ORIGINAL ARTICLE

INFLUENCE OF PARENTAL SOCIO ECONOMIC STATUS ON CARIES PREVALENCE AMONG CHILDREN USING PUFA INDEX

[1]LUBNA PASHA
[2]HUMA FARID
[3]FAIZA HASSAN
[4]YASIR PASHA

ABSTRACT

Dental caries and the resulting pulpitis is a reality of modern day life style. Important determinant for dental caries progression may be socioeconomic status (SES), gender, race, oral hygiene and habits like tobacco consumption. An association of dental caries with SES is still questionable. The objectives this study are to access the prevalence of untreated dental caries using PUFA index among 12 to 14 years old school going children and to determine an association of PUFA index with the socio-economic status (SES) of parents. A cross sectional study of three months duration was conducted among 12 -14 years old school going children reporting at the Operative Dentistry department of Margalla institute of Health Sciences Rawalpindi. An assessment of teeth and adjacent soft tissues of 300 children was carried out with mouth mirror. PUFA score of the whole sample was 1.42. The "P" component formed the majority of PUFA score (80%). Children with poor SES had a mean PUFA score of 1.32 while children with middle class SES had a mean PUFA score of 1.48. A statistically significant association was seen between SES and P component of PUFA ($p \leq 0.001$). These results with high degree of pulpal involvement in children belonging to middle class SES highlight the fact that there is a need for educating both parents and children regarding deleterious effects of refined sugars on oral health.

Key Words: *Untreated Dental caries, PUFA index, Pulpal involvement, Permanent dentition.*

INTRODUCTION

Dental caries and the resulting pulpitis is a reality of modern day life style despite the fact that access to dental care providers and dentifrices has improved.[1] High prevalence of dental caries in children is a global health concern.[2] Important determinant for dental caries progression may be socioeconomic status (SES), gender, race, oral hygiene and habits like tobacco consumption. Socioeconomic status (SES) is an economic and sociological combined total measure of a person's work experience and of an individual's or family's economic and social position in relation to others, based on income, education, and occupation.[3] An association of dental caries with SES is still questionable. Dental caries has been found as an indicator of SES in many studies while other studies don't support this association.[4-10] Peterson observed two different patterns of dental caries globally over the years.[4] The prevalence of dental caries has declined in developed countries in last 30 years {Decayed, Missed, Filled teeth (DMFT) from 4.5-6.5 to 2.6} and increased in developing countries (DMFT from 0.1-1.1 to 1.7).[4] Other studies also reported an increase in caries experience with an increase in parents' SES.[5,6,7] An increase in caries experience with a decline in parents SES had also been observed in studies.[8,9] Sofia et al found no association between caries experience and SES.[10]

DMF (Diseases, Missed, Filled) index was introduced in 1983 by Klein, Palmer and Knutson.[11] Since then it is used successfully for reporting caries experience in dental epidemiology for both permanent and deciduous dentition as it is simple and easy to use. This index is also adopted by WHO for national oral health surveys.[12] Although it is a powerful tool for measuring carious, restorative and surgical treatment status of dentition, yet there are several limitations associated with this index.[13,14] This index doesn't indicate number of teeth at risk or estimate treatment needs of an

[1] **For Correspondence:** Dr Lubna Pasha (Associate Professor), Operative Dentistry, Margalla Institute of Health Sciences, Rawalpindi Email: lubnapasha@hotmail.com
[2] Dr Huma Farid, Assistant Professor, Operative Dentistry, Margalla Institute of Health Sciences, Rawalpindi
[3] Dr Faiza Hassan, Assistant Professor, HOD Oral Pathology, Margalla Institute of Health Sciences, Rawalpindi, Pakistan
[4] Dr Yasir Pasha, Private Practitioner.

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individual. It also showed inter observer biased and variability in researches. It does not indicate teeth loss for reasons other than caries like periodontal disease, trauma or orthodontic reasons. Along with these, this index doesn't provide any information regarding squeal of dental caries like pulpal involvement, abscess and ulcers.[15] The shortcoming of DMF index in recording clinical consequences of untreated caries is the basis of development of Pulpal Involvement, Ulcer due to root fragments, Fistula, Abscess index (PUFA).[16] The PUFA/pufa index introduced in 2010 records the consequences of untreated dental caries in both permanent and deciduous dentition respectively (Pulpal involvement, ulcer due to root fragments, fistula, and abscess).[16] This index is unique because it not only documents pulpitis in its early stage but also gives an idea about the consequences of untreated pulpits. The data collected through PUFA index helps in decision making which is not possible through DMF index.[17] Scoring method of PUFA index is shown in the following table. (Table 1)

An association of dental caries and SES has been studied in multiple studies mostly using DMFT Index.[4,5] To our knowledge none of the study has seen an association between SES and dental caries using PUFA index. The purpose of this study was to assess the prevalence and severity of untreated dental caries in school going children aged 12 to 14 years reporting in operative dentistry department of a teaching institute using PUFA index. The secondary objective was to determine an association between PUFA index and socio-economic status (SES) of the children.

