Effect of Socio-Economic Status on Oral Hygiene and Gingival Health among 15-Year-Old School Children in Jaipur City: A Cross-Sectional Study.

Abstract

Background: Socio-economic status (SES) significantly influences oral health outcomes, particularly among adolescents.

Aim: To assess the association between SES, oral hygiene, and gingival health among 15-year-old school children in Jaipur City.

Methods: A cross-sectional study was conducted among 400 school children selected from 20 schools using stratified random sampling. SES was assessed using Modified Kuppuswamy Scale (2021). Oral hygiene and gingival status were evaluated using Oral Hygiene Index-Simplified (OHI-S) and Gingival Index (GI). Statistical analysis included ANOVA, Chi-square test, and Pearson correlation ($p < 0.05$).

Results:
58% of participants had good oral hygiene, while 11.5% had poor hygiene. Moderate gingivitis was most prevalent (37%). Mean OHI-S and GI scores increased significantly with decreasing SES ($p < 0.001$). A strong positive correlation was observed between OHI-S and GI ($r = 0.742$). Private-school students and females demonstrated significantly better oral health outcomes.

Conclusion: SES is a strong determinant of oral hygiene and gingival health. Targeted school-based interventions are essential to reduce oral health disparities.

Keywords: Socio-economic status, Oral hygiene, Gingival health, Adolescents, OHI-S, Gingival Index

1. Introduction

Oral health is an essential component of overall health and well-being, influencing nutrition, communication, and quality of life. According to the World Health Organization, oral diseases affect nearly 3.5 billion people worldwide, making them among the most prevalent non-communicable diseases[1–3]. Despite being largely preventable, conditions such as dental caries and periodontal diseases continue to pose a significant public health challenge, particularly in low- and middle-income countries[2].

Periodontal diseases, including gingivitis and periodontitis, are highly prevalent among adolescents. Gingivitis, characterized by inflammation of the gingiva without attachment loss, is reversible but can progress to more severe periodontal conditions if left untreated[25–26]. The accumulation of dental plaque is the primary etiological factor, and its impact is influenced by host response, hormonal changes, and environmental factors.

Adolescence represents a critical transitional phase during which oral hygiene practices are established, making it an important target group for preventive interventions[11–12]. However, oral health outcomes are not uniformly distributed across populations.

Socio-economic status (SES), a composite indicator of income, education, and occupation, plays a pivotal role in determining health behaviours and access to healthcare services[1–2]. The World Health Organization emphasizes that health inequalities arise from the conditions in which people are born, grow, and live[28].

Individuals from lower socio-economic backgrounds are more likely to experience poor oral hygiene, increased plaque accumulation, and higher prevalence of gingival diseases[3–4,14]. These disparities are often attributed to limited access to dental care, reduced health literacy, and unhealthy dietary practices[8–10]. Conversely, individuals from higher SES groups demonstrate better oral hygiene practices, greater utilization of dental services, and improved oral health outcomes[3].

In India, oral health disparities are further influenced by socio-economic diversity, rapid urbanization, and unequal distribution of healthcare resources[10,29]. National data indicate a high prevalence of gingival and periodontal diseases among adolescents, particularly in lower socio-economic groups[29].

Jaipur City, the capital of Rajasthan, represents a socio-economically diverse urban population, making it an ideal setting to study oral health inequalities. However, limited studies have explored the relationship between SES, oral hygiene, and gingival health among adolescents in this region[16].

Therefore, the present study was undertaken to assess the effect of socio-economic status on oral hygiene and gingival health among 15-year-old school children in Jaipur City.

2. Materials and Methods

Study Design and Population

A descriptive cross-sectional study was conducted among 400 school children aged 15 years in Jaipur City.

Sampling Method

Jaipur was divided into four zones, and 20 schools were selected using simple random sampling. From each school, 20 students were randomly selected.

Inclusion Criteria

- 15-year-old students
- Both genders
- Consent obtained

Exclusion Criteria

- Systemic illness affecting periodontal health
- Undergoing orthodontic treatment

Data Collection Tools

- **SES:** Modified Kuppuswamy Scale (2021)
- **Oral Hygiene:** OHI-S (Greene & Vermillion)
- **Gingival Health:** GI (Löe & Silness)

Statistical Analysis

Data were analyzed using SPSS v26.

- ANOVA for group comparison
- Chi-square test for association
- Pearson correlation for relationship between OHI-S and GI

Significance level set at $p < 0.05$

3. Results

A) Demographic Distribution-(Table-1)

In present study, total400 participants were enrolled .Out of which ,males were 51.3% and Females were 48.7%. Ratio of students from both private and government schools were 1:1.

