# Untreated Severe Dental Decay- A Neglected Determinant of Child's Oral Health

Pai Tanvi[1], Priya Nagar[2], Mayuri Borse[1], Jessy P[1]

**ABSTRACT**

**Introduction:** Oral health is an integral component of general health. Dental caries, one of the most widespread diseases in the world affecting 60-90% of school children, goes untreated with significant impacts on their general health, quality of life, development and educational performance. This study was done to evaluate the prevalence and experience of clinical consequences of untreated dental caries in 6 and 12 year old school children, using DMFT and PUFA index from Bengaluru North; and to assess the quality and reliability of the PUFA index in the Indian population

**Material and Methods:** The study sample included 150 children, aged 6 and 12 years from randomly selected schools of rural region of Bengaluru North. Caries experience in primary and mixed dentition period was evaluated according to WHO criteria (DMFT/dmft index). The clinical consequences of untreated dental caries were assessed by PUFA/pufa index. Data were analysed to express the experience and distribution of caries and PUFA scores of the sample population.

**Results:** The combined mean dmft scores for 6 and 12 year old school children was 1.787 whereas combined DMFT score was 0.333. Mean pufa scores for 6 and 12 year old population was 0.1 whereas mean PUFA scores was 0.773. Untreated caries, PUFA ratio was 61% and 65.33% of 6 year old population needed urgent or emergency treatment due to pain/infection or dental trauma whereas the same value for 12 year population was 18.66%.

**Conclusion:** PUFA/pufa index is relevant in addressing the neglected problem of untreated caries and its consequences. The index helps us to show the amount of untreated caries that has progressed to infection, clearly demonstrating the limited and often misleading explanatory power of the DMFT. PUFA/pufa can also be used to plan, monitor and evaluate access to treatment

**Keywords:** Untreated caries, DMFT, PUFA/pufa

## INTRODUCTION

Oral health is an integral component of general health.[1] Dental caries is one of the most widespread diseases in the world affecting 60-90% of school children.[2] Most of the dental decay remains untreated with significant impacts on general health, quality of life, development and educational performance of the children.

For the last 70 years, the prevalence of dental caries has been shown using the Decayed, Missing, Filled Teeth (DMFT/dmft) index.[2] During last decade, DMFT came in for criticism to be a not enough valid tool to diagnose all stages of caries. DMFT only omits early non-cavitated lesions, but also fails to provide information on the clinical consequences of untreated dental caries.

To overcome this problem, Monse et al devised the PUFA/pufa index in 2010, which assesses and quantifies caries complications; named from the first letters of four oral conditions resulting from untreated caries viz. visible pulpal involvement (P/p), ulceration caused by dislocated tooth fragments (U/u), fistula (F/f) and abscess (A/a). It is easy, safe to use, evaluation is short and does not require additional tools.[3]

The purpose of this study was to evaluate the prevalence and experience of clinical consequences of untreated dental caries in 6 and 12 year old school children, using DMFT, PUFA and PRS index, from Bengaluru North and to assess the quality and reliability of the PUFA and PRS indices in the Indian population.

## MATERIAL AND METHODS

### Study Population

The study was conducted across selected government schools in the rural region of North Bengaluru. One hundred fifty 6 and 12 year old school children were selected, using random sampling, amongst these schools and examined after taking consent from the parents, school authorities. The 6 year old and 12 year old group consisted of 75 children each. Table-1 presents the distribution of the population based on age and gender.

### Oral examination

Informed consent was taken from the parents of all the children who participated in the study along with necessary permissions from the school authorities to conduct the study. Dental examination was done following WHO guidelines using mouth mirror and periodontal (WHO) probe. WHO oral health assessment form for children was modified to suit our needs for this study. Both deciduous teeth and permanent teeth were checked and evaluated for DMFT/dmft index and Intervention urgency.[4]

Monse et al. developed an index to measure the clinical consequences of untreated dental caries, which he called the PUFA/pufa index. The capital letter scores the permanent dentition whereas the lowercase scores the primary dentition. In this index "P/p" stands for pulp involvement, e.g. tooth with an open pulp chamber or with excessive destruction of coronal part with only roots left, "U/u" stands for ulceration of oral mucosa because of sharp edges on the tooth surface with involvement of the pulp, "F/f" stands for an active fistula and "A/a" stands for an abscess. Each tooth will be given a single score with the gradient established as follows: ulceration will be a more advanced stage than pulp involvement, next level being fistula,

[1]PG Student, [2]Professor and Head, Department of Pedodontics and Preventive Dentistry, Krishnadevaraya College of Dental Sciences and Hospital, Hunasamaranahalli, Yelahanka, Bangalore- 562157, India

**Corresponding author:** Pai Tanvi Anandraya, G4, Sri Ganapa Residency, 8th Cross, Munireddy Layout, Maruthi Nagar Main Road, Madivala, Bangalore-560068, India

and an abscess would be scored as the most advanced stage of the index. The teeth without pulp involvement would not be recorded. The assessment of pufa scores was based only on the visual examination without the use of any instruments.[3]

## STATISTICAL ANALYSIS

The sample size and collected data were analysed using SPSS version 17 software. Mean and standard deviations were calculated to express the mean PUFA/pufa and DMFT/dmft scores.

