

# Awareness of Periodontal Disease and Systemic Health Inter-relationship amongst the General Population of Lucknow: A Cross-sectional Survey

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## ABSTRACT

**Aim:** The aim of the present study was to assess the knowledge of the general population of Lucknow towards oral - systemic disease interlink with the help of a questionnaire survey.

**Material and Methods:** A total of 500 subjects (225 males and 275 females) were included during the study period from August 2013 to October 2013. Data were collected based on the Questionnaire format distributed among the patients. The data were divided into four categories: illiterate (E0), undergraduates (E1), graduates (E2) and postgraduates (E3) and the scoring number was defined to assess their knowledge as poor, fair and good.

**Result:** Results of this study illustrated that postgraduates had a good knowledge (72.6%) about this interrelationship, undergraduates and graduates had fair knowledge (50-60%), and 80% of unlettered people had poor knowledge. With increasing education, the proportion of subjects with fair to good knowledge increased significantly ( $p \leq 0.001$ ).

**Conclusion:** There is a need for the interdisciplinary approach for the prevention of systemic disease by

integration of periodontal care and vice versa. The study concluded that the level of awareness regarding periodontal disease and systemic health interrelationship is limited, and efforts should be made to increase awareness amongst the population of Lucknow.

**Keywords:** Awareness, periodontal disease, inter-relationship, systemic conditions.

## INTRODUCTION

Oral cavity is an integral part of the body, and there are oral manifestations of many systemic diseases that must be carefully managed in both healthy and medically compromised people.<sup>1</sup> Periodontitis is a common chronic disease of the supporting structures of the tooth, caused by bacterial deposits accumulating on the tooth surface.<sup>2</sup> This immuno-inflammatory disease results from bacterial pathogens and pro-inflammatory cytokines released from inflammatory host response.<sup>3</sup> Local inflammatory disease, like periodontitis, induce systemic inflammation, which can aggravate systemic diseases such as, pulmonary disease, cardiovascular disease, diabetes mellitus and rheumatoid arthritis, adverse pregnancy outcome and many more.<sup>4</sup>

Adverse pregnancy outcomes that have been linked to periodontal disease include preterm birth, low birth weight, miscarriage or early pregnancy loss, and preeclampsia.<sup>4</sup> Diabetes mellitus is a metabolic disorder characterized by hyperglycemia. Many studies demonstrate a bidirectional adverse relationship between diabetes mellitus and periodontal disease, which could aggravate periodontitis. Periodontitis can negatively affect control of diabetes mellitus.<sup>5</sup> The concept that there is an interlink between periodontal disease and systemic health is not new. Dr. W. Miller in 1891 has described the mouth as “a focus of infection where microorganisms or their waste product obtain entrance to parts of the body contiguous to or remote from the mouth.”<sup>6</sup>

Studies show that untreated periodontal disease generates an immune response that elevates systemic inflammation.



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Accumulated bacteria on the surfaces of the teeth in the form of a biofilm are liable for the initiation and progression of periodontal disease.<sup>6</sup> Although these bacteria commence periodontitis, it appears that the host modifying risk factors contribute to the severity and extent of the disease.<sup>7</sup>

Periodontal disease is now gradually believed to play a significant part in various systemic conditions. Likewise these systemic illnesses and their severity have been found to have an impact on the morbidity of the periodontal disease. The diseases with such bidirectional link with periodontitis include cardiovascular, respiratory, neurological, and connective tissue diseases.<sup>8</sup>

The interrelationship between periodontal infections and host defense is complex. Some environmental, psychosocial, and physical factors have the potential to alter periodontal tissues and the host immune response, causing more severe periodontal disease expression. It is important to recognize that the systemic diseases or conditions themselves do not cause periodontitis, but they may predispose, accelerate, or otherwise increase its progression.<sup>9</sup> The impact on quality of life of periodontal disease has received much less attention as with other common oral conditions. A better understanding of the effects of periodontal disease from individual's point of view is needed for the planning and evaluation of public health interventions and allocation of resources. Furthermore, this information can be used to demonstrate the burden of periodontal disease on the general health of populations and to prosper for resources to improve access to oral health care services.<sup>10</sup>

