

Epidemiology of periodontal diseases in Indian population since last decade

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Abstract

Objective: India suffers lot of disparities in terms of oral health care and 95% of the Indian population suffers from periodontal disease. The aim of this review is to estimate the risk factors responsible for periodontal diseases as well as prevalence for the same in the last decade to make an attempt to develop a strategy to improve formulation of an effective oral health care policy in India. **Materials and Methods:** Keywords such as “prevalence of periodontal diseases,” “epidemiology,” “periodontitis in India,” and “oral hygiene status in India” were searched for appropriate studies to obtain a bibliographic database. The references of selected articles and relevant reviews were searched for any missed publications that included studies conducted in India estimating periodontal diseases with adequate sample size. Clinical parameters, sample size, and findings for each study were tabulated from 2006 to 2015 (till September 15, 2015) in chronological order to observe the prevalence as well as epidemiology of periodontal disease in India. **Results:** The projection of periodontal disease is disturbing. In addition, the majority of studies done have used the Community Periodontal Index of Treatment Needs (CPITN) as its epidemiological tool that can grossly underestimate the presence of deep pockets. **Conclusion:** Current knowledge has shown that periodontitis does not present a linear progression and is not age-dependent. Moreover, its distribution and severity are strongly influenced by host susceptibility and risk factors. A structured all-inclusive survey of all districts of the states is a prerequisite for the constitution of an apt and cogent health care policy in our country.

Key words: Community Periodontal Index of Treatment Needs, epidemiology, India, periodontal disease, periodontitis in India, prevalence

INTRODUCTION

India represents almost 17.31% of the world's population, which means that one out of six people on this planet live in India. About 72.2% of the population live in approximately 638,000 villages and the remaining 27.8% in approximately 5,480 towns and urban agglomerations.^[1] In a federation composed of 29 states and 7 union territories, it was revealed that the population ratio was 940 females per 1,000 males

in the Population Census of 2011.^[2] In addition, life expectancy in India is at 68 years, with life expectancy for women being 69.6 years and for men 67.3 years.^[3]

India reveals a lot of disparities in terms of ratios, one of which is the field of the oral health. The dentist-to-population ratio in the rural areas is dismally low with less than 2% dentists being available for 72% of the rural population. Statistics present the grim reality that 95% of the population in India suffer from

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periodontal disease, only 50% use a toothbrush, and just 2% visit the dentist;^[4] 23,690 undergraduate and 1,138 postgraduate students are educated in 291 dental colleges in India.

In order to calculate the risk factors responsible for periodontal diseases as well as prevalence of the same, various local as well as regional surveys have been directed across the country. A brief description is mentioned in Table 1 for some of the surveys that were done since the last decade in India.

MATERIALS AND METHODS

“Prevalence of periodontal diseases,” “epidemiology,” “periodontitis in India,” and “oral hygiene status in India” were the key words used to search Medline, the National Library of Medicine, PubMed, EBSCOhost, and Google to obtain a bibliographic database of the biomedical literature produced. About 30 studies were retrieved. Inclusion criteria were: (1) Adequate sample size (2) Study conducted in India to estimate prevalence of periodontal diseases (3) Study conducted in last 10 years, i.e., from 2006 to 2015 at the time of writing (September 15, 2015). Data were organized in tabulated form and arranged in chronological order for easy and comprehensible understanding of the prevalence as well as the epidemiology of periodontal diseases. Sample size, clinical parameters, and findings for each of the study was taken into account.

DISCUSSION

In the last 10 years, the alarming rate of prevalence of periodontal disease in India has drawn interest from various parts of the country. The dentist-to-population ratio of about 1:200000 in rural areas necessitates building up of the dental infrastructure at the primary health care center level. Sikri *et al.* observed that there is a direct effect on the prevalence of periodontal disease if access to the village health center is easy. Community health centers serve as a good option for the upliftment of oral health, but due to lack of dental equipment, materials, and instruments, they are not fully functional. Most of the hospitals and teaching institutions that organize regular dental checkups and encourage people regarding the prevention and treatment of existing dental disease are located in urban areas. Therefore it is less likely for rural areas to avail benefits from these because of conveyance problem.^[16]

About half of the world's autochthonous people, comprising 635 tribal communities including 75 primitive tribal communities, live in India. The

accessibility of these tribes to medical and dental care is minimal. They practice their own traditional methods to treat disease and alleviate pain. A recent study was conducted with an aim to determine the prevalence of periodontal disease in Konda Reddy tribes residing in Bhadrachalan, Khammam District^[15] and it was observed that a majority of 93.60% of them cleaned their teeth using twigs and only 6.20% of them cleaned their teeth with a combination of toothbrush, finger, and twig with toothpaste and charcoal.

