



Correlation between oral health status and knowledge among 12 to 15-year-old school going children: A cross-sectional study

Dr. Neetu Kadu¹, Dr. Utkarsha Deshpande², Khansarubby Shaikh³, Muskaan Shaikh³

¹ Head of Department and Reader, Department of Public Health Dentistry, M. A. Rangoonwala College of Dental Sciences and Research Centre, Maharashtra, India

² Senior Lecturer, Department of Public Health Dentistry, M. A. Rangoonwala College of Dental Sciences and Research Centre, Maharashtra, India

³ Intern, Department of Public Health Dentistry, M. A. Rangoonwala College of Dental Sciences and Research Centre, Maharashtra, India

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Abstract

Introduction

Oral health is an integral component of general health and plays a vital role in maintaining the overall well-being and quality of life of children. School-going children are particularly susceptible to oral diseases such as dental caries and gingival diseases because of inadequate oral hygiene practices, frequent consumption of sugary foods, and limited awareness regarding preventive oral health measures. Assessment of oral health knowledge along with clinical oral health status provides valuable information for planning effective preventive and educational programs.

Aim

To assess the correlation between oral health status and oral health knowledge among school going children aged 12–15 years.

Methods

A cross-sectional correlation study was conducted among 89 school-going children aged 12–15 years to assess their oral health status and knowledge. Data were collected using a structured questionnaire comprising 11 knowledge-based questions related to oral hygiene and oral health awareness. Oral examinations were performed by investigators under natural daylight. Dental caries experience was assessed using the DMFT Index, and oral hygiene status was evaluated using the OHI-S Index. The collected data were analysed using SPSS version 26. Descriptive statistics and correlation analysis were used to determine the relationship between oral health knowledge and oral health status. A p-value of <0.05 was considered statistically significant.

Results

Among the 89 participants, most demonstrated fair oral health knowledge (75.28%) and fair oral hygiene status (44.94%), while 37.08% exhibited poor oral hygiene. The mean DMFT score of the study population was 5.20 ± 2.00 . No statistically significant gender differences were observed in either oral hygiene status or DMFT scores. Pearson's correlation analysis showed no significant correlation between oral health knowledge and DMFT score ($r = -0.02$, $p = 0.864$). However, a significant weak negative correlation was observed between oral health knowledge and OHI-S score ($r = -0.24$, $p = 0.025$), indicating that better oral health knowledge was associated with better oral hygiene status.

Conclusion

The study found that most participants had fair to poor oral hygiene and a considerable prevalence of dental caries. Although females showed slightly higher OHI-S and DMFT scores, no significant gender differences were observed. The findings highlight the need for improved oral health education and preventive dental care among adolescents.

Keywords: Oral health, oral health knowledge, school-going children, adolescents, dental caries, DMFT index, oral hygiene status

Introduction

Oral health is an essential component of overall health and well-being. According to the World Health Organization (WHO), oral diseases remain among the most common chronic conditions affecting children worldwide, despite being largely preventable. Oral diseases can negatively influence nutrition, speech, appearance, self-esteem, school attendance, and quality of life.^[1,2]

Dental caries is the most prevalent oral disease among school-going children and adolescents. It is a multifactorial disease influenced by dietary habits, oral hygiene practices, fluoride exposure, socioeconomic status, and access to dental care. Frequent consumption of sugar-containing foods and beverages, inadequate plaque control, and

irregular dental visits significantly increase the risk of developing dental caries and periodontal diseases.^[3,4]

Knowledge regarding oral health plays a crucial role in determining children's oral hygiene behaviour. Children who possess adequate knowledge about proper brushing techniques, dietary practices, and preventive dental care are more likely to adopt healthy oral hygiene habits. However, knowledge alone may not always translate into positive oral health behaviour, as environmental, parental, and socioeconomic factors also influence oral health practices.^[5,6]

The age group of 12–15 years is considered particularly important because most permanent teeth have erupted during this period, allowing reliable assessment of dental caries experience and oral hygiene status. Furthermore,

children of this age are capable of understanding oral health education messages and independently practicing preventive oral hygiene measures.^[7]

Schools provide an ideal environment for implementing oral health promotion programs because they offer an opportunity to educate children during their formative years. School-based oral health education programs have been shown to improve oral health knowledge, encourage healthy oral hygiene practices, and reduce the burden of oral diseases. Regular assessment of oral health status and knowledge among school-going children is therefore essential for planning appropriate preventive strategies.^[8,9]