The effect of oral health on general body health has been reconsidered over the past two decades. Epidemiological studies have shown a link between poor oral health and some systemic conditions including cardiovascular diseases, type 2 diabetes, adverse pregnancy outcome, aspiration pneumonia, osteoporosis and rheumatoid arthritis. The focus more recently has been on identifying possible mechanisms that determine these associations and whether treating oral diseases lead to an improvement in markers of systemic disease. As a result, public awareness has raised quite dramatically, by encouraging individuals to make lifestyle changes regarding diet and exercise.<sup>11</sup> Periodontal disease and the systemic inter- relationship, although well researched in the scientific community, is not universally cognizant among clinicians as well as the citizenry. There is a critical need to bring the awareness about the interlink as it has far-reaching effects on management aspects.<sup>8</sup>

This study was aimed to determine dental awareness, knowledge and attitudes among the general population of Lucknow concerning their risk of periodontal disease and its preventions and to educate and motivate them about oral hygiene care and its importance to improving oral health

status and also help to control the various general health related problems.

## MATERIALS AND METHODS

**Subject and sampling:** This cross-sectional study was conducted in Department of Periodontology, Saraswati Dental College, Lucknow. The study population was selected from the Out Patient Department that includes different localities of Lucknow representing local north Indian population. A total of 500 individuals (225 males and 275 females) were recruited for this observational study. Study design and survey questionnaire was approved from Institutional Human Ethics Committee (IHEC) and Institutional Research and development Committee (IRDC). Approved questionnaire forms were distributed amongst all the participants. A trained investigator assisted them in filling the forms. The data were collected based on a questionnaire format (Fig. 1). Informed verbal consent from all patients and people of the society was obtained before participation.

**Questionnaire design:** The questionnaire included 15 questions designed to evaluate the knowledge, attitudes, awareness and behavior of patients regarding their periodontal health and systemic disease. The questionnaire was filled by all the subjects who took part in the study. It took the majority of the participants 15-30 min to complete the questionnaire. An awareness score was defined as shown in the questionnaire format. The participant who scored 0-3 were kept in poor knowledge group, 4-9 in fair knowledge and 10-15 as good knowledge. A score of 1 was given for each question.

**Statistical analysis:** The data was analyzed using SPSS Version 15.0. Chi-square test was employed. "p" value <0.05 indicated a statistically significant association.

## RESULTS

A total of 500 (271 males and 229 females) patients completed the questionnaire with a response rate of 81%. Out of 500 participants 54.2% were male and 45.8% female in which the illiterate group comprised of 66% male and 34% female, undergraduate had 55% male and 45% female, graduate had 47% male and 53% female followed by postgraduates 57% male and 43% female as shown in Table 1. The time required for each participant to fill out the questionnaire form ranged from 15-30 minutes. The frequency distribution of dental awareness among study participants is summarized in Table 2 and Fig 2. Most of the study participants knew about the term pyorrhoea as a gum disease (77%- E0, 93.3%- E1, 99.5%- E2, 98.8%-E3) and also the effect of smoking on periodontium (67.1%-E0, 88.5%-E1, 93.8%-E2 and 95.2%- E3) as in Table 2.