Waerhaug *et al.* gave an explanation for a strong correlation between age and periodontal breakdown. The equilibrium between plaque attack and host response may be disturbed and as a consequence, progression of periodontal disease can occur. Numerous studies done have given unswerving results.^[5] Despite remarkable progress in the field of diagnostic, curative, and preventive medicine, we are yet to see optimum oral health in subjects with mental retardation,^[17] Human immunodeficiency virus (HIV) positive status, pregnancy, diabetes, and rheumatoid arthritis.^[5] Less efficiency in maintaining oral hygiene is one of the causes for compromised oral health in subjects with low intelligence quotient (IQ).

As the 21st century proverb goes, the mouth is the portal to the body; we must know that periodontal health is not only related to the diseases, it has also proven its association with osteoporosis,^[18] preterm births (Lopez *et al.*),^[19] preeclampsia (Ramos *et al.* 1995),^[20] and erectile dysfunction (Zadik *et al.* 2008,^[21] Sharma *et al.* 2011^[22]). There is growing evidence of an association between periodontitis and sporadic late-onset Alzheimer's disease. Recent epidemiologic, microbiologic, and inflammatory findings strengthen this association.^[23] The association of periodontitis and peptic ulcers appeared largely consistent for gastric and duodenal ulcers as well as *H. pylori*-positive and *H. pylori*-negative ulcers. These observed associations persisted even after adjusting for putative risk factors, including smoking, alcohol intake, and regular use of aspirin and nonsteroidal antiinflammatory drugs (NSAIDs).^[24] However, there is a lack of literature available on the epidemiological surveys conducted on these diseases with adequate sample size.

We observe that the majority of surveys conducted in the last decade have used Community Periodontal Index of Treatment Needs (CPITN) as an epidemiological tool but a plethora of studies point out the demerits of the same. The hierarchical principles underlying its use are not universally valid (Takahashi 1988,^[25] Miller 1988^[26]). Ainamo (1985),^[27]

Table 1: Local/regional surveys conducted in India to estimate periodontal diseases

