

Full Length Research Paper

Personal hygiene habituation and related factors of high school students in Gaziantep -Turkey

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Hand hygiene practice has become quite an important issue among hygiene practices. Improving personal hygiene practices leads to decrease in the occurrence of many infectious diseases. A total of 1370 students in 36 classes in 9 schools in Gaziantep were included in this study by “size proportional systematic sampling” and “basic randomized sampling” techniques. A data collection form termed as determining personal hygiene habituation was applied to all students. Total hygiene score was calculated according to the results of the “data collection form”. Thereafter, Hand flora samples of 350 students among classes who participated in data collection form application were inoculated against blood agar, eosin methylene blue and saboraud dextrose agar by application on all left hand fingers. Identification of microorganism was performed by conventional method. *Staphylococcus aureus* was mostly isolated from hand culture of male students and *Streptococcus sp.* and *Enterobacter sp.* were mostly isolated from female students. Both personal hygiene practice among high school students and also toilet hygiene condition of schools were inappropriate. In this regard, education about hygiene should be given priority and the necessary structural arrangements should be made in schools.

Key words: Hygiene, Gaziantep, hand flora.

INTRODUCTION

Inappropriate hygiene practice is one of the most important reasons for the transmission of infectious diseases (Onsuz and Hıdıroğlu, 2008). Hand hygiene practice is at the head of personal hygiene practices (Nenstiel et al., 1997). Improving personal hygiene habituations was reported to result in fewer infectious diseases. Increasing the consciousness about hygiene in society leads to decrease in the frequency of these diseases (Greene, 2001). In this regard, students are the primary target group. Personal hygiene has much more importance among students because they spend the greater part of their time in crowded living environment, school and in propinquity and direct contact with each other. Teaching personal hygiene education to students

influences them for good toward their families and can potentially result in an increasing in the societal hygiene profile. Teaching practices related to personal hygiene and to determine both effective and lack factors, have a great significance personally and socially. In this study, personal hygiene habituation, related factors and lack of awareness of issue in high school students in Gaziantep, in a group selected by size proportional systematic sampling technique, was studied. Besides this, hand flora samples in students were collected and the effect of environment situations on the hand flora of students was performed.

MATERIALS AND METHODS

Participants

A total of 56.966 students in a total of 65 high schools are in Gaziantep. In a sectional study conducted about personal hygiene,

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optimum sample size was calculated as 1160 with $N=56966$, $p=0.16$, $D=0.03$ and $\alpha=0.05$. A total of 36 classrooms were adequately taken into consideration for the median strength of the students per classroom in Gaziantep. 9 schools from a total number of 65 high schools and one classroom per grade were selected from a total of 4 class grade in high school.

Protocol

First, required permissions were taken from legal authorities and the numbers of the students in high schools were obtained from local education authority and 9 schools were selected from a numbered list of 65 high schools by using a "size proportional systematic sampling technique". Then, one class per grade in participating high schools was selected by using "basic randomized sampling technique". During the months of April to May 2009, students were trained for interview at each intervention classrooms and then data collection forms about personal hygiene habituations were divided to each volunteer student. The Students were pre-informed not to indicate their names on the paper. Then the papers were distributed and students filled them and the papers were picked up back to conduct statistical analyzes.

Data collection form comprised of 32 questions about the socio-demographic characteristics and hygiene policies; especially hand hygiene of their families. 19 of them were about hygiene and were calculated as total hygiene score for each student. Thereafter, the score was divided into 4 groups (grouped as 25% slice) and students in the lowest 25% slice were termed as "the worse hygienic", those with the highest 25% slice "the best hygiene" and those in the median 50% slice "the intermediate hygiene".

Microbiological evaluation

For this evaluation hand flora samples were taken from student inoculated blood agar, EMB and SDA by applying it on the left hand fingers of one-third of the students from classrooms interviewed for data collection form by using systematic sampling technique. Collected samples were incubated at 37°C for 24 h for bacteria and for 7 days for fungi. Conventional method was performed to identify microorganism.

Statistical analysis

Data was assessed by using SPSS 10.0 packet program. In comparison of total hygiene score, "t-test" for double groups, "ANOVA" test for three and other groups and "Lineer regression analyses" for multipled analyses were performed.

RESULTS

1370 students were included from 9 schools. 1325 out of a total of 1370 students completed data collection form (96.7%). Demographic characteristics of students filled in data collection form are shown in Table 1. Approximately half of the students that participated in the study have 2 or 3 sisters or brothers. Median of total children number of families was calculated as 4.

Hand hygiene education status of students was questioned and answers were given in Table 2. Nearly 1/5 was determined not to be educated about hand hygiene. The rate of students with the answer "I and had hand hygiene education at school" was only 11.2%. Answers

against to "what do you use for washing your hands?" question as shown in Table 3. In general, most of the students said that they have been using liquid soap. In addition, usage of only water had the highest rate, 43% in hand washing at school spotlighted. Another significant item was "washing their hands with only water after defecation" answer of 7.8% students.

