Research Article

A CROSS- SECTIONAL STUDY TO EVALUATE ORAL HYGIENE STATUS AND PREVALENCE OF GINGIVAL AND PERIODONTAL DISEASES IN 12- 15 YEAR SCHOOL PUPILS OF PATNA, BIHAR USING CDC-AAP CASE DEFINITIONS

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A R T I C L E I N F O	A B S T R A C T
	Context: Periodontal disease is one of the most widespread diseases of oral cavity and is one of the main causes of tooth loss and a significant risk factor for several systemic diseases. **Aims:** Assessment of oral hygiene status and the prevalence of gingival and periodontal disease status in 12- 15 year school pupils of Patna, Bihar. **Methods and Material:** A total of 1003 school-going children with the age range of 12-15 years were included in this study, with approximate equal representation of both the genders. Ethical approval was attained from ethical committee of Buddha Institute of Dental Sciences and Hospital. Written informed consent was attained from the authorities of each school. Children were examined in their schools on pre-decided dates. Data regarding oral health and other relevant information were collected. Periodontal conditions were also recorded by clinical examination, using relevant indices. **Statistical tools:** Chi-square test, Fisher's exact test, Monte Carlo method. **Results:** Good oral hygiene was found to be present in 12-15 year school pupils of Patna, Bihar. **Conclusions:** The finding of the present study is significant in providing the first baseline data on the periodontal status of school pupils of Bihar.

INTRODUCTION

Severe periodontitis is the sixth most prevalent disease of mankind and as such is definitely an important public health issue. Although researchers regarding the nature of the disease have advanced to ground breaking levels, it is still shrouded in much uncertainty.[1]

Epidemiologic studies are basic tools in unshrouding the unknown facets of any disease process. For the first time, a study regarding prevalence of periodontal diseases has been undertaken in the Indian state of Bihar. Even the National Oral Health Survey conducted by Bali *et al*[2] which had data from most of the regions of India, had no mention of Bihar in it.

Aims and objectives

It has been generally observed in the study that the oral hygiene status of school students of Patna, Bihar is unsatisfactory. But as such there is no documented epidemiologic data supporting this observation, to start with,

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the present study was designed to assess the same in 12- 15 year old school children. A subsequent epidemiological study in the adults of the region is undergoing, in which the current study has acted as guideline.

Subjects and Methods

Since we don't have any prior information about the prevalence of gingival and periodontal diseases in 12- 15 year school pupils of Patna, Bihar; a pilot study design and adopting stratified simple random sampling for 1003 school going pupils from three different schools were included initially for higher accuracy. Ethical clearance was obtained from ethical committee of Buddha Institute of Dental Sciences and Hospital, Patna and written informed permissions were attained from the authorities of each school.

1003 school pupils of Patna in between 12-15 years were included in this study, with almost equal representation of both the genders.

Only permanent residents of Patna were included. Those children with any known systemic disease or conditions; or children undergoing orthodontic therapy; or any child not

willing to participate in the study due to any personal or religious reasons were excluded from the study.

Children were examined in their respective schools on pre-decided dates. Data about their oral health status were collected in a proforma, consisting of general information and oral hygiene habits of the subjects.

An intra-oral examination was carried out in broad- day light, with the pupils sitting in an upright position using a mouth mirror and William's graduated periodontal probe. The pupils were examined by a single examiner to avoid inter- examiner variations. Intra- examiner reliability test was performed by examining a cohort of 25 pupils at two different time- periods of one week apart.

For estimation of oral hygiene status, usually Oral Hygiene Index (Greene and Vermillion 1960)[3] are considered. The present study was unable to take DI into account, as some schools allotted time slots for the present epidemiological study immediately after lunch break, whereas others provided an early morning time slot, which would have made comparisons between DI inaccurate. Thus for estimation of oral hygiene status, the present study focused on Plaque Index (Sillness and Loe 1964)[4] and Calculus Index (Greene and Vermillion 1964).[5]

Gingival and periodontal statuses were recorded by clinical examination, using relevant indices (Gingival Index- Loe and Sillness 1963;[6] Plaque Index (PI)- Sillness and Loe 1964;[4] Calculus Index (CI) Greene and Vermillion 1964[5] and CDC-AAP case definitions for periodontitis).[7,8]

The data were entered in Microsoft Excel and statistically statistically analyzed using Chi Square test, Fisher's Exact test, Monte Carlo Methods.

