

Association of Socioeconomic Status and Maternal Education as a Factors of Oral Hygiene, Debris, and Calculus Status among School going Children of Lahore: A Cross-Sectional Study

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Abstract

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Background: Oral hygiene plays a vital role in maintaining overall health and preventing oral diseases. Socioeconomic status and, maternal education recognized as important social determinants that influence children oral health behaviors and outcomes. However, evidence regarding their association with oral hygiene status, debris and calculus accumulation remains limited in many developing

countries. Objectives: To evaluate the association of socioeconomic status and maternal education with oral hygiene status, debris and calculus status among children. Methods: A cross-sectional study was conducted among 150 children aged 10-15 years selected from socially disadvantaged communities in Lahore. Data on socioeconomic status and maternal education were collected using a structured questionnaire. Oral examinations were performed using the simplified oral hygiene index (OHI-S), including the Debris index-Simplified (DI-S) and Calculus-Simplified index (CL-S). Socioeconomic status was

categorized. Statistical analysis was performed using SPSS version 23. Association between socioeconomic status, maternal education, and oral hygiene parameters were parameter were assessed using the Chi-square test, independent t-test, ANOVA, or regression analysis as appropriate. A p- value of < 0.05 was considered statistically significant. Result: Children from lower socioeconomic background demonstrated significantly poorer oral hygiene status, with higher mean debris and calculus scores compared with those from higher socioeconomic groups. Similarly, lower maternal educational Attainment was significantly associated with poorer oral hygiene, increased debris accumulation, and higher calculus are important determinants of children's oral hygiene. Conclusion: Lower socioeconomic status and lower maternal education were significantly associated with poorer oral hygiene, increased debris accumulation, and greater calculus deposition among children. These findings highlight the importance of addressing socioeconomic disparities and promoting maternal oral health education through targeted community-based preventive programs to improve children's oral health.

Keywords: Oral hygiene, socioeconomic status, maternal education, debris index, calculus index, OHI-S.

Introduction

Oral health is a essential part of overall wellness and quality of life, affecting nutrition, speech, self –esteem, and social interaction throughout lifespan. poor oral hygiene characterized by the accumulation of debris and calculus is the major risk factor for dental caries and periodontal disease, both of which remain relatively prevalent worldwide, especially in low and middle-income communities. Socioeconomic status (SES). encompassing income, educational level and occupational background, has consistently been shown to shape oral hygiene behaviors and clinical outcomes in diverse populations. Several studies report that individuals from lower SES background exhibit poorer oral hygiene, higher debris and calculus scores, and greater disease burden compared to those higher SES groups. ^[1]

Maternal education is a particularly important determinant of child oral health. Educated mothers are more likely to possess health –related knowledge, engage in preventive behaviors, and promote routine hygiene practices. all of which positively influence their children's oral hygiene and reduce the accumulation of dental debris and calculus. Research in pediatric population shows that higher maternal education

correlates with better brushing habits and lower prevalence of adverse oral health outcomes, such as dental caries and poor oral hygiene status.^[2]

Despite significant evidence relating socioeconomic level and parental education to clinical behavior oral health indicators, few research has specifically investigated how these factors relate to oral hygiene status, debris and calculus in community based samples, particularly in South Asian contexts. Previous research in Pakistan and similar settings has shown that socioeconomic disparities contribute to difference in oral health behavior and clinical outcomes in children with parental education emerging as a critical predictor of oral hygiene practice^[4]

Background

Oral hygiene is a important predictors of oral health, since its influence the development and progression of common problem such as dental caries and periodontal disease. The accumulation of dental plaque and calculus, which is usually measured using debris and calculus indices, reflects an individual's oral hygiene habit and access to preventive care. Poor oral hygiene has been consistently associated with gingival inflammation, periodontal breakdown, and adverse oral health outcomes, making it a key indicator in epidemiological and community-based oral health research.^(2, 3)

Socioeconomic status (SES) is regarded as a significant social factor of health, particularly dental health. People from lower socioeconomic backgrounds may have a greater rate of oral diseases and less access to dental treatment. Factors such as income, occupation, and living conditions influence health –related behavior, awareness, and utilization of preventive dental care. Numerous studies have demonstrated that children and adults from lower SES groups exhibit higher debris and calculus scores and poorer oral hygiene compared to those from higher socioeconomic strata.⁽⁴⁻⁶⁾

Maternal education, in particular, plays a crucial role in shaping oral health behaviors, especially among children. Educated mothers are more likely to possess better oral health knowledge, promote healthy hygiene practices, and seek timely dental care for themselves and their children. previous research has shown a significant association between maternal education level and oral hygiene status, plaque accumulation, and periodontal health outcomes. However, evidence from cross-sectional studies in developing and resources –limited setting remains limited, highlighting the need to further explore the combined influence of socioeconomic status and maternal education on oral hygiene, debris and calculus status.⁽⁷⁻⁹⁾

Objectives

- To assess oral hygiene, debris, and calculus status among the study population.

