



Determinants of personal hygiene among school children: a community based cross-sectional study from Sonapat, northern India

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ABSTRACT

Background

Children who are healthy and well-nourished are more able to fully participate in school and thus benefit from education. Poor hygiene practices lead to days lost to sickness and play a major role in the increased burden of communicable diseases. It is important to assess the personal hygiene practices of schoolchildren in order to suggest where improvements can be made.

Methods

The personal hygiene practices of schoolchildren in Sonapat, a city in the Northern Indian state of Haryana, were assessed in a community-based cross-sectional study that enrolled 1,462 randomly selected students (Grades 6 to 12) across 50 schools. The study took place between June 2018 and June 2020. A pre-tested, structured proforma captured personal hygiene practices during morning health inspections. Chi-squared tests were used to determine statistical significance of differences; a p-value of ≤ 0.05 was considered significant.

Results

Adequate personal hygiene was observed for the following practices: hand (56%), body (75.1%), oro-dental (49.7%), nail (83.7%) and clothes hygiene (80.3%). Across all categories, an overall poor level of personal hygiene was observed among 780 (53.4%) of participants. A higher level of good personal hygiene was observed among girls (13.9%) than boys (9.5%) (p -value= <0.001); among participants from schools with teachers who had received training in health (14.5%) compared with schools without such teachers (10.8%) (p -value= <0.023); and in schools where teachers' knowledge of school health practices was rated as moderately adequate or above (p -value= <0.006).

Conclusion

We observed generally poor levels of personal hygiene practices among schoolchildren enrolled in the study. We recommend that schools should engage adequately trained teachers for school health. Such teachers can impart health education regarding personal hygiene, and embed good hygiene practices and healthy habits among schoolchildren. Such practices may then be cascaded out to family and community members.

Keywords: Personal Hygiene, Schools, Children, India

INTRODUCTION

A significant proportion of mortality and morbidity recorded in the Global Burden of Disease is due to communicable (infectious) disease.¹ The World Health Organization (WHO) estimates that South East Asia contributes 27% of the global burden of infectious and parasitic diseases and 30% of respiratory infections.²

Developing countries bear a notable burden of these diseases – respiratory and intestinal infections are the primary causes of morbidity and mortality among young children. This is attributed to inadequate sanitary conditions and poor hygiene practices¹ that lead to a number of conditions including diarrhoea,

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worm infestations, skin infections and dental diseases.³ The global burden of diarrhoeal disease is estimated to cause 3.6% of all Disability Adjusted Life Years (DALYs). A significant proportion of infections could be prevented by access to safe water, adequate sanitation services and better hygiene practices.⁴

Poor health among schoolchildren often results from a lack of awareness of the health benefits of personal hygiene.³ In recent years, handwashing has been the main focus in the promotion of hygiene practice⁵, not least because many upper respiratory and diarrhoeal infections, especially colds and gastroenteritis, are contracted through unwashed hands. Personal hygiene goes beyond just the hands, however. For example, oro-dental hygiene, which includes regular brushing and flossing of teeth, can prevent bad breath, gum disease and teeth cavities. Poor body hygiene, including wearing dirty clothing, can lead to unpleasant body odor and skin diseases.

All the above conditions can be prevented by good personal hygiene,⁶ yet a number of studies^{7,8,9} have shown that personal hygiene is often poor among schoolchildren and students, and leads to significant morbidity.^{10,11} One study³ observed that a majority (74.04%) of schoolchildren frequently suffer from morbidities associated with poor personal hygiene, including diarrhoea (56.7%), fever with or without cough/cold (54.8%), parasitic worms (45.2%), head lice (40.4%), scabies (39.4%), dental caries (9.6%) and multiple boils (7.7%).

Including health and hygiene educational in the school curriculum has the potential to significantly improve the health behaviour of students and may lead to improved personal hygiene at home as well as at school. Promotion of hygiene practices is contingent upon the availability of sufficient resources, however, such as well-designed and regularly serviced latrines, conveniently located handwashing facilities and a continuous supply of soap and clean water.¹ Educating students on correct hygiene practices can be a low-cost and effective measure for disease prevention, which in turn promises to reduce school absenteeism due to illness.¹² A 2013 study by Khatoun¹³ on schoolchildren in the Lucknow district of India

reported that school-based hygiene and keeping the school environment clean is vital for decreasing the rates of communicable diseases; other studies have reported the same.¹⁴ Currently, data on the personal hygiene of students in Haryana, a State in Northern India, is limited. This study observed personal hygiene habits of schoolchildren in the Sonapat district of Haryana; it thus adds to literature and proposes an appropriate intervention.