The Decayed, Missing, and Filled Teeth (DMFT)

Index and the Simplified Oral Hygiene Index (OHIS) are internationally accepted indices for evaluating dental caries experience and oral hygiene status, respectively. The combined assessment of clinical oral health status and oral health knowledge provides a comprehensive understanding of factors influencing oral health among adolescents.^[10,11]

Therefore, the present study was undertaken to evaluate the correlation between oral health status and oral health knowledge among school going children aged 12–15 years using standardized clinical indices and a structured questionnaire. The findings of this study may assist in planning targeted oral health education programs and preventive interventions for improving oral health among adolescents.

Methodology Study Design

A cross-sectional correlational study was conducted among school-going children aged 12–15 years to assess their oral health status and knowledge regarding oral hygiene. The study was carried out in selected schools among children aged 12–15 years. Data collection was performed within the school premises using a structured questionnaire and clinical oral examination.

Sampling

Convenience sampling was employed for participant selection. Schools were selected based on accessibility and permission from the school authorities. Eligible children fulfilling the inclusion criteria were recruited from each selected school. A total of 89 participants were included in the study.

Participants

The inclusion criteria for participants were children aged between 12 to 15 years. Exclusion criteria were applied to students with systemic diseases affecting oral health, students undergoing orthodontic treatments, uncooperative children and children with special health care needs.

Data Collection

Data collection was carried out in two phases. In the first phase, participants completed a structured questionnaire comprising 11 close-ended questions assessing oral health knowledge, awareness, and oral hygiene practices. The questionnaire included items related to tooth brushing frequency, brushing techniques, oral hygiene aids, dietary habits, dental visits, and awareness regarding the prevention of dental diseases. In the second phase, a clinical oral examination was performed under natural daylight following WHO oral health assessment guidelines. Dental caries experience was recorded using the Decayed, Missing,

and Filled Teeth (DMFT) Index described by Klein, Palmer, and Knutson.^[7] Oral hygiene status was assessed using the Simplified Oral Hygiene Index (OHI-S) proposed by Greene and Vermillion by recording debris and calculus scores on the index teeth. All clinical findings were recorded on a standardized Performa.^[8]

Questionnaire Development

A structured questionnaire was developed to assess the oral health of knowledge, awareness, and oral hygiene practices of school-going children aged 12–15 years. The questionnaire was prepared after reviewing relevant literature on oral health education and oral hygiene behaviour among children. The questionnaire consisted of two sections. The first section collected demographic information, including the participant's age and gender. The second section comprised 11 close-ended questions designed to evaluate the participants' knowledge, awareness, and oral Hygiene practices. Questions related to oral hygiene practices included the frequency and timing of tooth brushing; methods used for cleaning teeth and rinsing habits after meals. Knowledge and awareness-based questions assessed the participants' understanding of the importance of dental hygiene, the role of brushing in preventing dental caries, the effects of sugary and sticky foods on oral health, the impact of oral microorganisms on teeth and gums, and the importance of regular dental check-ups.

All questions were simple, age-appropriate, and easy to understand. The responses were recorded using multiple-choice options and dichotomous (Yes/No) responses. The questionnaire was administered to the participants prior to the clinical examination to obtain Information regarding their oral health knowledge and oral hygiene practices.

Validation of the Questionnaire

The questionnaire was developed using previously published literature and validated oral health questionnaires relevant to school-aged children. The content was reviewed by experts from the Departments of Public Health Dentistry to assess the relevance, clarity, and appropriateness of each item. Based on their suggestions, minor modifications were made to improve the wording and ensure that the questions were suitable for children aged 12–15 years while maintaining the objectives of the study.

Administration of the Questionnaire

The finalized questionnaire was administered to the participants in their respective classrooms before the clinical oral examination. The purpose of the study was explained to all participants, and they were encouraged to respond honestly and independently. Adequate instructions were provided whenever clarification was required, while ensuring that the responses remained unbiased. Confidentiality and anonymity of the participants were maintained throughout the data collection process.

Data Quality Control

To ensure the accuracy and completeness of the collected information, each questionnaire was checked immediately after completion. Incomplete responses were verified at the time of data collection whenever possible. The collected questionnaires were reviewed for consistency before being entered into the database, thereby minimizing recording and data entry errors.

