

# Perception of Oral Health as a Window to General Health: A Study among Postgraduate Medical Students

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## ABSTRACT

**Objectives:** The state of one's oral health plays a significant role in overall health. Numerous studies have demonstrated that the oral cavity can show symptoms of many systemic diseases and functions as a predictor of oral health. The primary aim of this research was to evaluate the awareness concerning the relationship between oral health and systemic health among postgraduate medical students.

**Material and Methods:** A total of 200 medical postgraduates participated in the study, and a questionnaire concerning the relationship between oral and systemic health was distributed via Google Forms. Informed consent was acquired from all participants, and demographic information was gathered for the study participants. The data that was collected was recorded in Microsoft Excel and was subjected to statistical evaluation.

**Results:** The outcomes were organized concerning the knowledge and awareness of oral and systemic diseases among the postgraduates using a Google Form. All of the 200 participants possessed knowledge about the interconnection of oral and systemic health, yet the application of this knowledge in managing medically complex patients was limited.

**Conclusion:** An increased emphasis should be placed on this association by incorporating interprofessional (medical and dental) training from the undergraduate level, which can be rectified by adjusting the academic regulations. Regular continuing education programs should be held to educate dental, medical, and other healthcare professionals regarding the substantial and up-to-date evidence of the oral-systemic relationship.

**Keywords:** Postgraduates, oral health, systemic health

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## INTRODUCTION

Oral health represents a vital part of general health and well-being, yet it is often disregarded. A growing body of scientific evidence emphasizes a strong synergistic relationship between oral diseases, specifically periodontal disease and systemic ailments such as diabetes mellitus, cardiovascular diseases, respiratory infections, detrimental pregnancy outcomes, and rheumatoid arthritis.<sup>[1]</sup> Regardless of this, oral health education remains limited yet fragmented in many medical curricula worldwide.<sup>[2]</sup> There is a crucial need to bridge this gap by emphasizing the interrelation of oral and systemic health to future physicians during their formative training.

Oral diseases are not isolated occurrences; they share common risk factors with significant non-communicable diseases, including tobacco use, poor dietary habits, alcohol intake, and insufficient oral hygiene.<sup>[3]</sup> These shared causes emphasize the need to incorporate oral health into the larger scope of non-communicable disease prevention and management. Moreover, systemic diseases frequently present with oral manifestations—such as gingival bleeding in leukemia, candidiasis in HIV, or dry mouth in autoimmune conditions—making it crucial for medical professionals to recognize these signs early in the diagnostic process.

Therefore, integrating the examination of oral-systemic health connections into medical education will improve the future generation of healthcare providers. It prepares medical students to approach the human body holistically, identify key oral indicators of systemic diseases, contribute to improving population health, and promote interprofessional collaboration with dental practitioners.<sup>[4]</sup> Such integration will help knock down the prevailing split

between medicine and dentistry, ultimately advancing the quality and equity of healthcare. With this background present study was designed to Assess The Perception of Oral Health as a Window to General Health among the Postgraduate Medical students.

### MATERIAL AND METHODS

This online-based questionnaire survey involved an estimated sample of 200 participants, specifically targeting postgraduates who were curious about the study. The participants were postgraduate students from Krishna Vishwa Vidhyapeet, Karad. Approval for this research was authorized by the Institutional Ethical Committee. [Ref.No. KVV/IEC/06/2025]

Sample size calculation –

The sample size of 200 students was obtained by the below mentioned formula.

Hence,

$$\text{Sample size (N)} = Z^2 Pq / L^2$$

Z = standard normal variable at 95%;

Confidence interval CI= 1.96

P= Factor of interest among the students= 50%

$$q = 100 - P = 100 - 50 = 50$$

$$L = \text{Margin at error at 93\% CI} = 7$$

Therefore,

$$N = (1.96)^2 (50)(50) / (7)^2$$

$$N = 10,000 / 49$$

$$N = 196$$

$$N = 200 \text{ (postgraduate students)}$$

Postgraduates from both dental and medical fields, who were willing to participate in this research, were included in the study. Forms that were incomplete and individuals who declined to participate were excluded from the study.

This questionnaire study was undertaken by means of Google Forms. The google forms survey link with a set of 10 questions was distributed among the postgraduate medical students of Krishna Vishwa Vidyapeeth through official channels, social media, and direct emails, after the due approval of ethical committee. The questionnaire is included with set of 10 questions with responses as yes/no, agree/disagree and different options.