RESULTS

The present study indicated that good oral hygiene status was seen in age 12- 15 years of school going children of Patna, Bihar.

Prevalence of 45.9% of gingivitis, 16.3% of mild periodontitis, 9.3% moderate periodontitis and 4.1% severe periodontitis [Figure 2] were found in age 12- 15 year of school going children of Patna, Bihar.

DISCUSSION

In 2003, the Centers for Disease Control and Prevention and AAP defined periodontitis according to probing depth together with clinical attachment level.[8] This classification has therefore been used in this study along with full mouth recording of all the data in each student, in order to prevent underestimation of prevalence. Various authors have reservations that random half mouth estimations with 2 or 3 sites per tooth result in underestimation of prevalence and extent of the disease.[7] Eke and others have demonstrated that partial recording does lead to a great deal of bias.[7] According to yet unpublished paper of P.N. Papapanau, there is no better substitute of examining all the teeth in cross- sectional studies involving young people, where the disease is less frequent, and thus more likely to be missed by a partial recording method.[9] The case definition for severe periodontitis is stringent to ensure that patients identified by the definition do have the disease.[8] Interproximal sites are considered because the disease usually starts at interproximal sites and is more severe

and because this minimizes the effect of gingival recession on the accuracy of probing depth (PD) measurements. At least two sites with Clinical Attachment Level (CAL) greater than equal to 6mm, not on the same tooth, are required because it is possible to have abnormal CAL and not have periodontitis. Such situations arise in case of overhanging margins of a subgingival restoration etc. The requirement also takes into account evaluator variation.[8]

Both CAL and PD values have been noted; CAL alone can be misleading because inflammation may not be the only reason for gingival recession. Besides, successful treatment may ensure resolution of inflammation without gain of attachment. When probing depth is used alone, prevalence may be underestimated. This is more so in case of older patients. For younger patients, PD as well as CAL are said to measure periodontitis equally.[8]

The periodontium has been shown to be stable when bleeding does not occur during probing. This is not only extremely specific but also has an impressive negative predictive value.[10]

Thus the present study has considered periodontal health as a situation when bleeding does not occur when a pocket is being probed.

For the present study, the age group of 12 − 15 years was chosen as; by 12 years of age, most children lose all the deciduous teeth and enter into permanent dentition whereas 15 years is usually the last limit for school based examination.[11] For estimation of oral hygiene status, usually Oral Hygiene Index[3] comprising of Debris Index and Calculus Index are considered. The present study was unable to take Debris Index into account, as some schools allotted time slots for the present epidemiological study immediately after tiffin, whereas others provided an early morning time slot, which would have made comparisons between Debris Index inaccurate. Thus for estimation of oral hygiene status, the present study focused on Plaque Index(PI), and Calculus Index (CI). Both PI and CI have indicated that the oral hygiene status of the students of all age group was good. This is in the agreement with a study conducted between 10-12 year old school pupils in Maharashtra, in 2010.[12] The same trend was observed in 7-12 years old urban school children of Nellore, while poor oral hygiene was noted in the same age group of rural school pupils of the same district.[13]

From the present study, it can be seen that the prevalence of gingivitis is maximum in all the different age groups of the students. There are a substantial percentage of periodontally healthy individuals in each age group, with 30.8% of 12 year old students being healthy. This percentage has been seen to go down with increasing age. The percentage of students with severe periodontitis on the other hand increases with increasing age, but forms an extremely low proportion of the students (4.4% of 12 years old versus 6.2% in 15 years). The percentage of students with mild periodontitis has been seen to be decreasing with increasing age while that of moderate periodontitis increases with increasing age [Figure 1]. The above information can be deciphered as follows- among the 12-15 year old school going children of Patna, a little less than half of the total number of students (45.9%) suffered from gingivitis; 29.7% are suffering from one of the three degrees of periodontitis whereas the rest 24.5% students are periodontally

