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Original Research Article

A Cross-Sectional Epidemiological Assessment of Knowledge, Attitude, and Practices (KAP) Toward Oral Hygiene among School Children

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Abstract

Aim: to assess dental health knowledge, attitudes, and practices among school children in Patna.

Materials and Methods: It employed a cross-sectional epidemiological approach, where each student completed a questionnaire on oral health.

Results: The study included 800 participants, with 54.8% being male and 45.2% female. Findings revealed that 59.1% of participants had fair knowledge about oral health. Significant associations were observed between age, school type, and educational level with oral health knowledge ($p < .05$). Approximately 57.2% of students exhibited positive attitudes, while only 45.3% demonstrated satisfactory oral health practices. Educational level significantly influenced attitudes and practices among students ($p < .05$).

Conclusion: Overall, the average level of knowledge, attitude, and practice was 53.9%, indicating a need for improvement in these areas. Strengthening these aspects could lead to better oral health outcomes among school children in Patna.

Keywords: oral hygiene, knowledge, school children

Introduction

Oral health encompasses freedom from mouth and facial pain, oral and throat cancer, oral infections and sores, periodontal (gum) disease, tooth decay, and tooth loss [1]. In low- and middle-income countries experiencing urbanization and changing living conditions, the prevalence of oral diseases is on the rise worldwide. This increase is largely attributed to insufficient exposure to fluoride (in water supplies and oral hygiene products like toothpaste) and limited access to community-based oral health care services [2]. Common oral conditions such as dental caries and periodontal diseases remain significant global health challenges

A solid understanding of good oral health practices is crucial for fostering positive oral health habits, and research indicates a clear connection between enhanced knowledge and improved oral health outcomes [3]. Recognizing this, the World Health Organization (WHO) advocates for oral health promotion in schools as a means to enhance understanding, behaviours, and practices related to oral health, aiming to prevent and manage dental diseases among schoolchildren.

Numerous studies have identified various sources of oral health information, including parents, school teachers, dentists, and mass media, all of which significantly influence schoolchildren's awareness of oral health [4]. School-based health education has proven effective in fostering awareness and promoting positive changes in attitudes and behaviours related to health [5]. Furthermore, intervening early among students is particularly effective because habits and lifestyles developed at a young age tend to be more enduring [6].

Educating school children about oral health is critically important because lifelong oral habits are typically established early in life. The significance of teaching oral hygiene to children, whether infants, pre-schoolers, or school-aged, has been acknowledged since as early as 1878 [7, 8]. Given that children spend a significant portion of their time at school, particularly during the formative years when habits are being shaped, schools serve as an ideal setting for promoting oral health [9]. This is particularly impactful as schools have the potential to reach over 1 billion children globally, making

them an effective platform for fostering good oral health practices [10].

Materials and Methods

A cross-sectional epidemiological study was conducted among school students with age 12–16 years. A simple random sampling methodology for data collection was used to select 12 public and private in Patna city.

Methodology

Study participants were required to complete a closed-ended questionnaire adopted and updated by Rad et al [11] The researcher created and designed a variant of the closed- ended questionnaire to gather information regarding oral health. The questionnaire was designed to assess the demographic data and the oral health knowledge, attitudes, and behavior of young school students.

The questionnaire consisted of four sections with 44 items. The first section contained questions about sociodemographic data including information on school type, students' grade level, age-group, gender, family income, and history of dental caries. The second section contained questions that covered students' knowledge regarding oral health, dental diseases, bleeding, eating sweet foods and drinking sweet liquids, and using fluoride. A score of 1 was given for each correct response and a 0 for "wrong" and "don't know" answers. Based on the total scores, participants' knowledge scores were divided into fair knowledge (score equal or greater than mean) or poor knowledge (score less than mean).

The third section consisted of questions exploring the attitude and perception of the participants regarding the importance of taking care of teeth, decay effects and how to prevent decay, regular visits to the dentist, the importance of primary teeth, and treating dental problems. Positive attitude responses were given a score of 1 for an agree response and negative responses were given a score of 1 for disagree and 0 for no opinion responses. Based on the total scores, participants' attitude scores were divided into positive attitude (score equal or greater than mean) and negative attitude (score less than mean).

The last section assessed the participant's oral health practices regarding brushing, tools for cleaning teeth, type of toothpaste, rinsing the mouth after each meal, the reason for brushing, and changing toothbrushes. Correct answers were given a score of 1 whereas incorrect and I don't know answers were given a score of 0. Based on the total scores, participants' behavior scores were divided into satisfactory practice (score equal or greater than mean) and unsatisfactory practice (score less than mean).