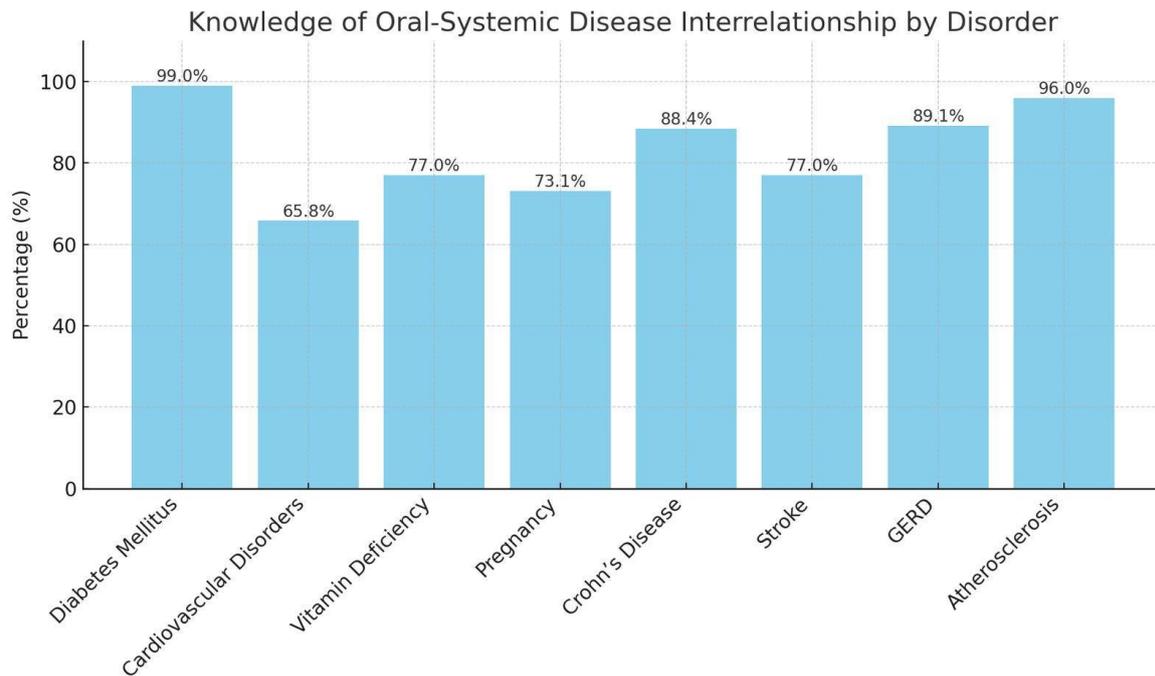
### RESULTS

A total of 200 postgraduate medical students participated in the study. The age of the participants ranged from 25 to 35 years, and females (127) were more than males (73).

**Table 1- Frequency table for demographic details of study participants.**

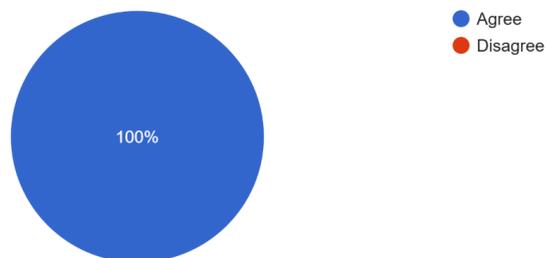
VARIABLES		FREQUENCY (n)	PERCENTAGE (%)
<b>Age</b>			
	25-30 years	178	89%
	31-35 years	22	11%
	Total	200	100
<b>Gender</b>			
	Male	73	36.5%
	Female	127	63.5%
	Total	200	100

**Figure 1- Association of knowledge of oral-systemic disease among the participants based on various systemic disorders**



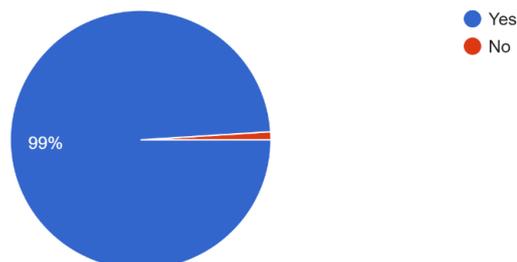
**Graph 1** – Illustrating knowledge and awareness of systemic and oral health among the participants. About 200 participants confirmed that a link exists between oral and systemic diseases in our study.