METHODOLOGY

This cross sectional study of three months duration was conducted among school going children seen at the Operative Dentistry Department of Margalla institute of Health Sciences, Rawalpindi. Non-probability sampling technique was used. After seeking permission from the hospital Ethical Committee and obtaining consent from the participant's parent/guardian, a total of 350 children were examined. The inclusion criteria were school going children (12-14 years old) with permanent dentition having Pakistani nationality and permanent residents of Rawalpindi and Islamabad. Children with congenital odontogenic syndromes (hypodontia, enamel dysplasia etc) and mental and physical disability were excluded. Demographic details included were age, gender and SES (Kuppuswamy socioeconomic scale[18] was used Table 2). PUFA index was used to assess the teeth for untreated caries and the consequences like ulcers, fistula and abscess. Visible assessment of teeth was carried out (with mouth mirror) for the presence of visible pulp or gross caries (P), ulceration due to root fragment (U), fistula (F) and abscess (A). (Table 1). Any lesion in the surrounding tissue not related to tooth with pulpal involvement was not recorded. No radiographs or other investigative tool was used in this study. Only one score was assigned per tooth. In case of doubt concerning the extent of odontogenic infection, the basic score (P for pulp involvement) was given to the tooth. The PUFA per person was calculated by allocating a value of one to any tooth that meets the PUFA diagnostic criteria (maximum 32 score for permanent teeth). The score for each tooth was then added up to give the individual's PUFA score i.e. P + U + F + A.

Data were analyzed using SPSS version 21. Mean PUFA score was calculated for SES and gender of children. Chi square test was used to study the association of PUFA with SES. Statistical significance was determined at $p \leq 0.05$.

RESULTS

A total of 350children were examined (Diseased "D"= 350). Out of 350 children, 200 met the PUFA diagnostic criteria. The remaining 150 children either presented with pits and fissure caries or undermined caries or dentinal caries which had not grossly damaged the tooth. Out of 200, 100 children were male and 100 were female. 82 (41%) were from lower socio economic background and 118 (59%) were from a middle class socio economic background. (Table 3)

The "P" component of PUFA had a score of 160 (80%), "U" and "F" component each had a score of 12

TABLE 1: PUFA INDEX SCORING SYSTEM

Code	Criteria
P/p	Pulpal involvement is recorded when the opening of the pulp chamber is visible or when the coronal tooth structure have been destroyed, the carious process and only roots or root fragments are left. No probing is performed to diagnose pulpal involvement
U/u	Ulceration due to trauma from sharp pieces of tooth is recorded when sharp edges of a dislocated tooth with pulpal involvement or root fragments have caused traumatic ulceration of the surrounding soft tissues e.g. tongue or buccal mucosa
F/f	Fistula is scored when pus releasing sinus tract related to a tooth with pulpal involvement is present
A/a	Abscess is scored when a pus containing swelling related to a tooth with pulpal involvement is present.

TABLE 2: KUPPUSWAMY SOCIOECONOMIC SCALE

(A) Education of Head	Score
1. Profession or Honours	7
2. Graduate or post graduate	6
3. Intermediate or post high school diploma	5
4. High school certificate	4
5. Middle school certificate	3
6. Primary school certificate	2
7. Illiterate	1
(B) Occupation of Head	
1. Profession	10
2. Semi Profession	6
3. Clerical, Shopowner, Farmer	5
4. Skilled worker	4
5. Semi-skilled worker	3
6. Unskilled worker	2
7. Unemployed	1
(C) Family income per month (Latest revision in Rs./month)	
1. ≥36,997	12
2. 18,498-36,996	10
3. 13,874-18,497	6
4. 9,249-13,873	4
5. 5547-9248	3
6. 1866-5546	2
7. ≤1865	1

SCORING:

Total score	**SES**	
26-29	Upper	
16-25	Upper middle	Middle
11-15	Lower middle	
5-10	Upper lower	Lower
< 5	Lower	