<b>Department of Periodontology</b>				
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<b>Questionnaire</b>				
<b>Name:</b>	<b>Age/ Gender:</b>			
<b>Occupation:</b>	<b>Educational Qualification:</b>			
<b>Address/ contact:</b>				
<ol style="list-style-type: none"> <li>1. Do you know about any gum diseases e.g. Pyorrhoea? <b>Yes/ No</b></li> <li>2. Are you aware of this fact that the gum diseases (pyorrhoea) can affect your general body health (systemic health) and gum diseases? <b>Yes / No</b></li> <li>3. Are you aware that your dentist should know your past/present medical condition, hospitalization and medication? <b>Yes/ No</b></li> <li>4. Do you know that gum diseases (periodontal diseases) is a potential risk factor for diabetes mellitus / increase your blood sugar level? <b>Yes / No</b></li> <li>5. Do you know that gum diseases can cause thickening of arteries leading to Heart attack? <b>Yes/ No</b></li> <li>6. Are you aware that periodontal diseases can exacerbate Respiratory diseases? <b>Yes/ No</b></li> <li>7. Do you know that gingival bleeding can be observed during puberty phase? <b>Yes/ No</b></li> <li>8. Are you aware that stress and psychological disturbances are related to periodontal (gum) diseases (ANUG) and may show ulcers in the mouth? <b>Yes/ No</b></li> <li>9. Do you know that drugs used for epilepsy e.g <b>Phenytoin</b> can cause gum enlargement? <b>Yes/ No</b></li> <li>10. Are you aware that medicines which are used for high BP like <b>Amlodipine / Nifedipine</b> also causes gum enlargement? <b>Yes/ No</b></li> <li>11. Are you aware that physicians/surgeons recommend oral prophylaxis (cleaning of teeth) before Radiation/Chemotherapy/ Organ transplantation? <b>Yes/ No</b></li> <li>12. Do you know that smoking is hazardous for your periodontal health and it can cause jaw/alveolar bone loss? <b>Yes / No</b></li> <li>13. Are you aware that HIV/AIDS can worsen oral health and exacerbate gum diseases? <b>Yes/ No</b></li> <li>14. Are you aware that during pregnancy bleeding gums/overgrowth is a common finding? <b>Yes/No</b></li> <li>15. Do you know that gum diseases can be a cause for low birth weight babies? <b>Yes / No</b></li> </ol>				

Figure 1: Format of questionnaire for the survey

The participant from the illiterate category had a good knowledge about pyorrhea and effect of smoking. Although the level of knowledge of female compared to male is less but for some questions the percentage are high as compared to males like bleeding gums during pregnancy (72%) and gum diseases causes low birth weight babies (67%). Awareness in E1 category is also less in some area as the level of knowledge was  $\leq 20\%$  for question number 5, 6, 9, 10

and 15 as depicted in Table 3. However even in the higher educational group including graduates and post graduates the level of knowledge was  $\leq 50\%$  for questions like gum disease can cause heart attack, exacerbate respiratory disease, drugs like phenytoin and amlodipine can cause gum enlargement and low birth weight babies. Total of 23.4% people were aware of interlink between periodontal disease

**Table 1: Gender distribution of study participants**

Educational Status	Gender			
	Male		Female	
	No.	%	No.	%
Illiterate (n=76)	50	66	26	34
UG (n=148)	82	55	66	45
Graduate (n=192)	91	47	101	53
Postgraduate (n=84)	48	57	36	43

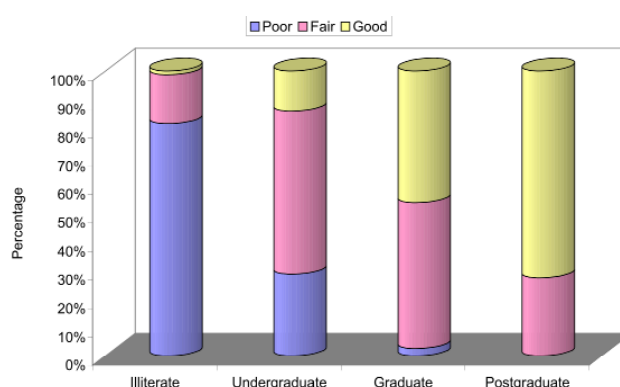
**Table 2: Association between Educational Status and Level of Knowledge**

Educational Status	Level of Knowledge					
	Poor		Fair		Good	
	No.	%	No.	%	No.	%
Illiterate (n=76)	62	81.6	13	17.1	1	1.3
UG (n=148)	45	30.4	90	60.8	22	14.9
Graduate (n=192)	5	2.6	98	51.0	89	46.4
Postgraduate (n=84)	0	0.0	23	27.4	61	72.6