Answers to "How often do you wash your hands in some cases?" question were shown in Table 4. Although students wash their hands regularly after using the toilet or soiling their hands, the ratio of hands washing before meals or after coming back home from school or outside was lower.

Answers given by students to some questions about school sanitation facilities are shown in Table 5. Approximately 30% of students said that "No suitable area to wash hands are available in toilets of school", 32, 9% of "No bar/liquid soap are available in toilets of school" and 92% of "No hand-drying material are available in school". Nearly 11% of students said they drink always or often tap water from the toilets at their schools.

Answers given by students to some questions about personal hygiene habituation are shown in Table 6. 42.9% of students have no personal towel and 7.3% of them no personal toothbrush. Almost 68% of students had a shower two or three times a week. 37% of students brush their teeth at least 2 times a day. Approximately 3/4 students change their toothbrushes during 6 months or shorter intervals.

Answers about personal hygiene habituation given by students were scored and termed as "total hygiene score". For questionnaire with maximum 60 points consisted of 19 questions, mean of total hygiene score by students was calculated as 49.5 ± 6.3 points and median was 51 points. Minimum score was calculated 8, maximum was 59. Comparison between total hygiene scores (and the percentage of students with the best hygiene) according to some demographic characteristics is shown in Table 7. Hygiene score of female students was higher than male students ($p<0.001$). Although hygiene scores between grades was not statistically significant, hygiene scores between schools was significant ($p<0.05$). Attending baby nursery and/or kindergarten in the former had no effect on the hygiene score. But the application of hand hygiene education had positive effect on total hygiene score ($p<0.001$). Total hygiene score of students decreased significantly on uneducated parents (respectively $p=0.006$, $p<0.001$). Hygiene score of children of working mothers was lower than children of housewife mothers but this difference was not significant ($p>0.05$).

Eight independent variable components which were thought could affect total hygiene score were examined through multiple analyses (Table 8). According to lineer regression analysis, 4 of 8 variable components (sex, mother's education status, housewife mother and teaching of hygiene education before) affected student's hygiene

Table 1. Demographic characteristics of students filled in data collection form.

Characteristic		Number	%
Sex	Male	673	50.8
	Female	652	49.2
Age	14≤	44	3.4
	15	279	21.1
	16	359	27.1
	17	392	29.6
	18	215	16.
	≥19	36	2.7
School	1	184	13.9
	2	175	13.2
	3	178	13.4
	4	143	10.8
	5	67	5.1
	6	176	13.3
	7	184	13.9
	8	123	9.3
	9	95	7.2
Class	9	343	25.9
	10	361	27.2
	11	335	25.3
	12	286	21.6
Total		1325	100.0

Characteristic		Number	%
Mother's Education	Uneducated	308	23.3
	Leaved from primary school	266	20.1
	Primary school	465	35.1
	Secondary school	126	9.5
	High school and over	159	12.0
	Total	1324*	100.0
Mother's work	Housewife	1176	88.8
	Worker	33	2.5
	Civil servant	52	3.9
	Tradesman	22	1.7
	Retired	22	1.7
	Other	20	1.5
	Total	1325	100.0
Father's Education	Uneducated	54	4.1
	Leaved from primary school	183	13.8
	Primary school	537	40.6
	Secondary school	223	16.8
	High school and over	327	24.7
Total		1324*	100.0

Table 1. Contd.

Father's work	Workless	132	10.0
	Worker	423	32.0
	Civil servant	147	11.1
	Tradesman	245	18.6
	Retired	182	13.8
	Other	191	14.5
	Total	1320*	100.0

*Students answered this question

Table 2. Hand hygiene education status of students.

Receive Hand hygiene education status	Number	%
Uneducated	244	18.5
Education received by reading	207	15.7
Education received by family	658	49.9
Education received at school	148	11.2
Other	61	4.6
Total	1318*	100.0

*Students answered this question

Table 3. Answers against to "what do you use for washing your hands?" question (%).

Parameter	Never washing	Water	Water and bar	Water and liquid soap	Water and foam soap
At home	0.6	5.4	30.8	60.5	2.6
At school	3.8	43.0	14.4	37.6	1.2
After urinated	0.7	10.0	29.4	56.5	3.4
After defecated	0.7	7.8	30.9	55.6	5.0
Before meals	2.4	19.9	25.0	49.2	3.5

Table 4. Answers to "How often do you wash your hands in some cases?" question (%).