TABLE 3: DISTRIBUTION OF SUBJECTS MEETING PUFA CRITERIA ACCORDING TO AGE, GENDER AND SES (N=200)

Gender	**Number**
Male	100 (50%)
Female	100 (50%)
Age (years)	**Number**
12	98 (49%)
13	62 (31%)
14	40 (20%)
Socioeconomic Status (SES)	
Lower class (upper lower+ lower)	82 (41%)
Middle class (upper middle + lower middle)	118 (59%)

TABLE 4: PREVALENCE OF PUFA INDEX CODES (N=200)

Code	**Number (%)**
P	160 (80)
U	12 (6)
F	12 (6)
A	16 (8)
Total	200 (100)

(6% each) and "A" had a score of 16 (8%) (Table 4). Children with poor socio economic background had a mean PUFA score of 1.32 while children with middle class socio economic background had a mean PUFA score of 1.48, while the PUFA score of the whole sam-

TABLE 5: MEAN PUFA EXPERIENCE AMONG CHILDREN IN RELATION TO SES AND GENDER

	PUFA Score Mean
SES	
Lower	1.32
Middle Class	1.48
Gender	
Male	1.47
Female	1.36

TABLE 6: COMPARISON OF PUFA VALUES ACCORDING TO SES

Frequency	Middle	Lower	Total	p value
P	121*	39	160	
U	10	2	12	
F	8	4	12	<0.001*
A	13	3	16	
Total			200	

*Chi square (Fisher exact) test
Statistically significant at 0.05 level

ple was 1.42. The male children of the sample had a PUFA score of 1.47 while the females of the sample had a PUFA score of 1.36.The"P" component of PUFA made up 1.13 out of 1.42 of the PUFA score for the whole sample. (Table 5).

A statistically significant association was also seen between SES and P component of PUFA ($p \leq 0.001$). Pulpal involvement "P" was more frequent in children belonging to middle class in comparison to lower class. No significant association of PUFA was seen with gender and age of the child.

DISCUSSION

The PUFA score of the whole sample in our study was 1.42 which is higher as compare to studies conducted by Kamran et al[19] (1.14) and Monse et al[16] (1.0) The high PUFA score may be due to the fact that the sample was taken from the operative dentistry department. There is a possibility that if sample was taken from randomly selected children from a school or community, the number of pulpal involvement cases would be on the lower side.

We used Kuppuswamy socioeconomic scale for categorization of children in different social classes and children in our sample met middle and lower SES criteria. In our study children with low SES background had a mean PUFA score of 1.32 while children with middle class SES background had a mean PUFA score of 1.48. A statistically significant association ($p \leq 0.001$) was also seen between SES and P component of PUFA. Pulpal involvement was more frequent in children with middle class SES as compared to lower class SES. According to our knowledge to this date no study has compared the PUFA scores with individuals' SES. Our result is in accordance with the observations made by Peterson[1,4] who while using DMF index concluded an incline in caries prevalence in developing countries over 30 years (DMFT from 0.1-1.1 to 1.7). Popoola and colleagues[20] also reported a direct relationship of caries experience and parental SES with high caries prevalence in high and middle class socioeconomic status. In another study among preschool children in Lahore, lower caries experience was found to be associated with rural residence and low family income.[5] These patterns can be attributed to the fact that in the developing countries rapid industrialization resulted in easy and cheap access to refine carbohydrates. Due to high affordability children from well off socio economic background are more exposed to caries risk, such as refined sugars and their detrimental effects on oral health.[7,20] The need for preventive measure become even more urgent in such cases.

The consequences of pulpal involvement if left untreated can be eventual pulpal death and infection of the soft tissues and bone. The U,F and A components of PUFA represent advance stages of a deteriorating dentition. The present study noted that although the number of cases with ulceration, fistula and abscess were lower than those with pulpal involvement, yet it did point out the fact that pulpal involvements were not being addressed in time. If this sample were to be followed without any intervention then there remained a possibility that the number of cases with U, F and A component of PUFA would increase .However not to treat cases reporting at a tertiary care hospital would be ethically inappropriate.

CONCLUSION

The results of the present study with high degree of pulpal involvement in children belonging to middle class SES highlights the fact that there is a need for educating the parents as well as children about deleterious effects of refined sugars on oral health.

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CONTRIBUTIONS BY AUTHORS

1 **Lubna Pasha:** Gave the idea and performed the research study.

2 **Huma Farid:** Conducted literature search and wrote the manuscript.

3 **Faiza Hassan:** Performed the statistical analysis.

4 **Yasir Pasha:** Wrote the manuscript.