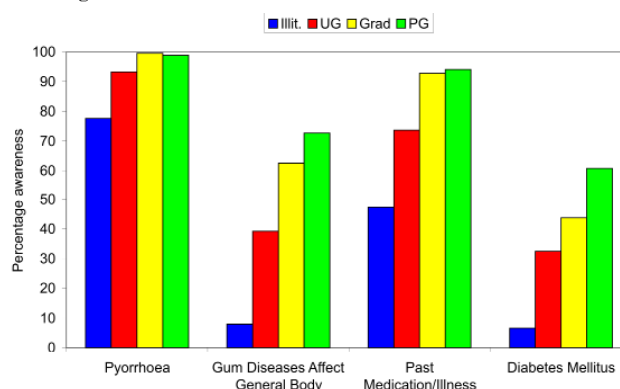
$\chi^2=291$  (df=6);  $p<0.001$

and pregnancy outcome and females outnumbered males for this awareness, and about 54.6% population (mostly females) were aware of pregnancy gingivitis.

For all the questions, illiterate (E0) had minimum awareness followed by undergraduates (E1). The awareness levels of graduates (E2) and postgraduates (E3) were found



**Figure 2: Association between Educational Status and Level of Knowledge**



**Figure 3: General awareness about pyorrhoea and its relationship with medical history**

**Table 3: Question wise level of awareness for different educational strata**

Question	Illiterate (n=76)		UG (n=148)		Graduate (n=192)		PG (n=84)		Significance of difference	
	No.	%	No.	%	No.	%	No.	%	$\chi^2$	p
Pyorrhoea	59	77.6	138	93.2	191	99.5	83	98.8	58.79	<0.001
Gum Diseases Affect General Body	6	7.9	58	39.2	120	62.5	61	72.6	91.61	<0.001
Past Medication/Illness	36	47.4	109	73.6	178	92.7	79	94.0	89.33	<0.001
Diabetes Mellitus	5	6.6	48	32.4	84	43.8	51	60.7	56.19	<0.001
Gum diseases can cause heart attack	2	2.6	11	7.4	47	24.5	36	42.9	61.33	<0.001
Exacerbate Respiratory Diseases	4	5.3	19	12.8	55	28.6	43	51.2	61.79	<0.001
Puberty	1	1.3	40	27.0	88	45.8	58	69.0	92.45	<0.001
Stress/ANUG	13	17.1	73	49.3	142	74.0	54	64.3	78.36	<0.001
Phenytoin (Drug)	1	1.3	8	5.4	54	28.1	37	44.0	75.56	<0.001
Amlodipine (Drug)	2	2.6	25	16.9	51	26.6	43	51.2	58.56	<0.001
Prophylaxis Before Radiation Therapy	1	1.3	39	26.4	103	53.6	72	85.7	144.6	<0.001
Smoking	51	67.1	131	88.5	180	93.8	80	95.2	46.30	<0.001
HIV/AIDS	7	9.2	88	59.5	159	82.8	73	86.9	155.4	<0.001
Pregnancy Induced Bleeding	36	47.4	60	40.5	116	60.4	61	72.6	28.27	<0.001
PLBW Babies	6	7.9	18	12.2	49	25.5	44	52.4	61.59	<0.001

to be significantly higher as compared to illiterates and undergraduates for all the questions as well as for overall assessment ( $p < 0.001$ ) as shown in Fig 3, 4, 5 and 6.