METHODS

A community-based cross-sectional study was carried out among schoolchildren to understand personal hygiene practices and the determinants of those practices. The study was conducted between June 2018 and June 2020 in the city of Sonapat, Haryana. This study enrolled students from Grades 6-12 from 50 local schools.

Only schools that had been established for more than five years were included; less established schools, and primary schools, were excluded. Schools had to grant permission for the study to go ahead. Students for whom consent could not be obtained and those who were absent on the day the study was conducted were also excluded. The study was part of a larger investigation into environmental, water, sanitation and hygiene conditions within Indian schools¹⁵.

Sample size

The sample size was calculated using the Cochran formula, and took into consideration the prevalence of adequate environmental and sanitary conditions in the main study,¹⁵ which recorded a prevalence of 50% at 95% CI and 15% permissible error. This determined the sample size of ≈ 50 schools. A final sample size of 1,462 students was achieved by including students from one randomly selected classroom from each of the 50 sampled schools.

A multi-stage random sampling technique using Probability Proportional to Size (PPS) was adopted for the study. One district was selected randomly, from which two education blocks were chosen using simple random sampling. Fifty schools were selected from across the two educational blocks and one class was randomly selected from each sampled school.

Data collection tools and data management

A pre-tested structured survey proforma was used to record personal hygiene status among schoolchildren, based on a morning health inspection as defined in *School Health: A textbook for Teachers, Administrators and Health Personnel* produced by Andhra Pradesh School Health Association (ASHA).¹⁶

A point system was assigned to evaluate personal hygiene among the schoolchildren, based on the following hygiene attributes: hand, body, oro-dental, nails and clothes. Adequate hand hygiene was defined as hand washing before and after eating food and after using the toilets; body hygiene was defined as daily bathing; oro-dental hygiene was defined as brushing twice a day; nail hygiene was defined as nails that were cut short; and clothes hygiene as clothes (specifically underwear) that were changed daily.

Whether or not the school had a designated health teacher, and if they were trained in school health was recorded. The level of the class teacher's knowledge regarding school health was graded as adequate ($\geq 75\%$), moderately adequate (50-75%) and inadequate ($< 50\%$) according to criteria developed by Ranga and Majra (2021).¹⁷

Data was entered, coded and tabulated in Microsoft Excel version 2019. One point was given for every adequate hygiene attribute. The level of students' personal hygiene was scored out of the five attributes and graded as good (score 5/5), moderate (score 4/5) or poor (score $\leq 3/5$).

Statistical analysis

Percentages and proportions were calculated using a chi-squared test for the categorical variable. Data was entered in Microsoft Excel and SPSS v.16 software was used for statistical analyses. A p-value of ≤ 0.05 was considered statistically significant.

Ethical considerations

Ethical approval for the study was obtained from the Institutional Ethics Committee of Bhagat Phool Singh Government Medical College for Women, Khanpur Kalan. Permission to conduct the study in the selected schools was received from the District Education Officer of Sonepat District. Informed written consent was taken from parents/guardians and students respectively. The anonymity of the participants and data confidentiality was assured.

RESULTS

Our study was conducted among 1,462 students: 707 (48.4%) of them were girls and 755 (51.6%) were boys. Of these, 918 (62.8%) participants were from rural schools and 544 (37.2%) from urban schools; 583 (39.9%) were from government schools and 879 (60.1%) from private schools. The demographic profile of schoolchildren enrolled in the study is shown in Table 1. Table 2 shows levels of hygiene for the five categories – hand, nails, oro-dental, body and clothes hygiene – broken down by gender. Statistically significant gender differences were observed for adequate hand hygiene (52.3% boys and 60% girls, $p < 0.001$) and for adequate nail hygiene (81.8% for boys and 85.6% girls) ($p = 0.05$).

