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RESEARCH ARTICLE

CLINICAL CONSEQUENCES OF UNTREATED DENTAL CARIES - A CROSS-SECTIONAL STUDY USING PUFA INDEX

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ABSTRACT

Introduction: Dental caries is a global public health problem, especially among child population. If left untreated, it directly affects the child's quality of life. Although, many surveys have been conducted reporting the prevalence of dental caries and caries experience, but the data on severity and clinical consequences of untreated dental caries are relatively unknown. **Aim:** The aim of this study was to assess the prevalence and severity of consequences of untreated carious lesions using PUFA/pufa index, i.e., pulpal involvement, and ulcer due to root fragments, fistula, and abscess index among 7-8 years old school children in Patiala. **Methodology:** A cross-sectional study was conducted in Patiala among 100 school going children of age 7-8 years. The clinical consequences of untreated dental caries by PUFA/pufa index was evaluated. The data obtained was compiled and put to statistical analysis. **Results:** The mean pufa value was 0.967 ± 0.56 and prevalence was 38% with major contribution from 'p' component of the index. Untreated caries ratio was 34.1% suggesting that more than one-third of the developed carious lesions cause severe consequences in a population. **Conclusion:** The PUFA/pufa index can be used to highlight the adverse consequences of dental caries in order to address the neglected problems among children at the earliest.

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INTRODUCTION

Dental caries is the most common childhood disease worldwide, despite improvements in oral health. Untreated dental caries is a global public health problem, especially among child population. Untreated caries impacts the child's quality of life by causing pain, discomfort and sepsis (Figueiredo, 2011), problems in chewing and learning behaviour (Leal, 2012), sleeping and behaviour disturbances (Gradella, 2011), child's nutrition, growth, body mass index and general health (Benzian, 2011). The data on dental decay have been collected worldwide using the DMFT/deft index. DMFT/deft index only provides information on scoring of caries and treatment experiences (extraction due to caries and restoration of decayed teeth). But, it fails to give information on the severity of untreated dental caries, such as involvement of pulp and dental abscess (Klein, 1938). Especially, in low and middle income countries, as well as deprived communities in high income countries, where people have little access even to the most basic forms of dental care, there is a need for a diagnostic index that presents the correct data on the consequences of advanced stages of dental caries to the health care professional and authorities (Singhal, 2018). Monse *et al*. in 2010 developed the PUFA/pufa index which attempts to compliment and increase the sensitivity of original DMFT/deft index and to record severity of a carious lesion. It is an index used to assess the presence of oral conditions and infections resulting from untreated caries in the primary and permanent dentition. Data collected through this index can have impact on decision taken by authorities regarding oral care, which can be used as an adjunct to DMFT/deft index. The purpose of the present study, therefore, is to determine the prevalence of dental caries and untreated dental caries among school children in Patiala and to gather basic data on clinical consequences of untreated dental caries among them using PUFA/pufa index.

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METHODOLOGY

A cross-sectional study was conducted among 100 children of 7-8 years old enrolled in schools of Patiala. The children were randomly selected from schools. The permission was obtained from school authorities before conducting the survey. Information about oral examination was given to the children. Clinical examination was conducted in the premises of each school under natural daylight using mouth mirror and probe (used only for recording DMFT/deft tindex).

Caries was recorded for both permanent and primary teeth in terms of decayed, missing and filled teeth index (DMFT and deft), using World Health Organization recommendations for oral health surveys (1997) and untreated caries was assessed using PUFA/pufa index according to the standard procedure recommended by Monse *et al*. (2010). All children were advised to brush their teeth prior to examination. Children were examined for dental caries and untreated dental caries while seated on the chair with their heads resting on the back rest.

The codes for PUFA index are as follows

- **P/p**: Pulp involvement is recorded when the opening of the pulp chamber is visible or when the coronal tooth structures have been destroyed by the carious process and only roots or root fragments are left.
- **U/u**: Ulceration due to trauma is recorded when sharp edges of a dislocated tooth with pulp involvement or root fragments have caused traumatic ulceration of the surrounding soft tissues, for example, tongue or buccal mucosa.
- **F/f**: Fistula is scored when pus releasing sinus tract related to a tooth with pulp involvement is present.
- **A/a**: Abscess is scored when a pus containing swelling related to a tooth with pulp involvement is present.

The PUFA/pufa score per person is calculated in the same cumulative way as for the DMFT/deft. The "PUFA" for permanent teeth and "pufa" for primary teeth are reported separately. Upper case letters are used for permanent dentition, and lowercase letters are used for primary dentition. Thus, for an individual person, the score can range from 0 to 20 pufa for the primary dentition and 0–32 PUFA for the permanent dentition. If the primary tooth and its permanent successor tooth are present, and both indicate stages of odontogenic infections, then both teeth will be scored. The index scores denote the presence of either a visible pulp, ulceration of the oral mucosa due to root fragments, a fistula or an abscess. In case of doubt concerning the extent of odontogenic infection, the basic score (P/p for pulp involvement) is given. The lesions in surrounding tissues that are not related to a tooth with visible pulp involvement as a result of caries are not recorded.