1. Did you know oral health is associated with systemic health?  
200 responses



**Graph 2-** Relationship between periodontal disease and diabetes, along with poor glycaemic control. In our investigation, 99 % of participants acknowledged this correlation.

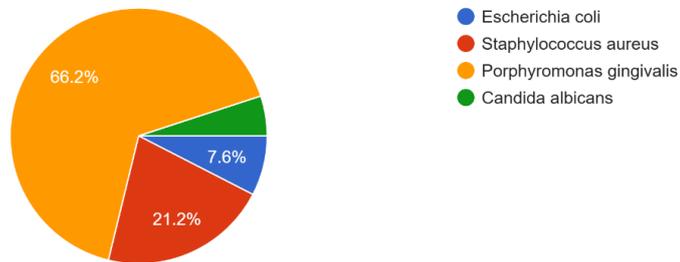
2. Periodontal disease contributes to poor glycaemic control in people with diabetes ?  
200 responses



**Graph 3-** The microbes associated with gum diseases that are linked to heart diseases are represented.

A total of 131 participants concurred that *P. gingivalis* may play a role in heart diseases, while the fewest votes were cast for *Candida albicans*.

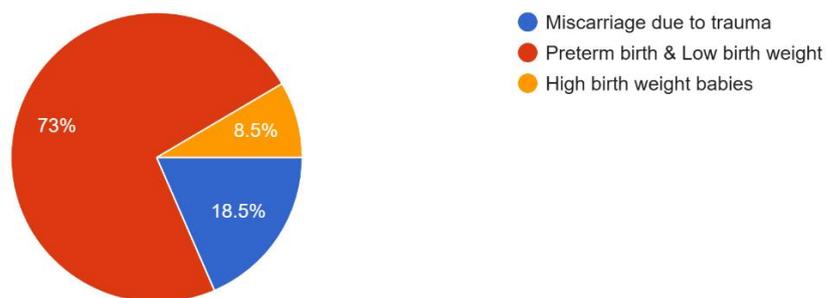
3. Which bacteria commonly found in gum disease is also linked to heart disease?  
198 responses



**Graph 4-** Demonstrating the risks associated with untreated gum diseases during pregnancy.

A maximum of 73% of participants recognized that gum disease could result in preterm birth and low birth weight, while only 8.5% indicated a belief in the possibility of high birth weight babies.

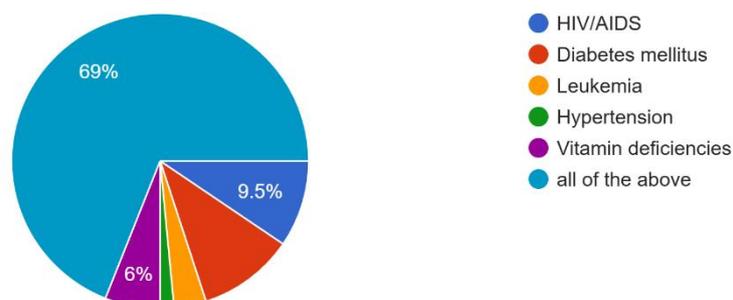
4. Pregnant women with untreated gum disease are at a higher risk for:  
200 responses



**Graph 5-** Representing oral manifestations in some systemic diseases.

A significant 69% of participants voting for all mentioned conditions, including AIDS, hypertension, diabetes, leukemia, and vitamin deficiency, while merely 1.5% opted for hypertension exclusively.

5. Oral manifestations can be the first sign of which systemic conditions?  
200 responses

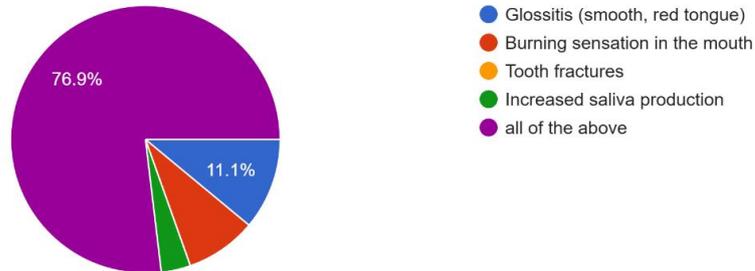


**Graph 6-** Portraying the oral manifestations linked to vitamin B12 deficiency.

76.9% of individuals voted for all symptoms, including glossitis, burning mouth, tooth fracture, and hypersalivation, while a minimum of 3.5% voted exclusively for hypersalivation.