healthy. Appropriate measures should be taken to identify the unhealthy students from the healthy ones and proper treatment modalities should be instituted to them from an early age.
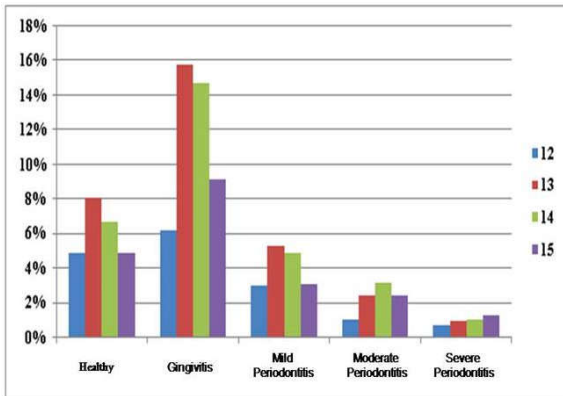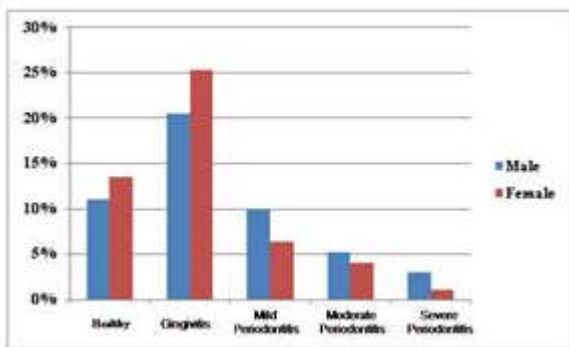

Fig 1 Age wise distribution of the gingival and periodontal diseases

Higher prevalence of gingivitis has been reported by Bhayya D *et al* 2010 in school going children of Maharashtra, as well as in various other studies in school going children in different parts of India.[4]

Majority of students examined in the present study used tooth brush and tooth paste to clean their teeth, finger cleansing was seen in 31 children, whereas 40 students used other methods of cleansing which mainly included usage of sticks, which is the traditional Indian way of cleaning teeth. This finding is into relation with those of Bhayya *et al*, 2010.[12]

The present study has shown that, more than 50% of the female students presented with gingivitis as compared to only 41.4% of male students having gingivitis. This might be associated with an earlier puberty experienced by the females than in males. This correlates with those of Meghna Singh *et al* and Saha and Sarkar.[11]

Among the female students, 23% suffered from a form of periodontitis, while the concomitant value of the male students was 36.3%. This association between gender and gingival and periodontal disease has been found to be statistically significant [Figures 2 and 3].


**Fig 2** Gender wise distribution of the gingival and periodontal disease
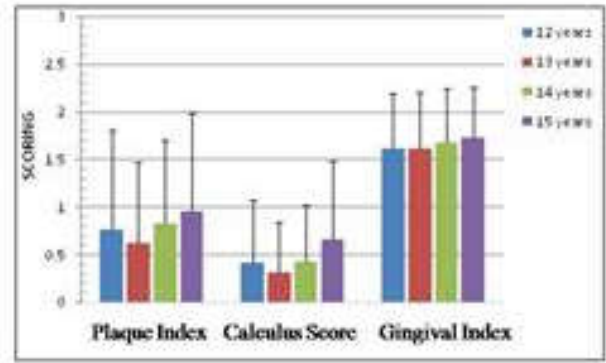
Fig 3 Distribution of mean and Standard deviation Plaque Index, Calculus score and gingival index according to age

It has been found that 31.6% of the vegetarian students were healthy while 22.4% of the non-vegetarian students were healthy. Gingivitis as well as periodontitis was found to be in much higher proportions among non-vegetarian students than their vegetarian counterparts. This data is statistically significant [Figure 4].
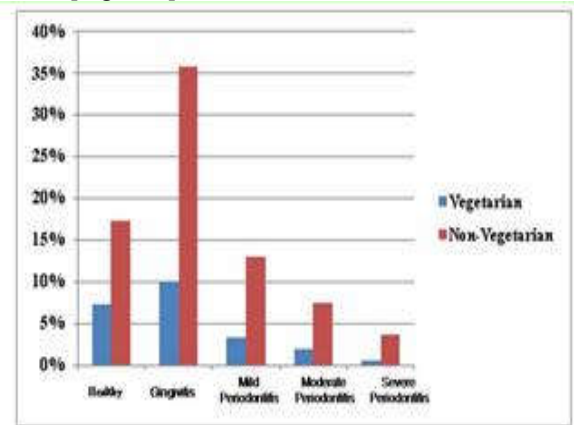
Fig 4 Distribution of Gingival and periodontal disease according to diet