Structured Questionnaire

Question Number	Question	Response Options
1	How many times do you brush your teeth in a day?	Once / Twice / Do not brush regularly
2	When do you usually brush your teeth?	Only in the morning / Morning and night / Sometimes forget
3	What do you use to clean your teeth?	Toothbrush and toothpaste / Finger and toothpaste / Tooth powder
4	Have your parents/teachers told you about dental hygiene?	Yes / No
5	Do you know that eating too many sweets can cause tooth decay?	Yes / No
6	Do you know that brushing twice daily helps prevent cavities?	Yes / No
7	Do you know the correct way of cleaning/brushing teeth?	Yes / No
8	Do you think sticky foods and chocolates can cause cavities?	Yes / No / Don't know
9	Do you know that germs in the mouth can damage teeth and gums?	Yes / No
10	Do you think regular dental check-ups are necessary?	Yes / No / Only when pain occurs
11	Do you rinse your mouth after eating food?	Always / Sometimes / Never

Data Assessment

Oral health knowledge was assessed using responses to the 11-item structured questionnaire (Q1–Q11). Each correct response was awarded one mark, while incorrect or inappropriate responses received zero marks. The total knowledge score for each participant was converted into a percentage and categorized according to the following cut-off values: Good knowledge (>80%), Fair knowledge (60–79%), and Poor knowledge (≤59%).

Statistical Analysis

The collected data were entered into Microsoft Excel and analysed using IBM Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the study variables. The independent samples t-test was used to compare the mean age between male and female participants. Pearson's correlation coefficient (r) was used to determine the relationship between oral health knowledge scores and oral health status, as assessed by the DMFT Index and the Simplified Oral Hygiene Index (OHI-S). A p-value of <0.05 was considered statistically significant for all analysis.

Results

A total of 89 school-going children aged 12–15 years participated in the present study. Oral health knowledge was assessed using a structured questionnaire comprising 11 close-ended questions. Clinical oral examination was carried out to evaluate oral hygiene status using the Simplified Oral Hygiene Index (OHI-S) and dental caries experience using the Decayed, Missing, and Filled Teeth (DMFT) Index. Statistical analysis was performed and the findings are presented in the following tables.

Table 1: Demographic Characteristics of Study Participants

Variable	male	Female	total	p value
Age (Mean±SD)	13.47±1.07	13.41±1.10	13.44±1.08	0.821

Independent samples t-test was used to compare mean age between genders.

Table 1 shows the demographic characteristics of the study participants. The mean age of the study population was 13.44 ± 1.08 years. No statistically significant difference in age was observed between males and females ($p = 0.821$), indicating that both groups were comparable.

Table 2: Oral Health Knowledge among Study Participants

Question	Response	n	%
Have your parents told you about dental hygiene practice?	Yes	50	56.18
	No	39	43.82
Do you know that eating too many sweets can cause tooth decay?	Yes	75	84.27
	No	14	15.73
Do you know that brushing twice a day helps prevent cavity?	Yes	56	62.92
	No	33	37.08
Do you know the correct way of brushing/cleaning the teeth?	Yes	51	57.30
	No	38	42.70
Do you think regular dental check-ups are necessary?	Yes	61	68.54
	No	28	31.46
How many times do you brush your teeth?	Once	36	40.45
	Twice	43	48.31
	Not regularly	10	11.24
When do you brush your teeth?	Only in the morning	28	31.46
	Day and night	36	40.45
	Not regularly	25	28.09
What do you use to clean your teeth?	Toothbrush and toothpaste	55	61.80
	Finger and toothpaste	30	33.71
	Tooth powder	4	4.49
Do you think sticky food and chocolate can cause cavity?	Yes	51	57.30
	No	33	37.08
	Don't know	5	5.62

Do you think regular dental check-ups are necessary?	Yes	40	44.94
	No	29	32.85
	When pain occurs	20	22.47
Do you rinse your mouth after eating food?	Always	31	34.83
	Sometimes	35	39.33
	Never	23	25.84

Table 2 shows that most participants had a moderate level of oral health knowledge. The majority were aware that excessive consumption of sweets causes tooth decay (84.27%) and that brushing twice daily helps prevent dental caries (62.92%). However, only about half knew the correct brushing technique. Although most children used a toothbrush and toothpaste, many exhibited inadequate oral hygiene practices, including brushing only once daily and irregular mouth rinsing after meals. These findings indicate the need for continued oral health education to improve knowledge and promote healthy oral hygiene practices among school-going children.