6. What oral signs might indicate vitamin B12 deficiency?

199 responses

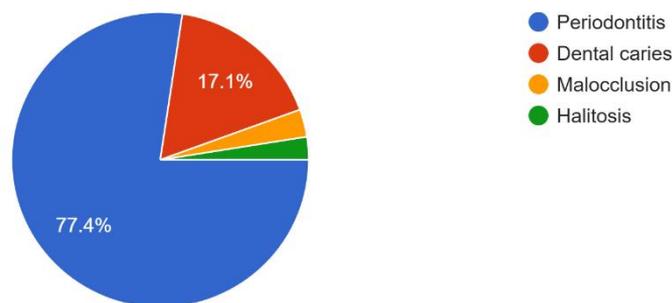


**Graph 7-** Reflecting on the oral conditions related to stroke.

A notable 77.4% reported that periodontitis raises the likelihood of stroke, while a mere 2.5% considered halitosis to be a risk for stroke.

7. Which oral health condition is linked to increased risk of stroke?

199 responses

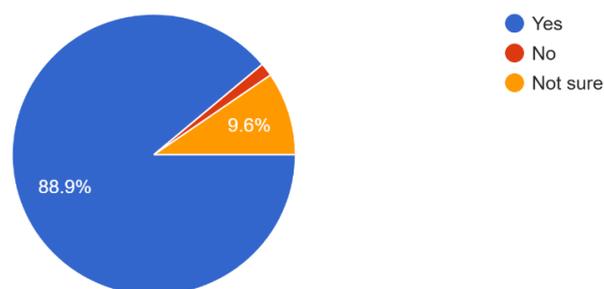


**Graph 8-** Demonstrating oral symptoms associated with Crohn's disease, such as recurrent aphthous ulcers and mucosal swelling.

A maximum of 88.9% of individuals were aware of the condition, while 1.5% were not aware.

8. Recurrent aphthous ulceration and mucosal swelling can occur in patients with Crohn's disease ?

198 responses

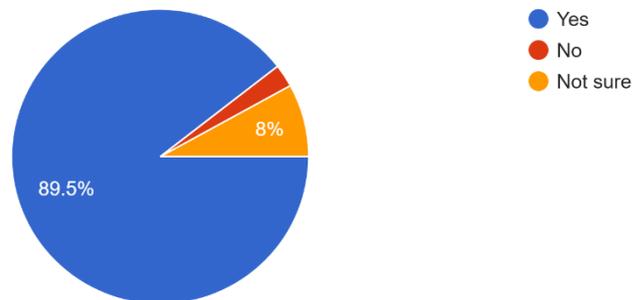


**Graph 9-** Association between GERD and dental disorders .

Approximately 89.5% of respondents concurred with this condition, while a minimal 2.5% disagreed.

9. Dental erosion with dentin hypersensitivity or irreversible pulp changes can be seen in patients with Gastro-esophageal reflux disease

200 responses

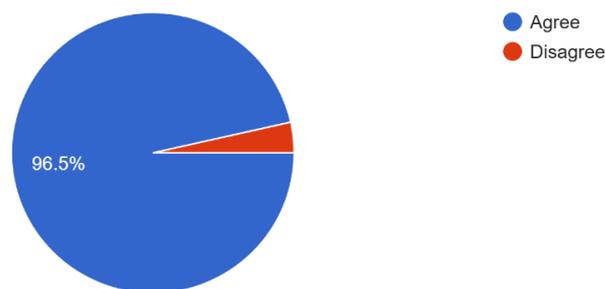


**Graph 10-** The preliminary role of oral bacteria in the advancement of atherosclerosis

This has been acknowledged by approximately 96.5% of respondents, while 3.5% expressed disagreement regarding this matter.