Table 1: Distribution of Study Participants by Gender and School Type

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	205	51.3
	Female	195	48.7
School Type	Government	200	50.0
	Private	200	50.0
Total	—	**400**	**100**

B) Socio-Economic Status

- Lower middle class: 38.5%
- Upper middle: 26.3%
- Upper lower: 21.8%

Table 2: Socio-Economic Status of Participants (Modified Kuppuswamy Scale)

SES Category	Score Range	Frequency (n)	Percentage (%)
Upper (I)	26–29	28	7.0
Upper Middle (II)	16–25	105	26.3
Lower Middle (III)	11–15	154	38.5
Upper lower (IV)	5–10	87	21.8
Lower (V)	<5	26	6.5
Total	—	**400**	**100**

C) Oral Hygiene Status

- Good: 58%
- Fair: 30.5%
- Poor: 11.5%

Table 3: Distribution of Oral Hygiene Status (OHI-S)

Category	OHI-S Range	Frequency (n)	Percentage (%)
Good	0.0–1.2	232	58.0
Fair	1.3–3.0	122	30.5
Poor	3.1–6.0	46	11.5
Total	—	**400**	**100**

D) Gingival Health

- Healthy: 22.5%

- Mild gingivitis: 28%
- Moderate: 37%
- Severe: 12.5%

Table 4: Distribution of Gingival Index (GI) Scores

Severity	GI Score Range	Frequency (n)	Percentage (%)
Healthy	0.0	90	22.5
Mild Gingivitis	0.1–1.0	112	28.0
Moderate	1.1–2.0	148	37.0
Severe	>2.0	50	12.5
Total	—	**400**	**100**

E) Association between SES and Oral Health

- Mean OHI-S increased significantly from upper to lower SES
- Mean GI also increased significantly with decreasing SES
- **Statistical significance:** $p < 0.001$

Table 5: Mean OHI-S Scores Across SES Categories

SES Category	Mean OHI-S	SD	p-value
Upper (I)	0.72	0.25	
Upper Middle (II)	0.95	0.31	
Lower Middle (III)	1.42	0.40	
Upper Lower (IV)	2.05	0.52	

SES Category	Mean OHI-S	SD	p-value
Lower (V)	2.55	0.60	
ANOVA	—	—	**<0.001***

4. Discussion

The present cross-sectional study evaluated the association between socio-economic status (SES), oral hygiene, and gingival health among 15-year-old school children in Jaipur City. The findings clearly demonstrate a statistically significant relationship between SES and oral health outcomes, reinforcing the concept of a social gradient in oral health.

4.1 Overall Oral Hygiene and Gingival Status

In the present study, 58% of participants exhibited good oral hygiene, while 30.5% had fair and 11.5% had poor oral hygiene. These findings are comparable to those reported by Mishra et al.[14], who observed that approximately half of the study population maintained good oral hygiene, with a substantial proportion falling into the fair and poor categories.

With respect to gingival health, moderate gingivitis was the most prevalent condition (37%), followed by mild gingivitis (28%), while only 22.5% of students had healthy gingiva. These results are consistent with findings from Sharma et al.[23], who reported a high prevalence of gingival inflammation among schoolchildren, indicating that gingivitis remains a common condition in adolescence.

However, when compared to the National Oral Health Survey of India[29], which reported gingivitis prevalence exceeding 80% in similar age groups, the present study suggests a relatively improved oral health scenario in urban Jaipur. This improvement may be attributed to increased awareness, better access to dental care, and exposure to oral health education in urban settings.

4.2 Socio-Economic Status and Oral Hygiene

A key finding of the present study was the statistically significant inverse relationship between SES and oral hygiene status ($p < 0.001$). Mean OHI-S scores increased progressively from upper SES (0.72) to lower SES groups (2.55), indicating worsening oral hygiene with decreasing socio-economic status.

These findings are in strong agreement with studies conducted by Lambert et al.[3] and Malhotra et al.[15], both of whom reported that lower socio-economic groups exhibited significantly higher plaque accumulation and poorer oral hygiene. Similarly, Locker et al.[2] emphasized that socio-economic disparities are a major determinant of oral health inequalities, independent of individual-level factors.

The observed gradient can be explained by differences in health behaviour, access to oral hygiene aids, and awareness. Children from higher SES families are more likely to use fluoridated toothpaste, brush twice daily, and attend regular dental check-ups, whereas lower SES groups often lack these resources[8–10].