- To evaluate the association of socioeconomic status and maternal education with oral hygiene, debris and calculus status.

Material & Methods

Study Design and Population

An observational, cross-sectional study was done with the group effort of a government school to assess the oral health status and related factors among 150 children aged 10-15 years from socially disadvantaged communities in Lahore. Data collection took place from August to October 2025; the minimum sample size was determined using standard parameters for the prevalence of the study. An expected prevalence of 50% ($p=0.50$), 95% confidence level ($z=1.96$), and a margin of error of 7% ($d=0.07$), resulting in a required sample of 150 students. Children who participated in the examiners calibration phase were excluded from the analytic sample.

Inclusion criteria included age limit 11-15 years, presence of natural teeth, and willingness to participate in the study. participants with systemic disease affecting oral health, those undergoing orthodontic treatment, or those who had received professional dental prophylaxis within the past 3-6 months were be excluded from the study.

Data Collection Method

Data were collected using a structured questionnaire and clinical examination. the questionnaire was used to obtain information on socioeconomic status and maternal education level. Socioeconomic status was assessed using a pre-tested and validated socioeconomic scale appropriate for the study population, while maternal education was recorded as the highest level of formal education completed.

Clinical oral examination was conducted to assess oral hygiene status, debris, and calculus using standardized oral health indices. Oral hygiene status was evaluated using the Oral Hygiene Index-Simplified (OHI-S), which include the debris index simplified (DI-S) and Calculus Index –Simplifies (CI-S). Examinations were performed under natural light/artificial light using sterile mouth mirrors and WHO periodontal probes, following standard infection control protocols.

To ensure consistency and reliability of measurements, the examiner was trained and calibrated prior to data collection, intra –examiner reliability was assessed using Kappa statistics, and acceptable agreement was achieved before commencement of the study. All data were recorded on pre-designed data-collection forms and later entered into a database for statistical analysis.

Statistical Analysis

Data were entered and analyzed using SPSS version 23, Descriptive statistics were used to summarize the study variables. Frequencies and percentages were calculated for categorical variables such as socioeconomic status and maternal education, while means and standard deviation were computed for continuous variables including oral hygiene, debris, and calculus scores.

For inferential analysis, the association between socioeconomic status and oral hygiene, debris and calculus status was assessed using the Chi-square test for categorical outcomes. When comparing mean oral hygiene, debris and calculus score across different socioeconomic and maternal education categories. An independent t-test was applied.

To identify socioeconomic status and maternal education as determinants of oral hygiene outcome, multivariable regression analysis was performed. Linear regression was used when oral hygiene, debris and calculus scores were treated as continuous variables, while binary logistic regression was applied when outcomes were categorized.

RESULT

A total of 150 school-going children aged 11-15 years participated in the study. The mean age of the participants was 12.9 ± 1.4 years., of the total participants, 82 (54.7%) were males and 68(45.3%) were females. According to socioeconomic status ,70 (46.7%) participants belonged to the low socioeconomic group,50(33.3%) to the middle socioeconomic group and 30 (20%) to high socioeconomic group. Regarding maternal education,38(25.3%) mother had no formal education,46 (30.7%) had primary education ,42 (28%) had secondary education, and 24 (16.0%)had higher education.

Table 1: *Demographic characteristic of study Participants: N= 150 (Table 1)*

Variable	category	frequency	percentage
Age	11-12	68	45.3
	13-15	82	54.7
Gender	Male	82	54.7
	Female	68	45.3
Socioeconomic status	Low	70	46.7
	Middle	50	33.3
	High	30	20.0
Maternal Education	No formal education	38	25.3
	Primary	46	30.7
	Secondary	42	28.0
	Higher	24	16.0

Oral Hygiene Status

Based on the Simplified Oral Hygiene Index (OHI-S),35(23.3%) children had good oral hygiene, 82 (54.7%) had fair oral hygiene, and 33(22.0%) had poor oral hygiene. The mean OHI-S score of the study population was 2.12 ± 0.89 , indicating overall fair oral hygiene.