10. Oral bacteria plays a significant role in the initiation and progression of atherosclerosis

199 responses



## DISCUSSION

The oral cavity is often called the "Mirror of the body," as it reflects both localized and widespread pathologies.<sup>[5]</sup> It is seen as the gateway to the body and is a hub for a constant influx of invaders, including bacteria, viruses, parasites, and fungi. Nevertheless, oral health has been treated as a distinct domain, primarily under the purview of dental professionals. This separation has continued despite scientific evidence that highlights the connection between oral and systemic health. Over time, studies have revealed a significant association between oral diseases, especially periodontitis and dental caries, and systemic illnesses such as diabetes mellitus, cardiovascular diseases, respiratory infections, adverse pregnancy outcomes, rheumatoid arthritis, and renal disorders.

A significant variety of oral mucosal lesions, such as lichen planus, recurrent aphthous ulcers, gingivitis, periodontitis, salivary dysfunction, and candidiasis, have been documented in patients with diabetes mellitus.<sup>[6]</sup> Recent research indicates a connection between gum disease and rheumatoid arthritis, especially the role of *Porphyromonas gingivalis*, which incites inflammation and contributes to the worsening of rheumatoid arthritis.<sup>[7]</sup> Patients with hematologic diseases and nutritional deficiency may exhibit oral manifestations like gum bleeding, glossitis, aphthous ulcers, and burning mouth. Similarly, cardiovascular disease has been linked to oral pathogens that enter the circulatory system through inflamed gingival tissue, leading to the formation of atherosclerotic plaques. Oral manifestations such as uremic stomatitis, glossitis, dysgeusia, and candidiasis may be suggestive of renal or gastric disorders. In addition, oral candidiasis, hairy leukoplakia, and gum diseases serve as early indicators of autoimmune diseases like HIV.

Throughout our study, all 200 participants confirmed the association between oral and systemic diseases. The age range of participants was from 25 to 35 years, with a greater number of females (127) than males (73). In contrast, Sahni P et al. found that 66 out of 100 participants were aware of the oral-systemic link.<sup>[8]</sup> Additionally, Pisani F et al. indicated that 91.4% of 122 participants recognized this same connection.<sup>[9]</sup>

Existing evidence highlights multiple associations between oral diseases like periodontitis, tooth loss, and oral cancer and diabetes mellitus. Although those with diabetes are generally more susceptible to post-surgical complications, there is minimal evidence to support that they are at an elevated risk after oral cavity surgeries. The knowledge rate among participants regarding the association between periodontal disease and diabetes stands at 99%, contrasting with the findings of Behl S et al., which reported awareness rates of 75.2% among 150 participants,<sup>[10]</sup> and Mani S et al., who found a rate of 62.6% among 200 participants.<sup>[11]</sup>

The correlation between periodontal diseases and adverse pregnancy outcomes, such as premature birth, low birth-weight infants, and preeclampsia, has gained substantial attention in recent years. Studies conducted in recent years have revealed that gingival inflammation in pregnant women significantly increases and peaks during the third trimester, only subsiding three months postpartum. Oral bacteria may translocate directly into the pregnant woman's system, potentially reaching the womb and causing localized inflammation and adverse pregnancy outcomes. In our research, 73% of participants were aware of the link between gum diseases and pregnancy. However, Mani S et al. reported that 54.5% of participants out of 200 were aware of the effects of gum disease on pregnancy.<sup>[11]</sup> Al Halal H et al. conducted a study where 281 (73.2%) out of 381 participants recognized that pregnant women with gum diseases are at a higher risk of preterm birth, low birth weight, and gestational diabetes.<sup>[12]</sup>

The global burden of disability and mortality associated with strokes has been increasing up to this point. Oral bacteria possess the capability to access the blood vessels within the brain, leading to bacteraemia, which may trigger localized inflammation and the discharge of detrimental toxins. This sequence of events may lead to the obstruction or rupture of blood vessels, ultimately resulting in a stroke. Oral infections, such as periodontitis, consistently activate immune responses and systemic inflammation, which are critical factors in the development of strokes.<sup>[13]</sup> Siregar D et al. performed a study on the knowledge of the oral cavity in relation to systemic diseases, where 55 out of 140 participants identified that periodontitis increases the risk of stroke.<sup>[14]</sup> In our study, 77.7% of participants demonstrated awareness of this issue.