4.3 Socio-Economic Status and Gingival Health

The present study also demonstrated a highly significant association between SES and gingival health ($p < 0.001$). Mean Gingival Index (GI) scores increased from 0.68 in the upper SES group to 2.26 in the lower SES group, indicating a marked increase in gingival inflammation among economically disadvantaged children.

This finding is consistent with studies by Mejia et al.[4] and Kumari et al.[20], which reported that individuals from lower socio-economic backgrounds are at higher risk of periodontal diseases. The association between SES and gingival health can be attributed to poor plaque control, inadequate oral hygiene practices, and limited access to preventive dental services.

Additionally, parental education and occupation—key components of SES—play a significant role in shaping children's oral health behaviour. Lower parental education is often associated with poor awareness regarding oral hygiene practices and delayed dental visits[12].

4.4 Correlation Between Oral Hygiene and Gingival Health

A strong positive correlation ($r = 0.742$, $p < 0.001$) was observed between OHI-S and GI scores in the present study. This indicates that as plaque and calculus accumulation increase, gingival inflammation also worsens.

This finding is in accordance with the classical studies by Greene and Vermillion[25] and Löe and Silness[26], which established dental plaque as the primary etiological factor in gingivitis. Similar correlations have been reported in multiple epidemiological studies, confirming that effective plaque control is essential for maintaining gingival health.

The strength of correlation observed in this study further emphasizes the need for preventive strategies focusing on oral hygiene practices, particularly among lower socio-economic groups.

4.5 Gender Differences

The present study revealed that females had significantly better oral hygiene (mean OHI-S = 1.15) and gingival health (mean GI = 1.16) compared to males ($p < 0.05$).

These findings are consistent with studies by Harikiran et al.[11] and Kuppuswamy et al.[12], which reported that females tend to exhibit better oral hygiene practices and greater health awareness. This difference may be attributed to increased aesthetic concern, better compliance with health instructions, and more disciplined hygiene habits among females.

In contrast, males often demonstrate neglect towards oral hygiene and lower utilization of dental services, contributing to poorer outcomes.

4.6 School Type as a Proxy for Socio-Economic Status

The study also found that students from private schools had significantly better oral hygiene and gingival health compared to those from government schools ($p < 0.001$).

This observation aligns with findings from Taani et al.[8] and Mahesh et al.[10], who reported that children attending public schools (typically representing lower SES) exhibited higher levels of plaque accumulation and gingival inflammation.

Private school students generally belong to higher socio-economic backgrounds, which provides them with better access to oral hygiene resources, regular dental care, and health education. Additionally, private schools often conduct periodic health check-ups and awareness programs, further contributing to improved oral health outcomes.

4.7 Public Health Interpretation

The findings of the present study strongly support the World Health Organization, which emphasizes that health inequalities arise from socio-economic disparities.

The consistent gradient observed across SES categories highlights that oral health is not merely a biological phenomenon but is significantly influenced by social, economic, and behavioural factors. These disparities are preventable and can be addressed through targeted public health interventions.

4.8 Implications for Prevention

The results suggest that improving oral health among adolescents requires a multi-level approach:

- **Individual level:** Promotion of proper brushing techniques and oral hygiene practices
- **School level:** Implementation of structured oral health education programs
- **Community level:** Awareness campaigns targeting parents and caregivers
- **Policy level:** Inclusion of oral health in national health programs

Interventions such as school-based dental education and provision of affordable oral hygiene aids have been shown to significantly improve oral health outcomes, particularly in low SES populations[17].

Conclusion

This study confirms that socio-economic status is a significant determinant of oral hygiene and gingival health among adolescents.

Lower SES groups are at higher risk for poor oral hygiene and gingival disease. Addressing these disparities requires school-based preventive programs, community awareness, and policy-level interventions

In summary, the present study confirms a strong and statistically significant association between socio-economic status and oral hygiene as well as gingival health among adolescents. The findings are consistent with both national and international literature and highlight the persistent inequalities in oral health.

Addressing these disparities requires integrated efforts involving education, access to care, and policy-level interventions aimed at improving oral health equity.