The total sample consisted of 800 school children from grades seventh intermediate to first secondary, including 438 males and 362 females. The participants were informed of the importance of answering the questions honestly and with confidentiality.

The data was analyzed according to the appropriate statistical technique determined by the level of measurement. After doing data analysis by using the IBM SPSS Statistics 22, descriptive statistics in the form of means, standard deviations, frequencies, and percentages were computed to describe students' demographic characteristics. In all statistical tests, a value of $p < .05$ was considered significant.

Results

Sociodemographic Characteristics of the Participants

A total of 800 students, 54.8% (n 438) were males, while 45.2% (n 362) were females. More than half of the students belonged to the age group >14 years. Nearly one third, 34.2% (n 274), of the participants enrolled in first secondary grade followed by 27.9% (n 223) in third intermediate grade. More than one third, 36.3% (n 290), had suffered from dental caries. Table 1 shows the sociodemographic data of the study sample.

Participants' Response to the Oral Health KAPs (N ¼ 800)

Oral health knowledge scores ranged from 0 to 9 out of 10 with M + SD of 6.5 + 1.45. General well-being needs to keep natural teeth (K1), keeping your mouth clean and healthy is good for health (K2), and teeth are an integral part of your body (K5) were areas that the participants were most knowledgeable. Overall, more than half of the participants, 59.1% (n=473), had fair knowledge, and 40.9% (n=327) had poor knowledge as shown in Table 2.

Oral health attitude scores ranged from 10 to 10 out of 10 with M + SD of 4.26 + 3.16. A higher score indicates a more positive attitude toward oral health. The findings revealed that less than half of the participants (42.8%) have negative attitudes toward oral health. A large proportion of the participants showed positive attitudes toward oral health "it is important to take care of my teeth (94.3%)," "decay makes my teeth look bad (89.3%)," " I can prevent my teeth from decaying," and "you care about your teeth as much as any part of your body (85.6%)" as revealed in Table 3.

Oral health practices scores ranged from 0 to 12 out of 12 with M + SD of 6.87 + 2.65. Higher score indicates satisfactory practice toward oral health. Analysis of participants' practices regarding oral health revealed that nearly half of the participants (45.3%) showed satisfactory practices. The vast majority of participants had a high commitment to

using a toothbrush with paste as a cleaning aid, used either a soft or medium toothbrush, and complied with morning and night as an appropriate time of brushing. On the other hand, findings revealed unsatisfactory practices in approximately three quarters of participants that reported eating sweets daily (74.4%). Furthermore, more than one half of the participants did not know the right reason for brushing teeth (53.6%), and half of the participants spent less than 1 min brushing (50.5%).

Association of Demographic Characteristics with M + SD of KAP Scores (N ¼ 800)

Among the demographic variables, students' grade level was found statistically significant factor affecting all the three dimensions KAP of oral health ($p < .001$). Interestingly, the third intermediate grade scored higher than the other grades in all three dimensions of KAP. There was a significant gender difference in two aspects of oral health that is, attitude and practice ($p < .05$). It should be noted that female students' scores were higher than the male students in all aspects of KAP. School type and students' age groups were significantly associated with knowledge ($p<0.05$). Findings revealed that students within the age group of more than 14 years and from a public school had a higher score in knowledge than other groups. Parental education and monthly income were found statistically significant factors affecting the practice aspect of oral health ($p < 0.05$). The students of highly educated parents and high monthly income showed a higher level of KAP than less-educated parents and those with a low monthly income as shown in Table 4.

Relationship Between Oral Health KAP Among a Studied Group of School Children

By using the Spearman test to examine the correlation between oral health KAP, results showed a weak positive relationship between knowledge and practice (r ¼ .282)

Table 1. Sociodemographic Data of School Students According to Gender.

