gums during pregnancy?



15) Are you aware that gum disease in pregnant women can cause premature deliveries, low birth weight babies?



**Discussion:** The build-up of plaque and calculus triggers a series of reactions leading to gingivitis and, if left untreated, periodontitis.<sup>[5][6]</sup> Poor oral health not only causes these conditions but also impacts overall health, with periodontitis having connections to various systems such as the endocrine and cardiovascular systems.<sup>[7]</sup> Understanding these connections can improve both oral and systemic health.<sup>[8][9]</sup> Our study found that females exhibited a higher awareness level than males, consistent with previous findings suggesting a greater awareness among females regarding periodontitis and its systemic implications.<sup>[10]</sup>

Interestingly, in our study, the 35–50 age group showed a greater awareness compared to other age groups.<sup>[11]</sup> Nevertheless, our study highlights a concerning lack of awareness regarding the adverse effects of periodontal disease on pregnancy. Elevated levels of Prostaglandin E2, indicative of chronic inflammation like periodontitis, have been associated with pregnancy complications such as low birth weight, preterm delivery, and preeclampsia.<sup>[12][13][14]</sup> Interdisciplinary approaches to oral healthcare during pregnancy can significantly improve maternal and fetal health outcomes. It is imperative to implement stringent oral hygiene programs for pregnant women starting from their first trimester.

The prevalence of patients taking antihypertensive medications for hypertension is concerning, with minimal awareness among patients regarding the potential side effect of gingival hyperplasia associated with some of these drugs. It is crucial to educate cardiac patients about the potential risk of cardiovascular events due to periodontitis.

Our study revealed a general awareness among the public regarding the connection between periodontal disease and overall health. Therefore, with proper patient motivation, maintaining periodontal health and achieving good oral hygiene should be feasible.

Patients with systemic diseases should be identified and encouraged to adhere to regular recall visits in dental outpatient departments to ensure optimal oral health management.

**Conclusion:** From this study we can conclude that 42.90% people were aware that good oral health can lead to improvement in the overall health of an individual and we can also conclude that people were least aware about the relationship of periodontal diseases with heart diseases compared to various other systemic diseases.

The general population requires education on the importance of maintaining good oral hygiene. Treating periodontitis has been shown to reduce the risk of cardiovascular events such as atherosclerosis in cardiac patients and can also affect the occurrence of premature childbirth and low birth weight in babies.<sup>[15][16]</sup> It is crucial to highlight the influence of nutritious diet on periodontal health to patients. Moreover, integrating periodontal healthcare into primary and community health services is essential.<sup>[17][18]</sup> Dental awareness should be heightened through awareness campaigns, outreach programs, and social media initiatives.

This study is limited to people attending our institute that is Faculty of Dental Science, Dharmsinh Desai University, Nadiad, Gujarat, India. Further research is warranted with larger sample sizes and tailored questionnaires to assess specific systemic complications and evaluate the outcomes of our study. Patients with systemic conditions affecting oral health should be included in a recall visit protocol to promote their overall well-being.

**QUESTIONNAIRE**NAME:  
Questionnaire

AGE: M/F

Yes/No/Don't No

- 1) Are you aware of disease affecting the gums known as gum disease (or) periodontitis?
- 2) Are you aware about the symptoms of gum disease like bleeding gums, loose teeth and pus discharge?
- 3) Do you think gum diseases are preventable?
- 4) Do you think gum diseases are hereditary?
- 5) Do you know that gum disease is one of the main reasons for causing bad breath?
- 6) Are you aware that good oral health can lead to improvement in overall health of an individual?
- 7) Are you aware that a majority of smokers have severe gum disease?
- 8) Are you aware that nutritional deficiencies (vitamins) in the diet can lead to oral ulcers and bleeding gums?
- 9) Did you know patients with high sugar level have higher incidence of tooth loss?
- 10) Did you know that high blood sugar level can increase the risk of infection in the oral cavity?
- 11) Do you think gum disease can affect blood glucose level in a sugar patient?
- 12) Were you aware that microbes causing gum disease can lead to narrowing of the blood vessel supplying the heart, leading to various heart diseases?
- 13) Did you know certain tablets given for blood pressure can increase the size of the gums?
- 14) Do you know that there is an increased tendency for bleeding gums and enlargement of gums during pregnancy?
- 15) Are you aware that gum disease can cause premature deliveries, low birth weight babies?

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