Data were analysed using T-test, 95% confidence intervals (CI) were calculated and level of statistical significance (p-value) was set at 5%.

## RESULTS

A total of 150 children were examined, among whom 67 (44.66%) were girls and 83 (55.33%) were boys (Table-2). There was a significant difference observed in the sample size of boys and girls (p<0.05).

The mean dmft scores of the deciduous dentition for the 6 year olds was 3.08 and 12 year olds was 0.68. The combined mean dmft scores for deciduous dentition in 6 and 12 year olds was 1.78. The mean DMFT scores of the permanent dentition for the 6 year olds was 0.26 and 12 year olds was 0.66. The combined mean DMFT scores for permanent dentition in 6 and 12 year olds was 0.33 (Figure-1).

Mean pufa scores for deciduous teeth for 6 year olds was 0, 12 year olds was 0.2 and the combined mean pufa scores for 6 and 12 year olds was 0.1. Mean PUFA scores for permanent teeth for 6 years olds was 1.25, 12 year olds was 0.29 and combined mean PUFA scores for 6 and 12 year olds was 0.773 (Figure-2). The untreated caries/PUFA ratio was 61% through which we can conclude and say that almost 2/3rd of the untreated decay progressed to pupal involvement (Figure-3). Intervention urgency code given by WHO showed that 65.33% of the 6 year olds and 18.66% of 12 year olds needed Immediate/urgent treatment due to pain/infection of dental and/or oral origin falling under Code 3 of the intervention urgency criteria (Figure-4).

## DISCUSSION

In our study, we assessed 150 children aged 6 and 12 years for their oral hygiene status and the consequence of untreated dental caries. We emphasized on these two age groups as it is the time of eruption of the permanent first and second molars respectively, at the same time covering the deciduous teeth through their time in the oral cavity. WHO has also recommended the age groups 5 and 12 years in their survey methods.[4] As the school going age in Indian government schools is 6 years, we modified the sample to suit our need.

In our study, the overall untreated caries/PUFA ratio was 61%, which was found to be higher compared to the study done by Monse et al[3], where the untreated caries/PUFA ratio was 41%.

The intervention urgency scores have also not been assessed in relation to PUFA/pufa index in the past. In our study, there was a positive correlation between intervention urgency and PUFA/pufa index, which shows the consequences of dental caries if left untreated.

Frencken et al. proposed a new index termed as Caries Assessment Spectrum and Treatment (CAST) index in order to

| | Gender | | |
|---|---|---|---|
| | **Boys** | **Girls** | **Total** |
| 6 year old | 37 | 38 | 75 |
| 12 year old | 46 | 29 | 75 |
| Total | 83 | 67 | 150 |

**Table-1:** Distribution of sample population based on age and gender

| Age (in years) | Total (n=150) |
|---|---|
| **6** | 75 |
| **12** | 75 |
| Gender* | |
| Girls | 67 (44.66%) |
| Boys | 83 (55.33%) |

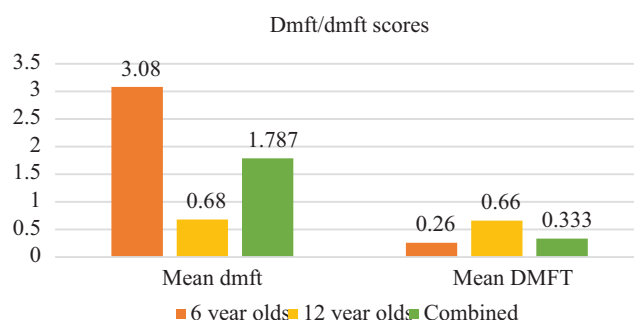**Table-2:** Distribution of sample according to age and gender
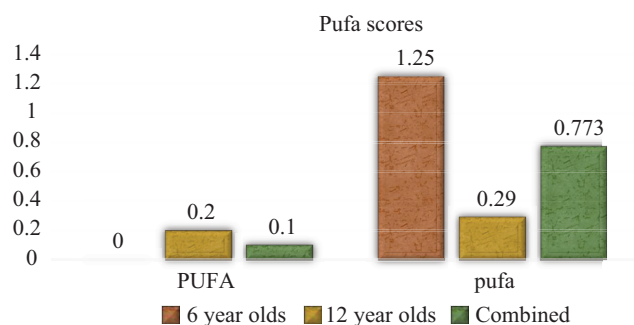