Variable	Male %	Female %	Total %	*p* Value
Age group				<.001*
12–14 years	169 (38.6)	193 (53.3)	362 (45.3)	
More than 14 years	269 (61.4)	169 (46.7)	438 (54.7)	
School type				
Public	318 (72.6)	301 (83.1)	619 (77.4)	<.001*
Private	120 (27.4)	61 (16.9)	181 (22.6)	
Students' grade level				
First intermediate	58 (13.2)	85 (23.5)	143 (17.9)	<.001*
Second intermediate	71 (16.2)	89 (24.6)	160 (20.0)	
Third intermediate	95 (21.7)	128 (35.4)	223 (27.9)	
First secondary	214 (48.9)	60 (16.6)	274 (34.2)	
Mother education level				
Illiterate	21 (4.8)	30 (8.3)	51 (6.4)	<.001*
Literate (read & write)	43 (9.8)	94 (26.0)	137 (17.1)	
Secondary & less	115 (26.3)	82 (22.6)	197 (24.6)	
Diploma	52 (11.9)	27 (7.5)	79 (9.9)	
Bachelor	145 (33.0)	95 (26.2)	240 (30.0)	
Master & above	62 (14.2)	34 (9.4)	96 (12.0)	
Father education level				
Illiterate	20 (4.6)	7 (1.9)	27 (3.4)	<.001*
Literate (read & write)	25 (5.7)	57 (15.7)	82 (10.3)	
Secondary & less	116 (26.5)	91 (25.2)	207 (25.8)	
Diploma	38 (8.7)	32 (8.8)	70 (8.8)	
Bachelor	156 (35.6)	109 (30.2)	265 (33.1)	
Master & above	83 (18.9)	66 (18.2)	149 (18.6)	
Father occupation				
Public sector	309 (70.6)	281 (77.7)	590 (73.7)	<.001*
Private sector	96 (21.9)	40 (11.0)	136 (17.0)	
Not working	33 (7.5)	41 (11.3)	74 (9.3)	
Mother occupation				
Public sector	183 (41.8)	139 (38.4)	322 (40.3)	<.001*
Private sector	61 (13.9)	22 (6.1)	83 (10.4)	
House wife	194 (44.3)	201 (55.5)	395 (49.3)	

Suffering from dental caries				
Yes	153 (34.9)	137 (37.8)	290 (36.3)	.220
No	216 (49.3)	157 (43.4)	373 (46.6)	
Do not know	69 (15.8)	68 (18.8)	137 (17.1)	

Table 2. Students' Oral Health Knowledge

		Fair Knowledge	Poor Knowledge
Knowledge Questions		Score (1) *N* (%)	Score (0) *N* (%)
K1	Keeping natural teeth is important for general well-being.	761 (95.1)	39 (4.9)
K2	Do you think keeping your mouth clean and healthy is good for your health?	751 (93.9)	49 (6.1)
K3	General body health has a relationship to oral health and dental diseases.	540 (67.5)	260 (32.5)
K4	Keeping natural teeth is not that important.	512 (64.0)	288 (36.0)
K5	Teeth are an important part of your body.	713 (89.1)	87 (10.9)
K6	Natural teeth are better than false teeth.	671 (83.9)	129 (16.1)
K7	Bleeding is a primary sign of poor oral health.	550 (68.7)	250 (31.3)
K8	Eating and drinking sweet food does not cause decay.	538 (67.2)	262 (32.8)
K9	Sweets/chocolates/biscuits/cakes/chips/wafers affect the teeth adversely.	650 (81.2)	150 (18.8)
K10	Using fluoride strengthens the teeth.	482 (60.2)	318 (39.8)
Overall knowledge		473 (59.1)	327 (40.9)

Table 3. Students' Oral Health Attitude

		Positive Attitude	Negative Attitude
Attitude Questions		Score (1) *N* (%)	Score (0 to —1) *N* (%)
A1	It is important to take care of my teeth.	755 (94.3)	45 (5.7)
A2	You care about your teeth as much as any part of your body.	685 (85.6)	115 (14.4)
A3	Decay makes my teeth look bad.	715 (89.3)	85 (10.7)
A4	Dental problems can cause other health problems.	540 (67.4)	260 (32.6)
A5	Dental problems can be serious.	572 (71.5)	228 (28.5)
A6	Dental disease is less important than other health problems.	386 (48.3)	414 (51.7)
A7	It is natural for people to lose all their teeth in old age.	278 (34.8)	522 (65.2)
A8	Milk teeth are not important because they fall out soon.	291 (36.4)	509 (63.6)
A9	I am able to prevent my teeth from decaying.	685 (85.6)	115 (14.4)
A10	Regular visits to the dentist are necessary.	610 (76.3)	190 (23.7)
Overall attitude		458 (57.2)	342 (42.8)

Table 4: Association of Demographic Characteristics with *M* + *SD* of Knowledge, Attitude, and Practice Scores