Year	Reference	Age (years)	Number of subjects	Clinical parameters	Conclusion
2006	Kumar <i>et al.</i> ^[57] Oral health status and treatment needs in institutionalized psychiatric patients in India	15-80	220	CPITN OHI-S DMFT	Low prevalence of caries with poor oral hygiene and extensive need for dental treatment
2007	Ranganathan <i>et al.</i> Greater severity and extent of periodontal breakdown in HIV positive patients	Not specified	136 HIV-positive individuals and 136 controls from the same background	CPITN	Periodontal breakdown more in HIV-positive patients
2007	Shashikiran <i>et al.</i> Effect of anti asthmatic medication on dental disease	6-14	105	CPITN DMFT	Asthmatic patients on medication should take more precaution for oral hygiene practice
2007	Nasim <i>et al.</i> Dental health status in children with acute lymphoblastic leukemia	6-14	104	Questionnaire Clinical examination DMFT	Moderate gingival inflammation irrespective of treatment ^[58] High DMFT
2007	Vandana, Shesha Reddy Periodontal status of a population residing in high fluoride area of Davangere district	15-74	1029	CPITN OHI-S Jackson's Fluorosis index	As the age advanced from 15 to 55 years and above, gingivitis reduced from 81.0% to 42.9% and periodontitis increased steadily from 18.0% to 57.1%, which was significant ^[59]
2008	Sumanth, Bhat <i>et al.</i> Periodontal health status in pan chewers with or without the use of tobacco	Not specified	300 subjects (150 tobacco chewers, 150 non-tobacco chewers)	OHI-S CPITN	Deep pockets were more (30%) in <i>pan</i> chewers with tobacco than (7.3%) in <i>pan</i> chewers without tobacco, approx. 4 times more <i>Pan+</i> tobacco chewers were found to have 7 times more risk of loss of attachment
2008	Kumar, Dagli <i>et al.</i> ^[60] Periodontal status of green marble mine labours, Rajasthan	18-25, 26-34, 35-44, 45 and above	513 male subjects	WHO oral health assessment form Clinical examination by method suggested by WHO oral health survey	Prevalence increased with increasing age Maximum disease was present in 35-44 years of age On an average, 0.4% sextant had deep probing depth
2009	Acharya, Bhat Oral health related quality of life during pregnancy	Pregnant: 26±5 Nonpregnant: 27.8±6.9	259 Pregnant, 237 Nonpregnant	CPITN	CPITN scores 2 and 3 and gingival index scores were significantly high among pregnant than nonpregnant women
2009	Doshi, Ramapuram <i>et al.</i> Periodontal status of HIV positive patients	21-61	52 HIV-positive 52 controls	OHI-S Plaque index	Significant difference in the overall mean OHI-S score among HIV-positive individuals and controls ($P=0.03$) was observed
2009	Kumar, Sharma <i>et al.</i> Determinants for oral hygiene and periodontal status among mentally disturbed children and adolescents	8-19	171	OHI-S CPITN DMFT	Oral health status of mentally retarded subjects population was poor and influenced by cause of disability, IQ level and parents' education
2009	Parmar <i>et al.</i> Oral hygiene status of areca and tobacco chewers and non chewers	32.5	365 (168 chewers and 197 nonchewers)	OHI-S Clinical examination for ulcers and burns	The incidence of bleeding gums was significantly higher in quid-chewers than in nonchewers, and more chewers (58.3%) had halitosis

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Table 1: Contd...

Year	Reference	Age (years)	Number of subjects	Clinical parameters	Conclusion
2009	Kumar, Dagli <i>et al.</i> Oral health status and practices of dentate Bhil adult tribes in Southern Rajasthan	15-54	1590 male subjects	CPITN OHI-S	All the independent variables, namely age, frequency of cleaning teeth, substance used for cleaning teeth, and visiting habits, were statistically significantly related to caries and periodontal status
2010	Mehta ^[6] Periodontal conditions and treatment in urban and rural population of West Bengal, India	15 onward	22542	WHO CPI	76.54% of the population were affected by calculus. Prevalence was slightly higher in females (76.58%) than males (76.51%)
2010	Abhinaya <i>et al.</i> ^[7] Prevalence of periodontal disease among individuals with rheumatoid arthritis	35-55	70	Bleeding scores Plaque scores	RA patients are 4.18 times more at risk for developing moderate to severe periodontitis than non-RA patients
2012	Megalamanegowdru <i>et al.</i> ^[8] Periodontal health status among permanent residents of low, optimum and high fluoride areas in Kolar District, India	35-44	925	Ion-selective electrode method Community Periodontal Index Loss of attachment	The overall prevalence of periodontitis was 72.9%; specifically, prevalences were 95.4%, 76.3%, and 45.7% in low, optimum and high fluoride areas, respectively
2013	Gambhir <i>et al.</i> ^[9] Dental health status and treatment needs of transport workers of a northern Indian city: A cross sectional study	45.3±7.8	1008	B.G. Prasad's classification of socioeconomic status CPITN International Classification of Diseases for Dentistry	Prevalence of dental caries was 63.4% and mean DMFT was 5.02. 47.6% of subjects needed some prosthesis in the maxillary arch, while 53.3% needed some prosthesis in the mandibular arch
2013	Anoop Kumar, Manmohan Krishna Pandey ^[10] Prevalence and severity of periodontal diseases in type 2 diabetes mellitus of Bareilly region	35-60	1000	Oral hygiene index simplified Gingival bleeding index	91.7% prevalence of periodontitis, predominating with 41.3% cases of moderate periodontitis, followed by 26.2% of severe and 24.2% of slight and 8.3% of gingivitis cases
2014	Grewal <i>et al.</i> ^[11] Prevalence of periodontal disease in the rural population of Punjab	18-74	340	CPITN	Progressive periodontal disease indicated by shallow and/or deep periodontal pockets was observed in 23.8% (N=81) of the total sample
2014	Torwane <i>et al.</i> ^[12] Assessment of periodontal status among Eunuchs Residing in Bhopal City, Madhya Pradesh, India: A cross sectional study		639 (207 eunuchs, 218 males and 214 females)	WHO oral health assessment <i>pro forma</i> 1997 Chi-square test, Analysis of variance, Multiple logistic regression analysis	Among study participants, eunuchs were having highest prevalence for bleeding (17.4%), shallow pocket (22.7%) and deep pocket (9.7%). However, the highest prevalence of 19.7% males and 10.1% eunuchs had LOA of 4-5 mm and 6-8 mm, respectively
2014	Vinay Kumar Bhardwaj ^[13] Prevalence and severity of periodontal disease among non insulin dependent diabetes mellitus patients in Shimla City	35-75	100	CPI index SPSS version 15	HbA1C has also shown significant association with the occurrence of higher CPI scores with increase in its value
2015	Monika Bansal, Neelam Mittal ^[14] Assessment of the prevalence of periodontal diseases and treatment needs: A hospital-based study	15-74	500 subjects (59% males and 41% females)	CPITN	77.98% subjects and 73.15% sextants require either oral hygiene instructions or oral hygiene instructions or oral prophylaxis