No instruments were used; only mouth mirror was needed to retract the cheek for better vision. The assessment was made visually, and only one score was assigned per tooth. The prevalence of PUFA/pufa was calculated as percentage of the population with a PUFA/pufa score of one or more. The PUFA/pufa experience for a population is computed as a mean value and can, therefore, have decimal values.

The "Untreated Caries PUFA/pufa ratio" was calculated as: [(PUFA + pufa)/(D+ d)] ×100.

The collected data was analysed using descriptive statistical analysis including prevalence and means of caries status (DMFT/deft scores) and untreated caries status (PUFA/pufa scores).

RESULTS

The sample was distributed according to gender as shown in Table 1. A total of 100 school children were surveyed, among whom 56% were boys and 44% girls.

Table 1. Distribution of study subjects according to gender

GENDER	N
Boys	56
Girls	44
Total	100

Table 2. Prevalence of pufa index codes

CODE	FREQUENCY	PERCENTAGE
p	32	32
u	0	0
f	4	4
a	2	2
TOTAL	38	38

Table 3. Mean pufa and deft values.

CODE	MEAN	SD
pufa		
p	0.52	0.904
u	0	0
f	0.04	0.197
a	0.02	0.140
Total	0.56	0.967
deft		
d	1.64	1.89
e	0.04	0.196
f	0.46	0.881
Total	2.13	2.272

Overall pufa codes prevalence was 38% (Table 2.), the "p" component formed majority of the pufa codes (32%). Also, 4 cases of fistula formation were reported. There were no cases of ulcer formation due to root fragment and sharp edges of pulpally involved tooth and only 2 cases of abscess/inta-oral swelling were recorded. The PUFA codes prevalence was not observed since no carious lesions progressed to any clinical consequence of untreated caries. Prevalence of dental caries in the study population was 63%. The untreated caries ratio was found to be 34.1% which can be inferred that more than one third of decayed component progressed to pulpal involvement significantly (p-value <0.05). The overall mean pufa index was 0.56 ± 0.967 and mean deft was 2.13 ± 2.272 (Table 3.).

DISCUSSION

In most of the epidemiological studies concerning dental health, the mean DMFT/deft index in relation to whole tooth or tooth surfaces was used to evaluate tooth decay and this constitutes a basis for the prevalence and incidence of dental caries. However, this DMFT/deft index does not describe the entire caries spectrum sufficiently because it did not take into consideration the changes in the enamel without the presence of a cavity and advanced stages of untreated carious lesions. The introduction of the PUFA/pufa index provides health planners with relevant information on the number of patients who present for treatment with symptoms that reflect the serious consequences of tooth decay. In the present study, 100 children of 7-8 years age group were assessed for their dental caries status and its consequences using PUFA/pufa index. 7-8 years falls under mixed dentition age group that covers effect of oral environment on primary as well as permanent teeth. The deciduous teeth are essential in oral cavity up to the age of 12 years for space maintenance and function hence, it is important to assess their future prognosis as well.

The results of the present study showed that the prevalence of caries among school children was high (63%). This could be due to lack of awareness among children, their parents, and teachers regarding importance of good oral health. Despite the high prevalence of dental caries in our study sample, prevalence of pufa codes was 38%, and the severity was considered low in comparison to the findings of Monse *et al*. (2010) (85% in 6-year old Filipino children), Bagińska *et al*. (2013) (72.4% in 7-year old Poland children) and Thekiso *et al*. (2012) (41% in 6–8 years old South African children). However, the prevalence was higher, when compared to study by Figueiredo *et al*. (2011) (23.7% on 5–6 years old Brazilian children). The untreated caries PUFA/pufa ratio was 38% among 7-8 years old children which is in line with the study reported by Monse *et al*. (2010) (40% in 6-year-old Filipino children). "p" component of pufa formed majority of the total score, that is, 32%. This finding was comparable to other studies as well (Figueiredo, 2011; Monse, 2010). Very few cases of other components of pufa were observed, especially, the u (ulceration) component, suggesting the need to modify the index (Figueiredo, 2011). Mean pufa value is 0.56, which was higher than as reported by Figueiredo *et al*. (2011) but lesser than in studies by Monse *et al*. (2010) and Bagińska *et al*. (2013) This ratio provides an opportunity for the dental healthcare workers to explain the health authorities about the adverse consequences of dental caries on teeth.

CONCLUSION

A majority of untreated carious lesions in the children is evident in the results of present study, suggesting lack of awareness among children, their parents, and teachers regarding importance of good oral health. Therefore, there is an urgent need to promote dental caries preventive and curative programs for school children. Also, PUFA/pufa index along with DMFT/deft index can act as an excellent epidemiological and educational tool for reporting consequences of untreated carious lesions in a population, provided some modifications in the index are made.

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