**Figure-1:** Mean DMFT/dmft scores



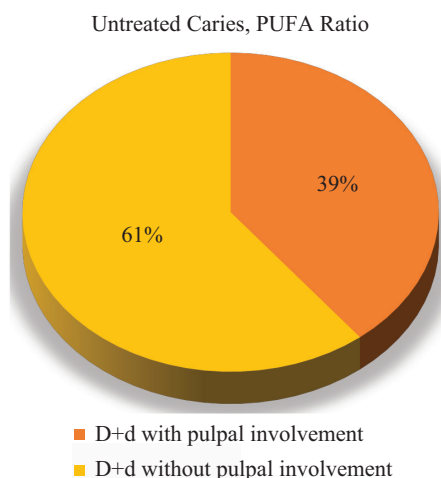**Figure-2:** Mean PUFA/pufa scores



**Figure-3:** Untreated caries, PUFA ratio

find a reliable, concise, and easy-to-read scoring system, based on the strengths of PUFA and ICDAS-II indices and to provide a link to the widely used DMF index (M and F components).
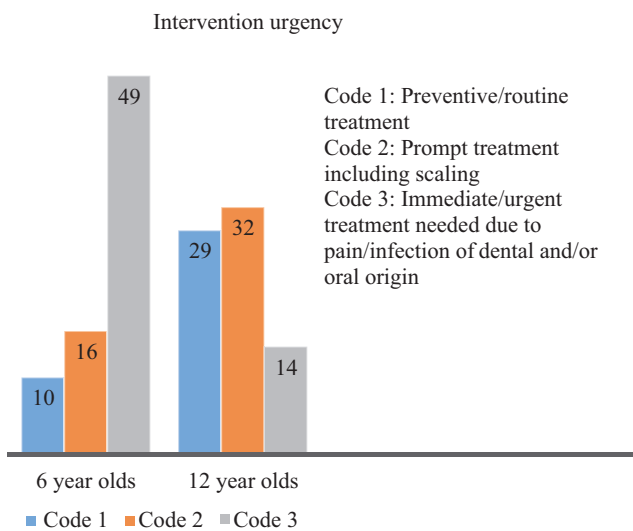
Intervention urgency



Code 1: Preventive/routine treatment
Code 2: Prompt treatment including scaling
Code 3: Immediate/urgent treatment needed due to pain/infection of dental and/or oral origin

**Figure-4:** Intervention urgency

It showed promising results for use in epidemiological studies where the DMF scores could easily be obtained from the CAST scores.[5]

Benzian et al. conducted a study on 11-13 year old Filipino school children and assessed the correlation between untreated dental decay and their Body Mass Index (BMI). He found a strong association between caries and BMI, particularly between odontogenic infections and below normal BMI; which shows us that dental caries is a largely neglected determinant of child's overall health.[6]

Shanbhog R et al. conducted a study among 12-14 year old orphan children to assess the relation between period of institutional stay, oral hygiene practice and diet of orphan children to untreated dental caries using PUFA index. His results showed that oral health amongst orphan children was neglected showing a high prevalence of dental caries with low dental care utilisation; and PUFA was an effective index in evaluating clinical consequences of untreated dental decay.[7]

Baginska et al. conducted a study on 5 and 7 year old school children from North-east Poland to study the correlation between pufa and dmft indices. He found negligence in the dental treatment of children from this area with the children found to be having a high prevalence and experience of pufa index in the primary dentition. He later described a modification of PUFA/pufa index to pulpal involvement-roots-sepsis (PRS/prs) index, as the PUFA/pufa index lacked in providing sufficient information on presentation of treatment needs. He concluded saying that the PRS instrument could be a good alternative to the PUFA index.[8,9]

Mehta A et al. studied the relationship between prevalence and severity of consequences of untreated dental decay using pufa index among 5-6 year old school children and found that more than one-third of the children with developed carious lesions caused adverse effects.[10]

Dua et al. investigated the effect of dental caries and its consequences on age-specific Body Mass Index (BMI) and socio-economic status (SES) of 4-14 year old rural children. He found that younger children with a lower SES have a higher mean PUFA/pufa score and below normal BMI compared to older children.[11]

## CONCLUSION

PUFA/pufa index is relevant in addressing the neglected problem of untreated caries and its consequences. The index helps us to show the amount of untreated caries that has progressed to infection, clearly demonstrating the limited and often misleading explanatory power of the DMFT. PUFA/pufa can also be used to plan, monitor and evaluate access to treatment.

However, further studies need to be conducted and newer indices need to be formulated as PUFA/pufa lacks in its ability to provide the concept of treatment need.

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