Table 3: Distribution of Oral Health Knowledge Categories

Category	Frequency	Percentage
Good	15	16.85
Fair	67	75.28
Poor	7	7.87
Total	89	100

Table 3 shows that knowledge score calculated from Q1-Q11 75.28% of participants demonstrated fair oral health knowledge, while 16.85% had good knowledge and 7.87% had poor knowledge, indicating a moderate level of oral health awareness.

Table 4: Mean DMFT components

Component	Mean $\pm$ SD
decayed	2.63 $\pm$ 1.58
missing	0.76 $\pm$ 0.54
filled	1.81 $\pm$ 0.80
Total DMFT	5.20 $\pm$ 2.00

Table 4 presents the DMFT components. The decayed component contributed the largest proportion of the overall DMFT score, suggesting that untreated dental caries constituted the major burden of disease.

Table 5: Distribution of Oral Hygiene Status (OHI-S)

Category	Frequency	Percentage
Good	16	17.98
Fair	40	44.94
Poor	33	37.08
Total	89	100

Table 5 shows that most of the participants (44.94%) exhibited fair oral hygiene, followed by 37.08% with poor oral hygiene, whereas only 17.98% demonstrated good oral hygiene. The findings suggest that a considerable proportion of children require improved oral hygiene practices and reinforce the importance of school-based oral health education and preventive dental care programmes.

Table 6: Correlation between Oral Health Knowledge and Oral Health Status

Variable	r	p-values
Knowledge vs DMFT	-0.02	0.864
Knowledge vs OHI-S	-0.24	0.025

Pearson's correlation coefficient (r). $p < 0.05$ was considered statistically significant.

Table 6 shows the correlation between oral health knowledge scores and oral health status among the study participants. The Pearson's correlation coefficient between oral health knowledge and DMFT score was $r = -0.02$, indicating a negligible negative correlation. The corresponding p-value (0.864) was greater than 0.05, indicating that the correlation was not statistically significant. In contrast, the Pearson's correlation coefficient between oral health knowledge and OHI-S score was $r = -0.24$, indicating a weak negative correlation. The corresponding p-value (0.025) was less than 0.05, indicating that the correlation was statistically significant.

Discussion

The present cross-sectional study was conducted to evaluate the correlation between oral health status and oral health knowledge among school going children aged 12–15 years. Oral health knowledge was assessed using a structured questionnaire, while oral health status was evaluated using the Decayed, Missing and Filled Teeth (DMFT) Index and the Simplified Oral Hygiene Index (OHI-S). Assessing both knowledge and clinical oral health status provides valuable information for planning effective preventive strategies and school-based oral health promotion programmes.

A total of 89 school-going children participated in the present study. The mean age of the participants was 13.44 ± 1.08 years, and no statistically significant difference in age was observed between male and female participants ($p = 0.821$). The comparable age distribution between both groups minimized the possibility of age acting as a confounding factor while evaluating oral health knowledge and oral health status.

The present study revealed that 75.28% of the participants demonstrated fair oral health knowledge, while only 16.85% had good knowledge and 7.87% had poor knowledge. These findings suggest that although most children possess basic awareness regarding oral health, their understanding of preventive oral health measures is still inadequate. Previous school-based educational interventions have demonstrated that structured oral health education significantly improves children's knowledge, attitudes, and oral hygiene practices, while also contributing to a reduction in untreated dental caries. These findings indicate that repeated educational reinforcement can positively influence children's oral health behaviour and preventive practices.^[3]

The evaluation of oral hygiene practices in the present study showed that although nearly half of the participants brushed their teeth twice daily, a considerable proportion still brushed only once daily, and many failed to rinse their

mouth regularly after meals. This finding suggests that adequate knowledge alone does not necessarily translate into appropriate oral hygiene behaviour. Evidence from systematic reviews has shown that oral health promotion programmes are more effective when education is combined with practical tooth-brushing demonstrations, repeated reinforcement, and active participation of teachers and parents. Such comprehensive interventions result in sustained improvements in oral hygiene practices and plaque control among school children.^[12]