Table 1 Demographic profile of schoolchildren enrolled in the study

Attributes	Girls (n=707)	Boys (n=755)	Total (n=1462)	
Location of schools	Rural	410 (58%)	508 (67.3%)	918 (62.8%)
	Urban	297 (42%)	247 (32.7%)	544 (37.2%)
Ownership of schools	Government	285 (40.3%)	298 (39.5%)	583 (39.9%)
	Private	422 (59.7%)	457 (60.5%)	879 (60.1%)
Student age (in years)	≤ 12	247 (34.9%)	193 (25.6%)	440 (30.1%)
	13-15	305 (43.1%)	352 (46.6%)	657 (44.9%)
	≥ 16	155 (22%)	210 (27.8%)	365 (25%)
Grade	6-8	267 (37.8%)	317 (42%)	584 (39.9%)
	9-10	298 (42.1%)	169 (22.4%)	467 (32%)
	11-12	142 (20.1%)	269 (35.6%)	411 (28.1%)

Table 2 Personal hygiene practices with respect to gender among schoolchildren enrolled in the study

Attributes		Girls (n=707)	Boys (n=755)	Total (n=1462)	chi ²	p-value
Hand hygiene	Adequate	424(60%)	395(52.3%)	819(56%)	8.68	0.00
	Inadequate	283(40%)	360(47.7%)	643(44%)		
Body hygiene	Adequate	544(77%)	554(73.4%)	1098(75.1%)	2.48	0.11
	Inadequate	163(23%)	201(26.6%)	364(24.9%)		
Oro-dental hygiene	Adequate	363(51.3%)	363(48%)	726(49.7%)	1.55	0.21
	Inadequate	344(48.7%)	392(52%)	736(50.3%)		
Nail hygiene	Adequate	605(85.6%)	618(81.8%)	1223(83.6%)	3.69	0.05
	Inadequate	102(14.4%)	137(18.2%)	239(16.4%)		
Clothes hygiene	Adequate	576(81.5%)	598(79.2%)	1174(80.3%)	1.18	0.27
	Inadequate	131(18.5%)	157(20.8%)	288(19.7%)		

Table 3 Level of personal hygiene recorded among schoolchildren enrolled in the study

Attributes	Level of personal hygiene				chi ²	p-value
	Good	Moderate	Poor	Total		
Gender						
Boys	72 (9.5%)	232 (30.7%)	451 (59.8%)	755 (51.6%)	26.011	<0.001
Girls	98(13.9%)	280 (39.6%)	329 (46.5%)	707 (48.4%)		
Age (in years)						
≤12	52(11.8%)	127(28.9%)	261(59.3%)	440 (30.1%)	15.014	0.004
13-15	67(10.2%)	245(37.3%)	345(52.5%)	657 (44.9%)		
≥16	51(14%)	140(38.4%)	174(47.6%)	365 (25%)		
Grade						
6-8	57(9.8%)	182(31.2%)	345(59%)	584 (39.9%)	22.700	<0.001
9-10	49(10.5%)	166(35.5%)	252(54%)	467 (32%)		
11-12	64(15.6%)	164(39.9%)	183(44.5%)	411 (28.1%)		
School area						
Urban	60 (11%)	188 (34.6%)	296 (54.4%)	544 (37.2%)	0.502	0.778
Rural	110 (12%)	324 (35.3%)	484 (52.7%)	918 (62.8%)		
School ownership						
Private	92(10.5%)	307 (34.9%)	480 (54.6%)	879 (60.1%)	3.215	0.200
Government	78(13.4%)	205 (35.2%)	300 (51.5%)	583(39.9%)		
Availability of soap for handwashing at school						
Yes	19(12.2%)	46(29.7%)	90(58.1%)	155 (10.6%)	2.194	0.334
No	151(11.5%)	466(35.7%)	690(52.8%)	1307 (89.4%)		
Designated teacher for school health						
Yes	56(11.3%)	173(35%)	265(53.7%)	494 (33.8%)	0.067	0.967
No	114(11.8%)	339(35%)	515(53.2%)	968 (66.2%)		
Trained teachers to teach school health						
Yes	48(14.5%)	97(29.4%)	185(56.1%)	330 (22.6%)	7.559	0.023
No	122(10.8%)	415(36.7%)	595(52.5%)	1132 (77.4%)		
Level of knowledge among designated teachers regarding school health[†]						
Moderately adequate	89(14.6%)	216 (35.4%)	305 (50%)	610 (41.7%)	10.148	0.006
Inadequate	81 (9.5%)	296 (34.7%)	475 (55.8%)	852 (58.3%)		
Total	170(11.6%)	512 (35%)	780(53.4%)	1462		

Table 3 shows the standards of hygiene in the study population according to gender, age, Grade, rural or urban location, school ownership, availability of soap for handwashing at school and level of training in school health amongst teachers.

