Original Article

Dental Caries

Socio-economic Gradient & Its Impact on Dental Caries among School Children of Primary and Early Mixed Dentition

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ABSTRACT

Introduction: Dental Caries influence on the Quality of life of any individual. There is a conspicuous gap between the living standards of the high and low socioeconomic populations living in urban & rural settings.

Objective: The aim is to determine Dental caries prevalence among different socioeconomic classes and to observe a social gradient across the high and low income areas which impacts oral health care needs.

Study Design: Cross-sectional study

Place and Duration of study: This study was carried out at various Schools from Lahore city and its surrounding were included. The data were collected over a period of 3 months time.

Materials and Methods: The sample size was 750 school children age 2-6 years. The data were collected using questionnaire regarding Oral hygiene and Oral examinations were performed to observe DMFT scores.

Results: Mean DMFT score was found to be 1.7 Score. The students from urban school settings have lesser DMFT scores as compared to students from rural school settings bearing higher DMFT Scores ($p<0.001$). Students having DMFT score 5 or above exist only in rural settings (73 students) however there was no student in urban area bearing such high score of 5 or above. Majority of the students (88.5%) never attended any dentist and those who have attended were mainly from the urban school. There was not a single child in which Dental Sealant was found.

Conclusion: There is a strong need towards provision of equality based oral health care services. These services should include both Preventive, Promotive and Curative aspects. In this context a strong Oral health Plan should be fabricated on national level to address these issues.

Key Word: Socioeconomic Gradient, Dental Caries, Urban & Rural Setting

INTRODUCTION

Dental Caries contributes a major influence on the Quality of life of any individual. It is predisposed by various factors, which alters the Quality of life of that person during childhood, adolescence and elderly ages.[1] While considering the Dental Caries burden globally, a decline in the occurrence of Dental Caries is observed during the past 20-30 years but still data advocates the occurrence is found higher in portions of under privileged areas of developed countries and broadly in various developing countries.[2]

Despite the low prevalence of Dental caries in this region, a disparity in the provision of Treatment with a huge number of untreated cases still exist.[3] Amongst those who are effected with this disease, majority of which has grossly decayed teeth.

According to the socioeconomic situation of this region, there is a conspicuous gap between the living standards of the high and low socioeconomic populations.[4] Elite class is privileged enough with resources that encourage them to also focus on their oral health needs, while the lower class has to worry about the inherent basic necessities of life than to focus on oral issues. Routine Dental Evaluations are not a top health priority especially when the basic health needs are not being met.

Another role is the habitual Norms of the two societies which also causes this divergence. For instance the role of Maternal Education is an essential ingredient in structuring a child's dental routine which lasts a lifetime. To add to the discrepancy of living standards, children from low socioeconomic income reside in areas where the control of disease and its diagnosis are compromised and treatment is based upon cultural beliefs. This causes a significant delay in seeking dental management, resulting in children having compromised oral health. Moreover, as outlined by the World Health Organization global policy, the basic guidelines for the promotion of oral health which include fluoridation, healthy nutrition and tobacco control are not fulfilled in the low income society.[5]

While considering the Education, children from low income families usually go to public schools in this country which are very economical and much affordable to every class of a society. However, the remaining affording children went to private schools. Unfortunately, Children from these public and private institutions differ due to different approach in Education system, general awareness and level of perception which results in the evident discrepancy

Another important factor causing the prevalence of caries is Diet. A high sugar intake is linked with a higher incidence of Dental Caries. [6] As the sugar

consumption has increased in recent years. This marked increase in sugar consumption result in increased caries prevalence, making a lifestyle more prone to the disease. [7]

The general objective of this study is to determine caries prevalence among different socioeconomic classes of school children. However, expended objectives are:

- To determine the prevalence of Dental Caries in primary and early mixed dentition of school going children in various rural and urban settings.
- To observe a social gradient across the high and low income areas which impacts oral health care needs
- To assess the self perception and satisfaction level of oral health by school children
- To see the effect of oral hygiene habits on dental caries.
- To compare the effect of dietary habits and sugar intake on the prevalence of caries.
- To depict access to oral health services

To provide established data that would help in organizing future dental preventive programs in areas gravely affected.

MATERIALS AND METHODS

In this Non-Interventional Cross-sectional Study, various schools from Lahore city and its surrounding were included. Convenient sampling was done with a sample size of 750 students, aged 2 to 6 years. The data were collected over a period of 3 months time. This data collection was done in two steps. First an interview was performed with the kid followed by Oral Health Assessment using DMFT index.

An interviewer administered questionnaire was used for documenting the accumulated data by interviewing each child in his familiar classroom settings. The main division of these schools were made on the basis of financial background of their parents. This also consequently leads to two economic divisions from urban and rural class. The names of these schools were kept anonymous; however a verbal consent was taken at every level of the survey.