Dental health issues may serve as early indicators of heart problems. Research has shown a growing link between poor oral hygiene and cardiovascular conditions, including heart disease, blocked arteries, and stroke. The connection is attributed to inflammation; bacteria from infected gums may enter the bloodstream, leading to inflammation in blood vessels and increasing the likelihood of atherosclerosis. Approximately 192 participants recognized that oral bacteria contribute to the progression of atherosclerosis, whereas in the study conducted by Siregar D et al., 114 out of 140 participants acknowledged a similar finding.<sup>[14]</sup>

A significant array of gastrointestinal disorders can result in modifications to the hard and soft tissues found in the mouth. Among these disorders are Crohn's disease, ulcerative colitis, celiac disease, and gastroesophageal reflux disease (GERD). The dental impacts of gastrointestinal disorders are chiefly characterized by tooth erosion, sensitivity, pulpitis, reduced taste sensation, erythema, mucosal atrophy, and loss of teeth. These lesions can lead to significant functional and aesthetic impairments, thereby negatively affecting the quality of life for patients.<sup>[15]</sup> Mu'taz M et al. and colleagues carried out a cross-sectional study examining the awareness of GERD among medical students. In their research, approximately 8% of the 350 participants recognized the loss of dental enamel as a consequence of GERD.<sup>[16]</sup> In contrast, our study found that about 89.5% of participants were aware of this issue. Undernutrition exacerbates the severity of oral mucosal and periodontal diseases and serves as a contributing factor to the life-threatening condition known as noma. In particular, a deficiency in vitamin B12 can lead to gum disease and oral infections. Low levels of B12 may result in mouth sores, ulcers, and a swollen tongue.<sup>[17]</sup> A questionnaire-based study was conducted by Packyanathan JS et al. among the general population. About 94% of the 158 participants acknowledged the essential role of vitamin B12 in overall nutrition. In comparison, our study found that only 76.9% had similar awareness.<sup>[18]</sup>

Nevertheless, in settings with limited resources, where access to dental care is restricted, physicians often serve as the sole healthcare professionals available for interaction. In these circumstances, their capacity to assess oral health and initiate suitable interventions can significantly impact lives. Thus, the integration of oral health into general medical training is not only clinically significant but also vital for reducing health disparities and enhancing health outcomes across diverse populations.<sup>[19]</sup>

In addition, the collaboration between medicine and dentistry has been restricted due to educational silos. Medical students receive only a minimal amount of exposure to dental professionals during their training. This barrier fosters fragmented care and hinders the development of team-based approaches to patient management. By merging the study of oral and systemic health, they will be better prepared to engage in meaningful collaboration with dentists, contribute to team-oriented planning, and provide more comprehensive healthcare services to patients.<sup>[20]</sup>

## CONCLUSION

All participants in our study demonstrated awareness of the link between oral health and systemic health. The majority showed knowledge and understanding of key associations, including the relationship between periodontal diseases and

diabetes, the role of *Porphyromonas gingivalis* in heart disease, the impact of untreated gum disease on adverse pregnancy outcomes, and the oral manifestations of vitamin B12 deficiency. Additionally, participants recognized the increased risk of stroke associated with periodontitis, the oral indicators of gastrointestinal disorders, and the role of oral bacteria in the progression of atherosclerosis. Hence, we can assert that the mouth is much more than a means of expression or nutrition—it is a reflection of the body's overall health.

#### **Ethical approval**

The author(s) declare that they have taken the ethical approval from the Institutional Ethical Committee [Ref.No. KVV/IEC/06/2025]

#### **Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent

#### **Financial support and sponsorship**

Nil

#### **Conflicts of interest**

There are no conflicts of interest.

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#### Table legend

Table 1- Frequency table for demographic details of study participants.

#### Figure legend

Figure1- Association of knowledge of oral-systemic disease among the participants based on various systemic disorders

#### Graph Legend

- Graph 1- knowledge and awareness of systemic and oral health.
- Graph 2- Relationship between periodontal disease and diabetes.
- Graph 3- Microbes associated with gum diseases that are linked to heart diseases.
- Graph 4- Risks associated with untreated gum disease during pregnancy.
- Graph 5- Oral manifestations in systemic diseases.
- Graph 6- Oral manifestations linked to vitamin B12 deficiency.
- Graph 7- Oral conditions related to stroke.
- Graph 8- Oral symptoms associated with Crohn's disease.
- Graph 9- Oral manifestations of GERD.
- Graph 10- Role of oral bacteria in the advancement of atherosclerosis.