Assessment of oral hygiene status using the Simplified Oral Hygiene Index (OHI-S) revealed that 44.94% of the participants had fair oral hygiene, 37.08% had poor oral hygiene and only 17.98% demonstrated good oral hygiene. These findings indicate that plaque accumulation and inadequate oral hygiene remain common among school-going children. Recent evidence suggests that comprehensive school-based oral health promotion programmes that combine classroom education, practical demonstrations, parental participation, and periodic reinforcement produce better oral hygiene outcomes than isolated educational sessions. Such programmes have consistently been associated with improved plaque control, healthier oral hygiene practices, and better long-term oral health among children.^[13]

The mean DMFT score observed in the present study was 5.20 ± 2.00 , with the decayed component contributing the largest proportion of the total DMFT score. This finding indicates that untreated dental caries remains the predominant oral health problem among the study participants. Previous epidemiological studies have shown that higher DMFT scores are commonly associated with inadequate oral health knowledge, poor oral hygiene practices, frequent consumption of sugary foods, and limited utilization of preventive dental services among school-going children. Furthermore, cross-sectional studies have demonstrated that children with lower oral health awareness are more likely to have untreated dental caries and higher DMFT scores, emphasizing the importance of preventive oral health education and regular dental check-ups. These findings are consistent with the observations of the present study and highlight the need for early diagnosis, preventive interventions, and timely restorative treatment to reduce the burden of dental caries among adolescents.^[4,19,20]

The present study found no statistically significant difference in oral health status between male and female participants. Similar observations have been reported in studies conducted among school-going children, where oral health behaviour and dental caries experience were found to be comparable between boys and girls when both groups had similar access to oral health education and preventive dental care. These findings suggest that oral health promotion programmes should be implemented uniformly for all children irrespective of gender, with greater emphasis on improving oral hygiene practices and preventive behaviour.^[6,10]

The principal objective of the present study was to determine the correlation between oral health knowledge and oral health status. Pearson's correlation analysis demonstrated no statistically significant correlation between oral health knowledge and DMFT scores ($r = -0.02$, $p = 0.864$). This finding suggests that although children may possess adequate knowledge regarding oral health, knowledge alone is insufficient to reduce the occurrence of dental caries. Previous research has demonstrated that dental

caries is a multifactorial disease influenced by dietary habits, fluoride exposure, oral hygiene behaviour, socioeconomic status, parental supervision, and accessibility to dental care. Therefore, improvement in oral health knowledge should be accompanied by behavioural modification and preventive interventions to achieve a meaningful reduction in dental caries.^[4,19]

In contrast, the present study demonstrated a statistically significant weak negative correlation between oral health knowledge and OHI-S scores ($r = -0.24$, $p = 0.025$), indicating that participants with better oral health knowledge generally exhibited better oral hygiene status. Previous intervention studies have demonstrated that children receiving continuous oral health education showed significant improvement in plaque control, tooth-brushing practices, and oral hygiene status following educational reinforcement. These findings suggest that oral health knowledge has a greater influence on day-to-day oral hygiene practices than on dental caries experience, which develops over a longer period and is affected by multiple biological, behavioural, and environmental factors.^[3,12]

Overall, the findings of the present study reinforce the importance of comprehensive school-based oral health promotion programmes that integrate regular oral health education, supervised tooth-brushing programmes, dietary counselling, periodic dental screening, fluoride based preventive measures, and timely restorative care. Evidence suggests that such comprehensive preventive strategies contribute to sustained improvement in oral hygiene practices and reduction in the burden of oral diseases among school-going children. Active participation of teachers, parents, and oral health professionals is therefore essential for promoting lifelong oral health and improving the quality of life of adolescents.^[9,13,20]

Conclusion

Within the limitations of the present study, it can be concluded that most school-going children aged 12–15 years possessed a fair level of oral health knowledge, while the majority exhibited fair to poor oral hygiene status and a considerable burden of dental caries. Although no statistically significant correlation was observed between oral health knowledge and DMFT scores, a significant weak negative correlation was found between oral health knowledge and OHI-S score indicating that better oral health knowledge was associated with improved oral hygiene status. The findings suggest that improving oral health knowledge alone may not be sufficient to reduce dental caries; however, it can positively influence oral hygiene practices. Therefore, comprehensive school-based oral health education programs, periodic dental screening, preventive interventions, and active involvement of parents and teachers are essential for promoting healthy oral hygiene behaviours and improving the oral health of adolescents.

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