Overall personal hygiene

Overall, the level of personal hygiene observed during morning health inspection in the presence of a school teacher and a female health worker was low. Across all five hygiene attributes (hands, nails, oro-dental, body and clothes), the majority of the students (780 – 53.4%) scored poor (scoring adequate on >3/5 attributes), 512 (35%) scored moderate (adequate on 4/5 attributes) and only 170 (11.6%) scored good (5/5 – adequate hygiene on all five attributes). This is a lower rate of personal hygiene than has been observed by Elsabagh (2016)¹⁸, who reported 55.4% good, 36.8% moderate, and only 7.8% poor, but higher than Rajbhandari et al (2018)⁹ which recorded almost entirely moderate (59.9%) and poor (31.8%).

Hand hygiene

Adequate hand hygiene was recorded in just over half – 819 (56%) – the participants. This is significantly lower than that observed in other studies, such as Rahman et al (2019)¹⁹ which recorded a rate of 83.33% and Rajbhandari et al (2018)⁹ which recorded 81.2%, but higher than the 43.7% found by Pal (2017).⁷ More girls (60%) practiced adequate hand hygiene than boys (52.3%). This is in line with findings from Rajbhandari et al (2018)⁹ and Shekhawat et al (2019).²⁰ Hand hygiene was slightly higher among urban students (58.6%) compared to rural students (54.4%), but this was not statistically significant.

Nail hygiene

Long fingernails can harbour bacteria and are thus an infection risk, but this can easily be mitigated by carefully cleaning and trimming fingernails.²¹ In this study, nail hygiene was observed to be adequate in the majority of participants (83.7%, n= 1,223) which is much higher than has been observed in other studies, e.g. Sihra et al (2018)²² (73.6%) and Oyibo (2012)⁸ (42.6%). We found nail hygiene to be slightly higher among students from rural schools (84.5%) compared to their urban counterparts (82.2%), but this was not statistically significant. There was a statistically

significant difference between girls (85.6%) and boys (81.8%) however (p = 0.05). This corroborates findings by Shekhawat R et al (2019),²⁰ though Kakkar R et al (2018)²³ found no gender difference in nail hygiene.

Clothes and body hygiene

School students are encouraged to wear clean clothes. Untidy and dirty clothes can adversely affect confidence and self-esteem; and dirty clothing can lead to ectoparasitic and fungal infections.¹² Clothes and body hygiene tend to go together: body hygiene was higher among participants with better clothes hygiene practices (80.3%, n=1,174). Other studies have found wide variation in clothes and body hygiene, with the proportion of students recorded wearing dirty school uniform varying from 8-45%^{8,24}.

Just over three quarters of participants (75.1%, n = 1,098) demonstrated good body hygiene. This is lower than has been found by other studies e.g. Temitayo (2016),²⁵ (99.6%), Sihra et al (2018)²² (97.3%) and Kakkar R et al (2012)²³ (82.6%) – but much higher than that reported by Rajbhandari AK et al (2018)⁹ (11.5%), in which the majority of the respondents reported they bathed just once per week. There was no significant difference in body hygiene between the students from rural schools (75.7%) compared to the urban ones (74.1%). Girls reported practicing slightly higher body hygiene (77%) compared to boys (73.4%), contrary to a study by Shekhawat R et al (2019)²⁰ that recorded higher body hygiene among boys, but the difference was not statistically significant.

Oro-dental hygiene

Brushing teeth at least twice daily is considered necessary to keep healthy teeth, especially when coupled with regular health check-ups and follow-up services provided through schools.²⁶ In our study, just under half – 49.7% (n=726) – of the students reported adequate oro-dental hygiene. This was better than has been found in some previous studies, e.g. Rajbhandari et al (2018)⁹ (38.1%) and Pal (2017)⁷ (0.3%) but less than in others, e.g. Rahman (2016)¹⁹ (75%), Motakpalli (2013)²⁵ (66%), Kakkar et al (2012)²³ (61.1%) and Meher et al (2018)²⁷ (57.5%). We found girls to have better oro-dental hygiene (51.3%) than boys (48%) but this was not statistically significant. Dental hygiene has been found to be inconsistent in

previous studies: Rajbhandari et al (2018)⁹ reported higher oro-dental hygiene in girls than boys (42.3%:33.9%), but Shekhawat et al (2019),²⁰ observed better oro-dental hygiene among boys (67%:55.6%).