The data were compiled into three sections. The first part dealt with the socio-demographic data of the child included age, gender and socioeconomic status of the child's parents which was assessed by the school in public or private sector while the second part was related to his Self perception and Satisfaction towards Oral Health and lastly, consisted of data representing the DMFT score of that particular child which was recorded for primary and early mixed dentition.

For documenting DMFT Score, a basic intraoral examination was carried out by the Dentist, with the child seated on a portable chair and the data being record by the assistant. The detection of caries was done by visual examination with the help of a wooden spatula, light, a mouth mirror and a dental probe.

The data entry and analysed was performed on *SPSS*© V.17 for the generation of statistical results and inferences. Multiple descriptive analysis and test were applied where needed.

Inclusion Criteria:

- Children of 2-6 years of age belonging to either type of school (Urban/Rural) attending the class during the survey time.
- Children with Primary and early mixed dentition

Exclusion Criteria:

- Physically and mentally handicapped children
- Medically compromised patients
- White spot lesions on the teeth.

RESULTS

A total of 750 students participated in this study. Mean Age of these children was found to be 5 years. Among them 327 (43.6%) were males and 423 (56.4%) were females. Students belonged to Public Schools were 417 (55.6%) and 333 (44.4%) belongs to private schools.

Oral Health Concerns: Mean DMFT score was found to be 1.7 Score (S.D 2.14±). Majority of the students when asked about their oral health, considered it to be good (73.3%) and were satisfied with their teeth (86.4%). Those who were not satisfied, main concern were the Colour of their teeth (9.6%) and Appearance (10%). Only a few were not satisfied by their Chewing ability (3.3%).

Oral Hygiene Practices: Students who brush more than once / twice a day were more in number (37.7%) as compared to those who brush only once (27.5%). However there are some students who never used a tooth brush (9.6%) for Oral hygiene maintenance. Students who brush their teeth twice (226 students) have better dental conditions (DMFT score is zero, $p=0.001$) as compared to other students who brush only once or never.

Regarding oral cleanliness, students from urban cities prefer the method using tooth brush and fluoridated tooth pastes to clean their teeth (333 students) while in rural areas they prefer to clean their teeth (388 students) with conventional methods including oral rinse, finger brushing, or using tooth powder.

Frequency of Dietary Sugar Intake: The present study considered frequencies of various Dietary Sugar intakes according to their routine like "more than once, daily, rarely, or never" basis. Many children consumed Biscuits on daily basis (43.5%) for single time however there are a few children who eat more than once a day (4.8%) on daily basis in lunch or in evenings. The toffees and Candies consumption is more prevalent (40.9%) in some children on daily basis as compared to those children who never consumed (9.5%). Milk was

consumed (44.1%) mainly on a daily basis whereas a few children (3.3%) never consumed it. Soft Drinks were consumed rarely by majority of the students (55.9%). Similarly Juices were consumed rarely by the majority (43.2%). Tea makes the top of the list of the most rarely consumed drink by majority of the students (38.5%) while some children (32.1%) consume tea daily. Regarding access to Dental Health Care, majority of the school children never had any Dental Visits (88.5%).

DMFT Score comparison in Urban & Rural settings: The students from urban school settings have lesser DMFT scores(0,1,2 and 3 scores among 248,38,35 and 10 students respectively) as compared to students from rural school settings bearing higher DMFT Scores (0,1,2,3 and 4 Score among 93,50,71, 72 and 58 students respectively)($p<0.001$). Students having DMFT score 5 or above exist only in rural settings (73 students) however there was no student in urban area bearing such high score of 5 or above.

Regarding the association of sugared milk intake with DMFT, those who have high DMFT Scores (Score 7) have daily consumed sugared milk (46.7%) as compared to those who rarely consumed sugared milk (40%) has lesser DMFT scores. Rural children consumed more sugared milk (60.4%) as compared to urban children (39.6%).

Oral Health care Services: Regarding Oral health care access to the students, when they were asked about have you ever attended a dentist, majority of the students (88.5%) answered negatively whereas those who did attend were (95.3%) mainly from the urban students.

Despite the importance of Dental Sealant, there was not a single child in which dental Sealants was placed.

Table No.1: Frequency of various types of Diet Consumed by Children

	Biscuits N (%)	Toffees N (%)	Sugared Milk N (%)	Soft Drink N (%)	Sugared Tea N (%)	Juices N (%)
Never	117 (15.6)	71 (9.5)	25 (3.3)	139 (18.5)	289 (38.5)	141 (18.8)
Rarely	271 (36.1)	179 (23.9)	184 (25.4)	419 (55.9)	128 (17.1)	324 (43.2)
Once a day / Daily	326(43.5)	307 (40.9)	331 (44.1)	171 (22.8)	241 (32.1)	247 (32.9)
More than once	36 (4.8)	193 (25.7)	210 (28.0)	21 (2.8)	92 (12.3)	38 (5.1)

DISCUSSION

The discussion part of this article includes interpretation of the result in close context of the topic selected. This portion will discuss the key findings of this study in relation to previously published literature.