**DISCUSSION**

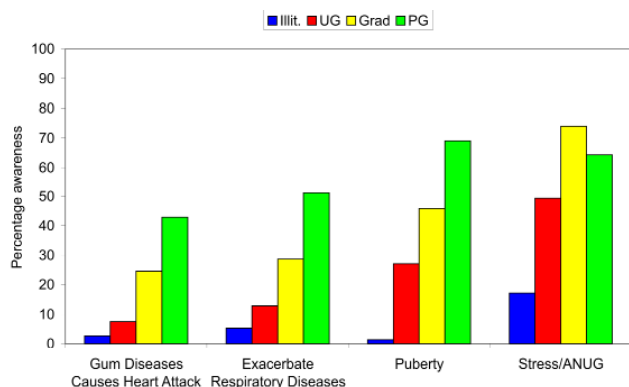
“Periodontal disease is no longer just about health; it’s about the whole body”. Periodontal disease is an immuno-inflammatory response to microbial complexes resulting from the interplay between periodontal pathogens and host. It is reckoned that more than 500 different bacterial species

are capable of colonizing the mouth of an adult.<sup>12</sup> Systemic challenges with the potential vascular dissemination of microorganisms and their products (via the sulcular epithelium) e.g. lipopolysaccharides (LPS) throughout the body induce a major vascular response.<sup>13-15</sup> This host-immune response may offer explanatory mechanism for the interaction between periodontal infection and a variety of systemic disorders like coronary heart disease and related events such as angina, infarction, and atherosclerosis; stroke; diabetes mellitus, premature rupture of membrane and low-birth-weight infants; chronic obstructive pulmonary disease and hospital-acquired pneumonia.<sup>15</sup>

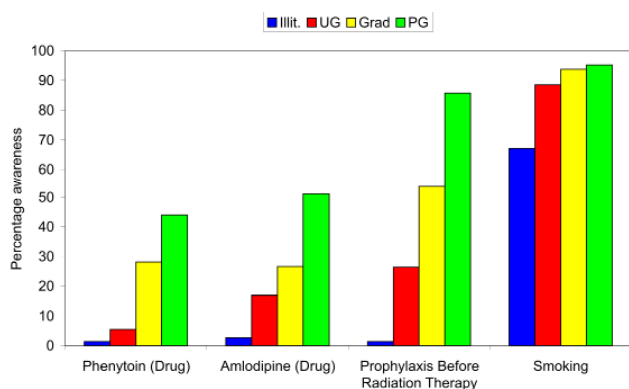
Oral hygiene awareness and practice differ from country to country and community to community. Unfortunately, a little of such epidemiological data is available. Although India is a developing country and the literacy ratio is comparable to the developed countries, still we have some areas where people are less educated and in this study we have tried to reach the people with different educational level. The present work was done with the aim of collecting data on the awareness of oral-systemic inter-relationship in general population of Lucknow. A questionnaire was formulated and distributed to the varied sections of people including patients in the OPD, social gathering, neighborhood, etc. A total of 500 subjects (Male=225, Female=275) were included for the study and result showed that the awareness of oral-systemic link in the qualified group is different when compared to general less qualified public. Although in the qualified group which are not related to medical stream the knowledge about the oral disease, the relationship of oral health with systemic disease and life threatening oral disease is very limited.

In a similar study by Nasir *et al.*,<sup>16</sup> the awareness regarding the association of periodontal health and coronary heart disease among medical interns was found to be 55% while in the results of our study the awareness was 42.9% amongst the postgraduates. In the present study, the awareness regarding diabetes and periodontal diseases was about 43.8% in graduates, which is in accordance to the study by Habashneh *et al.*<sup>17</sup> who concluded that 48% Jordanian were aware that diabetic patients are more prone to periodontal diseases and oral health complications. Whereas in a study by Bowyer *et al.*<sup>18</sup> showed that 69.1% people had never received any oral health advice related to their diabetes and the awareness was limited. In another study by Bangash *et al.*<sup>19</sup> among the diabetic patients concluded that 64% of the patients had knowledge about the oral complications of diabetes, which had similar results as in our study that showed 60.7% of postgraduates were aware of this interrelation.