Hygiene according to age

The majority of participants (44.9%, n=659) were from the 13-15 years age group, with a mean age of 13.6±6 years. Good personal hygiene was observed more often among students aged 16 and above, in 11th-12th Grade (p value= ≤0.05). Personal hygiene improved as the students moved up into higher Grades.

Hygiene according to gender

Our results suggest that girls are more aware of and engage in more hygienic practices than boys. Gender differences were statistically significant: 98 (13.9%) girls scored 'good' compared with only 72 (9.5%) boys, while fewer girls (329 – 46.5%) girls scored 'poor' than boys (451 – 59.8%) (p<0.001).

Similar trends have been observed by Motakpalli (2013)²⁵ in Karnataka, where more girls (65.9%) reported higher levels of good personal hygiene than boys (60.5%), and by Deb et al (2010).²¹ However, Elsabagh et al (2018)²⁸ reported contrary findings: 63.3% of boys were reported as observing good hygiene, but only 45.6% of girls. Lopez et al (2009)²⁹ observed no gender difference.

Location and ownership of schools

Overall, more students from government schools than private ones were observed to have good hygiene practices (13.4%:10.5%). Between urban and rural schools, personal hygiene levels were broadly comparable – 60 (11%) and 110 (12%) respectively scored 'good', while 296 (54.4%) and 484(52.7%) students respectively scored 'poor'. This was not statistically significant (p value =0.778).

In India, school health services include health education (though clinical assessment and monitoring of nutritional status is provided by Primary Healthcare Centres). Health services in urban areas are generally better than in rural India, and literacy is also higher amongst the urban population,²¹ which may account for the differences.

Availability of handwashing facilities and soap

In our study, a good level of personal hygiene was observed among 12.2% of students in schools where soap was available at handwashing facilities and among 11.5% students in schools where it was not. As this difference is not statistically significant (p value=0.334), it may suggest that the presence of soap alone does not make an appreciable difference in this setting. Caruso et al (2014)²⁸ observed that availability of soap at school does lead to better hand hygiene practices however; the difference between this and our study could be due to poor understanding of adequate handwashing practices among students.

Teacher training

In schools that had designated school health teachers, 48 (14.5%) students had a good level of personal hygiene and 185 (56.1%) were observed to be poor. In schools where trained teachers were not available, 122 (10.8%) students displayed good personal hygiene and 595 (52.5%) displayed a poor level. This difference was not statistically significant (p value =0.023).

Among students from schools where teachers' own knowledge regarding school health was considered to be inadequate when measured against the criteria developed by Ranga and Majra (2021),¹⁷ 81 (9.5%) had a good level of hygiene and 475 (55.8%) had a poor level. This was significantly lower than students from schools where teachers had moderately adequate knowledge for school health, of whom 89 (14.6%) scored good and 305 (50%) scored poor (p value =0.006). Concerningly, none of the schoolteachers were assessed as having a completely adequate level of knowledge regarding school health.

DISCUSSION

Poor hygiene practices play a major role in the increased burden of communicable diseases, presenting a barrier to child health, full participation in school activities and sufficient education.²⁹ School teachers should provide health education to the students and encourage hygienic habits to improve their health. They should be aware of local health programmes to ensure they deliver relevant health education to their students. Whist several of the schools in our study had either a designated teacher to

deliver health education and/or a teacher who had been trained to do so, only the teacher's own level of knowledge of school health made a significant difference ($p=0.006$), rather than their training.

Limitations of the study

This study is based on a representative sample that includes randomly selected participants from government and private schools located in urban as well as rural areas. However, as it was conducted in only one district, it may not represent the whole state of Haryana or India. Other classrooms and other schools may show some variations.

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CONCLUSION AND RECOMMENDATIONS

The study reports overall poor personal hygiene among school children in Sonapat, Haryana. The future of a nation depends on the health of its children: we recommend that schools engage adequately trained teachers to promote school health, impart health education regarding personal hygiene, and improve hygienic practices among schoolchildren so that they can carry healthy habits back to their family and communities. Khatoon et al (2017)¹³ have reported that delivering health education to students improves their level of personal hygiene. Tidwell et al (2020)³⁰ suggest using teachers to promote handwashing.

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