The mean DMFT value in this study was found to be 1.7 which is similar to the Scores in this region. Study conducted in Karachi, Pakistan determined similar DMFT score for which the caries prevalence and severity was particularly higher in government preschool children compared to those belonging to private schools. [8] In another study done in Lahore, Pakistan relating dental caries with a child's residence and family income, the mean DMFT was found to be 1.85 (+/- 3.26). Furthermore, a significant association was found between caries incidence, low socioeconomic status, female gender and rural residence.[9] Similar study conducted in Bhopal, India, the mean DMFT of 5 year old tribal children was found to be 4.13 +/- 3.90. This slight higher score is due to snacking between meals and the children never visited any health personnel for dental treatments.[10] In Penaflor, Chile, study conducted on the prevalence of dental caries on preschool children showed DMFT Score 2.1 +/- 2.9 for the 3 to 5 year olds. Males were found to be more affected than females and significant finding was stated that there may be an inverse socio economical influence on the DMFT.[11]

Dental Caries incidence in this study was found to be higher in the lower income groups. However, urban settings had a better DMFT score as compared to those from rural settings. High DMFT scores of 5 or above belonged to the rural settings as no student from urban settings has such a high score. Such Similar trend is found in other studies, in which children from low socioeconomic group showed a higher percentage of caries including India, [12] North-east Italy[13] and in Amman, Jordan[14] respectively. These studies correlate the association of lower socioeconomic levels with higher DMFT Scores. This higher difference of caries incidence in various literature are found due to a lack of adequate oral hygiene measures taken by students themselves and a reluctant attitude of their parents / guardians towards Oral Health maintenance. The negligence towards Oral Health awareness and Education by the parents and as well as the teachers is another contributing reason. Inappropriate Diet intake in low family status and changing priorities are among the cause of this gradient shift. Lack of adequate Oral health care services in rural areas also leads to increased cases of untreated dental decay. However, these conditions are much better in developing cities in the same country. In a study conducted in Islamabad, Pakistan a significant relationship was found between low socioeconomic standing and a high DMFT. Influence of poor oral hygiene and increased carbohydrate consumption was also reported. [15]

Another study in Washington found that children from low income backgrounds had a higher incidence of oral disease as compared to those from a high income background, in whom the situation was found to be better.[16]

Similarly, in a study conducted in UAE, it was determined that the prevalence of caries was inversely proportional to the socioeconomic class and directly proportional to the frequency of sugar consumption and snacking in between meals.[17]

In this study, association of sugared milk intake was assessed with DMFT Score. Results of this study showed that those who have higher DMFT Scores (Score 7) have consumed more sugared milk daily (46.7%) as compared to those who rarely consumed sugared milk (40%) and have lesser DMFT scores. The annual health report of Pakistan has reported that sugar consumption has increased from 17 kg per person per year in 1950 to over 28 kg per person per year in recent years. [7] This result in increased caries significance as in previously years. While inferring to the association between urban & rural school settings and sugared milk intake, rural population consumed more sugared milk (60.4%) as compared to urban population (39.6%). This study showed incidence of high DMFT score in rural population in which sugared milk was consumed. This could be considered another contributing factor for tooth decay. Similar study which was conducted in Baltimore, USA 2003 on the dietary determinants of dental caries of preschoolers, concluded that certain guidelines should be given to parents to avoid frequent consumption of sugary drinks in bottles or small cups and to discourage children sleeping with bottles at night, among others.[18] Another longitudinal study carried out in Iowa, USA on fluoride, beverages and dental caries in the primary dentition, concluded that sugared beverages and milk were associated with caries incidence.[19] Furthermore, a study undertaken in Japan in 2011 on early childhood caries stated that children who develop early childhood caries are exposed to frequent and long durations of sugared beverages consumptions and that nursing bottles increase the exposure to lactose.[20] Similar results were presented in Australian studies, Thai studies [21] and Saudi Arabian studies.[22] This supports in establishing a connection between sugared milk and a high caries incidence.

CONCLUSION

To improve the Oral Health situation in Pakistan, measures should be undertaken to control the burden diseases among the unprivileged class. Certain issues like lack of resources and Dental care professional services where needed can be addressed. In this context, an appropriate National Dental Public Health plan or policy should be formulated (WHO, 2001). A strong need exists to create awareness programs in public schools on a regular basis in order to pound healthy habits in children from a young age. Oral Health Awareness program could serve as an excellent tool, to enhance both maternal level as well as children's knowledge in order to incorporate better oral hygiene practices. This intervention would aim towards the consequential minimization of the disease. . The data can be utilized by the policy makers to design such programs to accommodate the dental needs of the low income level inhabitants without creating a financial burden.

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