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Table 1: Contd...

Year	Reference	Age (years)	Number of subjects	Clinical parameters	Conclusion
2015	Naheeda, Shaik Mohammed Asif ^[15] Assessment of Periodontal Status of Konda Reddy Tribe in Bhadrachalam, Khammam District, India	20-70	500 subjects (225 males, 275 females)	CPI Index	The mean number of sextants with healthy condition were 0.04±0.19; calculus 4.69±1.21; pockets 4-5 mm 0.91±0.91 and pockets >6mm 0.02±0.15

CPI=Community periodontal index, LOA=Loss of attachment, ICDDA=International classification of diseases for dentistry, ANOVA=Analysis of variance, SPSS=Statistical package for the social sciences, CPITN=Community periodontal index of treatment needs, OHI-S=Oral hygiene index: simplified, DMFT=Decayed missing filled teeth, HIV=Human immunodeficiency virus

Gaengler (1988),^[28] and Miller (1990)^[29] suggested that the partial recording approach of CPITN may grossly underestimate the prevalence of deep pockets. Baelum *et al.* in 1995^[30] observed that CPITN yields extensively distorted estimates of the prevalence and severity of periodontal destruction in a population. Given the very severe shortcomings of CPITN, we see no place for this particular system in this context.

Shah^[31] observed that for periodontal diseases, the projection is alarming, with prevalence at present being 45% for the 15+ years age group and the actual prevalence in lakhs at 3413.8 (year 2010) and 3624.8 (year 2015). Due to the rampant use of pan masala and gutkha by persons of all age groups, the proportion of the population above the age of 15 years with this disease could be 80–90%. Concerned^[32] with the urgent need for action, it is vital to promote sound oral health, prevent dental caries and periodontal diseases, and give impetus to activities that promote oral health.

CONCLUSION

The final purpose of epidemiology is to apply the knowledge gained from studies to “promote, protect and restore health.” For planning of national or regional oral health promotion programs, to prevent and treat oral health problems, baseline data about a magnitude of problems and various epidemiological factors are required. There is a dire need for a comprehensive survey of all districts of the State to access the prevalence of periodontal disease over a wider geographic area in order to develop a strategy to improve the periodontal status of the population as a whole. Such surveys do help the government to take the necessary steps to improve the health and living status of the population. Government hospitals, health centers and dispensaries, dental teaching institutions, and even private practitioners can generate such data, which will contribute tremendously to the formulation of a sound and effective oral health care policy in India.

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Conflicts of interest

There are no conflicts of interest.

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