The present study was not able to find any student with gingival or periodontal abscess, pericoronitis, any forms of desquamative gingivitis or aggressive periodontitis (as it is not possible to distinguish between the chronic and aggressive forms on the basis of single examination). Only 14 students presented with gingival enlargement, which were mostly associated with malocclusion of teeth. 267 students presented with recession in one or more teeth, which could not be attributed to any periodontal disease. They were mainly due to faulty brushing techniques and malocclusion [Figure 5].
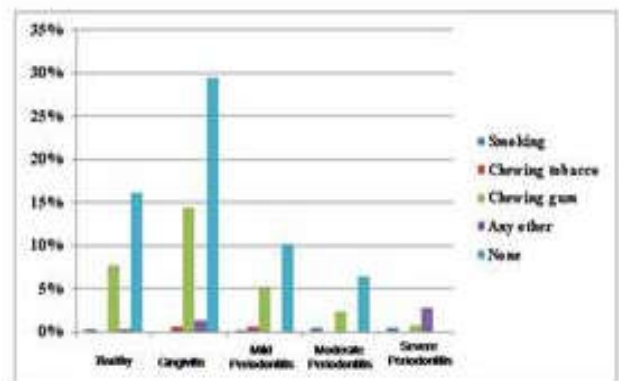
Fig 5 Distribution of gingival and periodontal diseases according to personal adverse habits

Smoking has been accepted globally as a significant risk factor for periodontitis.[14] The present study has shown a prevalence of 29.4% of moderate periodontitis and 29.4% of severe periodontitis in the children who have admitted to regular smoking habits [Figure 6]. Considering the tender age of these children it can very well be assumed that these children have not been exposed to smoking for a long period of time. Since the prevalence of moderate and severe periodontitis has been found to be 9.3% and 4.1%, the above figures for the smokers demand special attention. But periodontitis being a multivariate disease process, the exact amount of damage caused by smoking in these children cannot be estimated by this kind of cross-sectional study. However, the fact that smoking contributed to the disease process in these children cannot be doubted.

The present study has certain limitations: firstly, the sample size of the present study was not very big and was restricted to only few schools in and around the city of Patna. Secondly, the cross-sectional nature of the study prevents drawing inferences about causal relationships. Hence, more studies in this field are required with increased sample sizes and longer durations. Thirdly, majority of the studies conducted previously have used CPITN as a case definition for periodontitis. CPITN is based on the requirement of treatment, without attributing to true prevalence rate in terms of severity and extent.[14] Thus, the present study has been performed using the Williams Graduated Periodontal Probe instead of the CPITN probe and has used the CDC-AAP case definitions for periodontitis, because of which this study could not be compared to any previous study.

However, the data procured by us may serve as a platform for large scale epidemiologic studies to assess periodontal diseases and associated risk factors in the state of Bihar, as there is a scarcity of data for this state.

CONCLUSION

A cross-sectional study carried out among 12-15 year school going pupils of Patna to assess the oral hygiene status and the prevalence of gingival and periodontal diseases showed:

1. Good oral hygiene status for students of all age groups.
2. 45.9% prevalence of gingivitis.
3. 16.3% prevalence of mild periodontitis
4. 9.3% prevalence of moderate periodontitis and
5. 4.1% of severe periodontitis, according to CDC-AAP case definition of periodontitis.
6. 24.5% were periodontally healthy.

The findings are significant enough in providing one of the first baseline data on the periodontal status of school going children of Bihar. The not very big sample size of students examined from a limited number of schools of Patna necessitates further studies with bigger sample size from a larger number of schools. Longitudinal studies are also recommended for identification of risk factors of periodontal diseases, particular to Eastern India.

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