	Knowledge Score	*p*	Attitude Score	*p*	Practice Score	*p*
Variables	*N* (Out of 10) *M* + *SD*	value	(Out of 10) *M* + *SD*	value	(Out of 12) *M* + *SD*	Value
Age group						
12–14 years	3626.39 + 1.36	.006*	4.19 + 2.91	.573	6.87 + 2.63	.970
More than 14 years	4386.68 + 1.51		4.32 + 3.36		6.86 + 2.68	
Gender						
Male	4386.50 + 1.47	.277	4.06 + 3.34	.048*	6.12 + 2.59	<.001*
Female	3626.61 + 1.43		4.50 + 2.92		7.77 + 2.44	
School type						
Public	6196.60 + 1.45	.049*	4.37 + 3.07	.082	6.89 + 2.65	.707

Private	1816.36 + 1.45		3.90 + 3.46		6.80 + 2.68	
Students' grade level						
First intermediate	1436.1 + 1.48	<.001*	3.55 + 3.20	<.001*	6.57 + 2.59	<.001*
Second intermediate	1606.51 + 1.27		4.56 + 2.79		7.28 + 2.52	
Third intermediate	2236.93 + 1.24		4.94 + 2.28		7.39 + 2.66	
First secondary	2746.74 + 1.63		3.90 + 3.79		6.36 + 2.66	
Mother education						
Illiterate	516.51 + 1.61	.663	3.86 + 3.23	.098	6.57 + 2.56	.034*
Literate (read & write)	1376.42 + 1.61		4.93 + 2.51		7.18 + 2.69	
Secondary & less	1976.51 + 1.45		4.19 + 3.44		6.54 + 2.70	
Diploma	796.48 + 1.42		3.80 + 3.36		6.82 + 2.78	
Bachelor	2406.60 + 1.41		4.13 + 3.13		6.77 + 2.58	
Master & above	966.74 + 1.29		4.39 + 3.21		7.35 + 2.55	
Father education Illiterate	276.41 + 1.74	.392	5.19 + 3.15	.052	5.59 + 1.99	<.001*
Literate (read & write)	826.65 + 1.44		5.13 + 2.78		7.35 + 2.63	
Secondary & less	2076.38 + 1.55		4.14 + 2.99		6.42 + 2.71	
Diploma	706.66 + 1.42		4.17 + 3.75		7.11 + 2.81	
Bachelor	2656.55 + 1.41		4.12 + 3.22		6.63 + 2.59	
Master & above	1496.68 + 1.37		4.44 + 2.62		7.76 + 2.45	
Father occupation						
Public sector	5906.58 + 1.42	.107	4.24 + 3.16	.001*	6.85 + 2.68	.617
Private sector	1366.32 + 1.59		3.71 + 3.30		6.79 + 2.68	
Not working	746.69 + 1.45		5.45 + 2.63		7.15 + 2.35	
Mother occupation						
Public sector	3226.50 + 1.55	.136	4.05 + 3.23	.003*	6.68 + 2.64	<.001*
Private sector	836.31 + 1.44		4.57 + 3.45		5.78 + 2.73	
House wife	3956.64 + 1.37		4.60 + 2.68		7.10 + 2.60	
Monthly income						
<8,000 SAR (<2,150.0 $)	1886.49 + 1.43	.141	4.26 + 3.43	.080	6.60 + 2.58	<.001*
8,000–15,000 SAR (2,150.0–4,000.0 $)	3406.46 + 1.55		4.0 + 3.26		6.46 + 2.64	
>15,000 SAR (>4,000.0$)	2726.69 + 1.33		4.58 + 2.81		7.56 + 2.59	

Discussion

In the Southern region of the Kingdom of Saudi Arabia, data on oral health knowledge, attitudes, and practices of school-age children were scarce; however, the present study was carried out to provide a comprehensive overview and information about the level of oral health knowledge, attitudes, and practices among 12- to 16-year-old school-children in Patna city. Oral health is considered as one of the most important health issues worldwide. Today, oral care, including tooth brushing, is considered as an easy and affordable procedure for people of different age groups. Furthermore, oral health practices and attitudes are used as measures of a community's knowledge of oral health [12].