Limitations:

- Cross-sectional design
- Self-reported behaviour
- Urban-only population

References

1. Locker D. Deprivation and oral health: a review. Community Dent Oral Epidemiol. 2000;28(3):161–9.
2. Locker D, Ford J, Leake JL. Area-based measures as indicators of socio-economic status in dental research. Community Dent Oral Epidemiol. 1996;24(5):290–8.
3. Lambert M, Vanobbergen J, Martens L, Declerck D. Socio-economic inequalities in oral health among Belgian children. Eur J Paediatr Dent. 2016;17(4):291–8.
4. Mejia GC, Jamieson LM, Ha DH, Spencer AJ. Greater inequalities in dental caries among disadvantaged populations. Community Dent Health. 2018;35(3):142–8.
5. Theristopoulos A, et al. Socio-economic determinants of oral health in Greek schoolchildren. Int J Paediatr Dent. 2024;34(2):123–31.
6. Zornitsa L, et al. Gingival health status among adolescents and its association with socio-economic factors. J Oral Health Dent Res. 2024;11(1):21–9.
7. Timis T, et al. Oral hygiene habits and socio-economic differences among adolescents. Int J Adolesc Med Health. 2005;17(4):285–92.
8. Taani DQ. Relationship of socio-economic background to oral hygiene, gingival status, and dental caries in children. Int Dent J. 2002;52(2):98–103.
9. Azimi S, et al. Oral health status and treatment needs among Afghan children. BMC Oral Health. 2023;23(1):219.
10. Mahesh K, Joseph T, Varma RB, Jayanthi M. Oral health status of school children in Chennai. Indian J Dent Res. 2005;16(2):56–61.

11. Babu MS, et al. Oral health status and dental caries experience among schoolchildren in Andhra Pradesh. J Indian Soc Pedod Prev Dent. 2011;29(4):357–61.

12. Harikiran AG, et al. Oral health-related knowledge, attitude, and practice among school children in Bangalore. J Dent Educ. 2008;72(5):676–82.

13. Kuppuswamy B, et al. Socio-economic status scale modification and its application in oral health research. Contemp Clin Dent. 2014;5(4):452–9.

14. Mishra P, et al. Association of socio-economic status with oral hygiene among adolescents. J Community Health Manag. 2018;5(3):144–9.

15. Malhotra S, et al. Effect of socio-economic status on oral hygiene among adolescents in Lucknow. Indian J Public Health Res Dev. 2021;12(3):241–7.

16. Nagraj A, et al. Oral health knowledge and practices among school children in Jaipur. Int J Health Sci Res. 2023;13(2):89–97.

17. Sanadhya YK, et al. Effectiveness of oral health education among school children. J Educ Health Promot. 2014;3:53.

18. Pathania V, et al. Oral health awareness and practices among school children in Himachal Pradesh. J Int Soc Prev Community Dent. 2015;5(5):349–54.

19. Rao R. Periodontal disease prevalence and socio-demographic factors. J Indian Soc Periodontol. 2016;20(2):174–80.

20. Kumari M, et al. Socio-economic factors and periodontal disease: a cross-sectional study. J Indian Acad Oral Med Radiol. 2021;33(1):22–8.

21. Sharmila JMK, et al. Oral health awareness and practice among school children. J Pharm Bioallied Sci. 2020;12(Suppl 1):S342–7.

22. Aggarwal S, et al. Oral hygiene knowledge and practices among adolescents. J Oral Biol Craniofac Res. 2021;11(2):165–70.

23. Sharma N, et al. Gingivitis prevalence and associated risk factors among children. J Indian Soc Periodontol. 2021;25(4):321–8.

24. Janakiram C, et al. Prevalence of periodontal disease in India: a systematic review and meta-analysis. J Clin Periodontol. 2020;47(3):296–306.

25. Greene JC, Vermillion JR. The simplified oral hygiene index. J Am Dent Assoc. 1964;68(1):7–13.

26. Löe H, Silness J. Periodontal disease in pregnancy. Acta Odontol Scand. 1963;21:533–51.

27. World Health Organization. Global oral health status report: towards universal health coverage for oral health. Geneva: WHO; 2022.

28. World Health Organization. Closing the gap in a generation: health equity through action on the social determinants of health. Geneva: WHO; 2008.

29. Dental Council of India. National Oral Health Survey and Fluoride Mapping 2002–2003. New Delhi: Ministry of Health and Family Welfare; 2004.

30. Ministry of Health and Family Welfare. National Oral Health Programme: operational guidelines. New Delhi: Government of India; 2015.

31. Ministry of Health and Family Welfare. Ayushman Bharat: comprehensive primary health care through health and wellness centres. New Delhi: Government of India; 2018.

32. World Health Organization. Global strategy on oral health. Geneva: WHO; 2022.