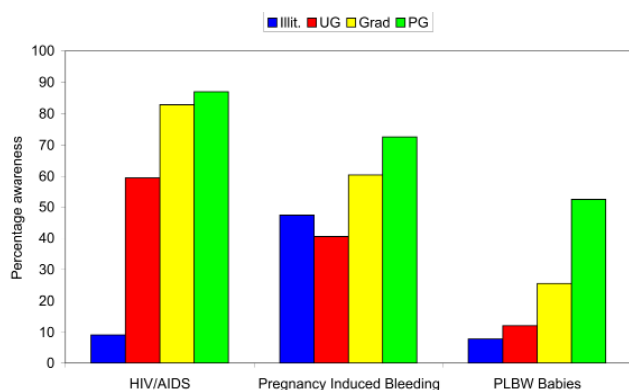
A study by Tarannum *et al.*<sup>20</sup> among General Dentists, General Medical Practitioners (GMPs) and Gynecologists



**Figure 4: Effect of Gum diseases on Health Status and Association of Growth and Stress with Gum diseases**



**Figure 5: Association of various drug intakes and smoking with Gum diseases**



**Figure 6: Association of Gum diseases with HIV/AIDS, Pregnancy and Birth weight of babies**



said that more general dentists (67.4%) than GMPs (56.4%) and Gynecologists (63%) knew that there is an association between periodontal disease and pre-term low birth weight, which was similar to our study as postgraduate group had 52.4% knowledge. Moreover, in a study by Nasir *et al.*<sup>16</sup> concluded that only 26% medical interns were aware of this interlink, which was in accordance with the present study as graduate people had 25.5% knowledge about this interlink.

In this study, 60.4% of graduates and 72.6% of postgraduates were aware of bleeding during pregnancy, which was in accordance with a study by Nutalapati *et al.*<sup>21</sup> in which 73.3% of the gynecologists reported that their patients complain of bleeding gums, swellings, and mobility. About 58.3% of the gynecologists were aware that gum diseases occur at a higher rate in pregnant females. About 38.3% of the gynecologists were aware that periodontal diseases can affect the outcome of delivery. Whereas in our study 23.4% people were aware of this interlink (periodontal disease and preterm low birth weight babies) and females outnumbered males for this awareness, and about 54.6% population (mostly females) were aware of pregnancy gingivitis.

A study by Nasir *et al.*<sup>16</sup> resulted that medical interns are aware that periodontal disease a risk factor for systemic diseases 59%, whereas in our study 49% people were aware.

In a study by Nwhator *et al.*<sup>22</sup> found that the level of awareness of a link between smoking and periodontal disease is extremely low among Nigerians, whereas, in our study awareness for the effect of smoking on periodontal health was 93.8% and 95.2% in E2 and E3 category.

A study by Kahabuka *et al.*<sup>23</sup> for Dares Salaam, Tanzania people stated that a total of 13.4% of the participants were completely unaware of the oral manifestations of HIV/AIDS whereas all participants were fully aware of general symptoms of AIDS. There was no significant association between awareness of oral manifestations and general awareness of HIV/AIDS, or level of education. Participants were relatively well aware of the different types of oral manifestations (e.g. oral ulcers 87%, oral candidiasis 84%). In our study 65.4% people were aware of HIV/AIDS and their oral manifestations out of which 86.9% are from E3 category.

In this study 24.2% people were aware of the fact that periodontal diseases exacerbate respiratory diseases (COPD/ asthma), and 94.2% people across all educational group were aware about gum disease as the term pyorrhoea. Only 56.4% people (most of them are from E2 and E3 – graduate and post graduate category) were aware that stress and psychological disturbances are related to periodontal diseases. About 24.2% people were aware that drugs like nifedipine and phenytoin cause gingival enlargement. In

summary, this study questionnaire has attempted to include various aspects of the relationship between periodontal diseases and systemic health. To the best of our knowledge, limited study regarding this interlink has been published.

## CONCLUSION

There is a need for the interdisciplinary approach for the prevention of systemic disease by integration of periodontal care and vice versa. The study concluded that the level of awareness regarding periodontal disease and systemic health interrelationship is limited, and efforts should be made through various means such as- demonstrations, audiovisual aids, newspapers and TV advertisements, to increase awareness amongst the population of Lucknow.

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