Debris Status: the mean debris index simplified score was 1.28 ± 0.56 , According to debris status: Good 42 (28%), fair 80 (53.3%)and poor 28 (18.7%).

Calculus Status: The mean Calculus Index Simplifies was 0.84 ± 0.49

The distribution of calculus status was as follows:

No Calculus: 68 (45.3%), mild calculus 58(38.7%), moderate /severe was 24 (16.0%) (Table:2)

Distribution of Oral Hygiene, Debris and Calculus Status: (Table 2)

Variable	Category	Frequency	Percentage
Oral-Hygiene Status (OHI-S)	Good	35	23.3
	Fair	82	54.7
	Poor	33	22.0
Debris status (DI-S)	Good	42	28.0
	Fair	80	53.3
	Poor	28	18.7
Calculus status (CI-S)	No calculus	68	45.3
	Mild calculus	58	38.7
	Moderate / severe	24	16.0

Table 3. Association of Socioeconomic Status and Maternal Education with Oral Hygiene, Debris, and Calculus Status (N = 150)

Variable	Category	Oral Hygiene Good/Fair/Poor	P- Value	Debris Good/Fair/Poor	P- Value	Calculus Good/Fair/Poor	P- Value
SES	Low (n=70)	8/35/27		12/37/21		22/30/18	
	Middle (n=50)	15/30/5	0.001	16/29/5	0.002	26/20/04	0.012
	High (n= 30)	12/17/1		14/14/2		20/8/2	
Maternal Education	No formal	4/17/17		5/18/15		10/16/12	

(n=38)						
Primary	8/28/10	<	10/27/9	0.004	18/21/7	0.022
(n=46)		0.001				
Sec.	12/25/5		14/24/4		26/16/3	
(n=42)						
Higher	11/12/1		13/11/0		15/5/2	
(n=24)						

Table 3 shows the association of socioeconomic status and maternal education with oral hygiene, debris and calculus status. Significant associations were found between socioeconomic status and oral hygiene ($p= 0.001$) debris ($p=0.002$) and calculus ($p=0.012$). similarly

DISCUSSION

Oral health is influenced by multiple social, behavioral, and environmental factors, among which socioeconomic status (SES) and maternal education play significant roles. The present cross-sectional study highlights the association between socioeconomic condition, maternal education, and oral hygiene indicators , including debris and calculus status. These finding support the concept that social determinants strongly influence oral health behaviors and disease risk. [4] [5]

Socioeconomic status affects oral health through several pathways, including access to dental care, availability of oral hygiene resources, dietary practice and and health related knowledge. Individuals from lower socioeconomic background may experience greater barrier to preventive dental services and may have limited access to tooth brush, fluoridated tooth paste and professional oral education [6]

Maternal education is considered an important determinant of children 's oral health because mothers often influence early –life health behaviors, dietary pattern ,and utilization of health care services .Higher maternal education is generally associated with better awareness of oral hygiene practices, improved supervision of children tooth brushing habits, and greater adaptation of preventive dental behaviors, Previous studies have demonstrated that children of mothers with higher education levels tends to exhibits better oral hygiene status and lower levels of oral diseases compared with whose mothers have limited education (10)

The relationship between the maternal education and oral hygiene status may also be explained through health literacy. educated mothers are more likely to understand the importance of regular brushing, fluoride use, reduction of sugary intake, and routine dental visits. in contrast , inadequate oral health knowledge among caregiver may lead to delay preventive practice and increase accumulation of plaque ,

debris and calculus . Therefore ,improving maternal oral health knowledge may serve as effective strategy for reducing oral health inequalities.^[7]

The finding also emphasized that socioeconomic disadvantage and low parental education often coexist and may have a cumulative effect on oral health outcome. Children and families facing socioeconomic hardship may have difficulty getting preventive dental treatment, resulting in a higher prevalence of untreated oral disorders. Addressing these disparities necessities community based oral health programs, school dental health education, and tailored interventions to raise caregiver knowledge. .^[8]

CONCLUSION

This study found that the socioeconomic position and mother’s education are important predictors of children oral hygiene status .children from low socioeconomic background and mothers with low educational level attains a poor oral hygiene with significantly higher calculus and debris scores than the children with higher education background .these findings highlight the significance of mother education and socioeconomic factors sustaining dental health .community based oral health promotion initiatives at lower income families as well as educational intervention for mothers, may assist improve oral hygiene practice and lesser the burden of illness.

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