The findings of the current study suggest that the levels of knowledge and attitude were fair, while the level of practice was unsatisfactory. Although it was found that the mean knowledge score was considered good for all the questions (6.55 + 1.45) and fair knowledge, in general, was 59.1%, which means that the knowledge among children of school age was good. This may illustrate why improved health behavior does not inherently apply to oral health awareness. Furthermore, Pearson's correlation between oral health knowledge, oral health practice, and oral health attitude was examined.

A weak positive linear relationship was found between knowledge and practice, knowledge and attitude, respectively (*r* .282, *r* .285). These findings are in disagreement with other studies carried out worldwide [13, 14]. This difference may be related to the difference in sample size with the region and time of the study. Most of the children had a satisfactory understanding of keeping natural teeth is important for general well-being, and teeth are an important part of the body, which is similar to other studies [15, 16]. The awareness among the children in the present study about the effect of fluoride on teeth (60.2%), the effect of sweet eating (81.2%), and bleeding as a sign of poor oral health (68.7%) was fair.

Concerning schoolchildren's attitude, the overall oral health attitude level (57.2%) of school children was positively satisfied, except for their attitudes about tooth loss in old age (34.8%); unimportance of primary teeth (36.4%); and importance of dental

disease (48.3%). In agreement with previous studies that were conducted in Jordan and Saudi Arabia, the majority of the children (76.3%) recognized that regular visits to the dentist were necessary [12]. This attitude could be explained in terms of fear of getting dental caries and periodontal diseases. This may be due to the high knowledge of the value of regular dental check-up visits to improve oral hygiene and avoid tooth decay, but this could be attributed to variations in population sample demographics relative to the outcomes of previous research.

Regarding oral health practices, the most common hygiene aid used (78.3%) was the use of a toothbrush with toothpaste; this is in line with findings obtained among children in Saudi Arabia and Jordan. More than one third of school students brushed their teeth at least twice a day. This result is comparable to several studies [15, 17], compared to 66.5% in central Saudi Arabia (Al Subait et al., 2016) and 58.3% in India [18]. Almost half of the study participants (49.5%) spent 2 min or more brushing, and more than one third of the students in the school brushed their teeth before going to bed at night and after waking up in the morning. These findings are in agreement with the literature that revealed the most important time of day to brush is right before going to bed, and in the morning after breakfast is another good time for brushing. Teenagers frequently strive to achieve independence and develop their own identity with little parents' attention over oral health practices may explain these findings [12, 14].

Evidence has shown that tooth brushing with paste alone is not adequate to clean proximal teeth surfaces, and hence, it has been advised to use dental floss, mouthwash, and Miswak to further assist in the prevention of dental caries as well as periodontal disease [17, 19]. Tooth surface loss or erosion may also be caused by frequent use of toothpicks and Miswaks [20, 21]. Approximately 12.0% of schoolchildren in this study used dental floss, Miswak, and mouthwashes as a cleaning system between the teeth and rinsing the oral cavity, which indicates that the value of teeth cleaning was less well known, and school- children were unaware that dental floss, Miswak, and mouthwash could help to remove the plaque and food particles between teeth; this also could be attributed to the cost of such aids. The findings are consistent with the findings of the Al-Sadhan study conducted in Riyadh, which showed that only 5.1% of students used dental floss [22]. These findings contrast with a study conducted among 1,115 male students in Al Hasa Saudi Arabia in 2008 who recorded that 45.0% of students used Miswak as a brushing tool [23]. This result indicates that awareness development is required to improve dental-related practice among that age-group and is consistent with other studies [24].

The oral health knowledge levels were influenced by sociodemographic factors, notably age (p .006), school type (p .049), and students' grade level ($p <$ .001). Oral health behavior levels were differently significant in gender (p .048), students' grade level ($p <$ .001), father and mother occupation, respectively (p .001; p .003), while oral health practice levels were affected by gender ($p <$ .001, students' grade level ($p <$ .001), and mother and father edu- cation, respectively (p .034; $p <$ .001). Findings showed that mother and father's educational level and their jobs had an effective role in increasing KAP among schoolchildren. This finding was similar to other studies (Bener et al., 2013; Petersen et al., 2008). Findings support that educated parents have children with better oral health.

Conclusion

The current survey provides essential data regarding the knowledge, practices, and attitudes of school children in Patna aged 12–16 years. The results of this study show that the average KAP level was 53.9%, which is not a positive indicator and needs to be strengthened. It can be used as a basis for comparison with other studies conducted in other regions of Bihar or other studies in developing or developed countries. To address the disparity between KAP, evidence-based interventions should be introduced at school.

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