Parameter	Frequency of washing hands				
	Always	Often	Sometimes	Rarely	Never
After using toilet	88.3	8.8	2.3	0.4	0.2
After getting dirty hands	84.2	11.8	2.1	0.8	1.0
After meals	59.4	26.2	11.6	2.0	0.8
After coming back home from school	57.5	21.7	15.2	3.8	1.9
After playing	56.9	26.1	10.2	3.5	3.3
Before meals	48.3	31.9	16.8	2.1	0.8
After coming back home from outside	46.5	28.6	18.6	4.2	2.1

score significantly. It was determined that total hygiene score of students among the female students are also remarkable. Hand cultures of 350 students from 9 schools were evaluated. The isolated microorganisms are given in Table 9. Although there was no difference between hand flora of male and female students. *Staphylococcus aureus* isolated mostly from hand culture

of male students and *Streptococcus* sp. and *Enterobacter* sp. were mostly isolated from female students. The distribution of isolated microorganisms from hand flora culture due to schools is shown in Table 10. The distribution of the most frequently seen microorganisms isolated from hand flora culture with regards to classes is shown in Table 11. The difference between hand flora

Table 5. Answers given by students to some questions about school sanitation facilities.

		Number	%
Is there any suitable area for washing hands in school?	Available	926	70.2
	Not available	394	29.8
	Total	1320*	100.0
Is there any bar/liquid soap in toilets in school?	Available	436	32.9
	Sometimes available	662	50.0
	Always available	226	17.1
	Total	1324*	100.0
Is there any hand-drying material in toilets in school?	Available	1217	92.0
	Sometimes available	61	4.6
	Always available	45	3.4
	Total	1323*	100.0
Do you drink water from taps in toilets in school?	Always	65	4.9
	Often	75	5.7
	Sometimes	170	12.8
	Rarely	191	14.4
	Never	824	62.2
	Total	1325	100.0

*Students answered this question.

Table 6. Features related with personal hygiene of students participated in study.

Features		Number	%
Personal towel	Available	753	57.1
	Not available	566	42.9
	Total	1319*	100.0
Having a shower	Everyday	81	6.1
	Two or three times a week	897	67.9
	Once a week	297	22.5
	Once in two weeks	46	3.5
	Total	1321*	100.0
Personal toothbrush	Available	1227	92.7
	Not available	96	7.3
	Total	1323*	100.0
Brushing teeth	Never	71	5.4
	Seldom	308	23.3
	Once two or three days	119	9.0
	Once a day	337	25.5
	Two times a day	389	29.4
	Over three times a day	99	7.5
	Total	1323*	100.0
Changing toothbrush	Never (not brush)	131	10.1
	Once in two years	56	4.2
	Once a year	151	11.4
	Once in 6 months	514	38.8
	Once in 3 or less months	473	35.7
	Total	1325	100.0

*Students answered this question.

Table 7. Comparison between total hygiene score and the percentage of students with best hygiene.

Characteristics		The percentage of those with the best hygiene	Total hygiene score		
			Mean	Standard deviation	Statistical analyses
Sex	Male	11.6	47.67	6.51	<0.001
	Female	34.2	51.53	5.52	
School	1	40.4	51.73	5.52	<0.05
	2	29.6	51.50	5.68	
	3	25.4	50.29	5.83	
	4	20.9	50.08	5.24	
	5	18.7	49.47	6.32	
	6	19.1	49.38	5.85	
	7	16.5	48.43	6.81	
	8	19.4	47.74	7.69	
	9	5.4	44.40	6.87	
Class	9	22.8	49.51	6.04	0.23
	10	16.9	49.20	6.03	
	11	25.1	49.45	7.09	
	12	26.9	50.22	6.14	
Attending to baby nursery	Attended	25.3	50.22	6.42	0.07
	Not attend	22.1	49.41	6.30	
Hygiene education	Not receive	15.1	47.50	7.09	0.001
	Received	24.3	50.03	6.04	
Education status of mother	Uneducated	19.0	48.59*	6.77	0.006
	Leaved from primary school	21.6	49.52	6.06	
	Graduated from primary school	21.7	49.63	6.16	
	Graduated from secondary school	28.0	50.57	5.79	
	Graduated from high school and over	30.2	50.59	6.66	
Mother's work	Housewife	22.9	49.72	6.13	0.08
	Working	20.6	48.50	7.58	
Education status of father	Uneducated	5.7	45.96*	7.55	0.001
	Leaved from primary school	17.8	49.03	5.90	
	Graduated from primary school	22.6	49.66	5.89	
	Graduated from secondary school	23.2	49.52	6.93	
	Graduated from high school and over	27.7	50.30	6.48	

agents and class degree was not significant.

DISCUSSION

Infectious diseases have been the major causative factor for mortality and morbidity worldwide (Nenstiel et al., 1997). The only way to cause a "decrease in infectious diseases is by improving personal hygiene status"

(Greene, 2001). Hygiene habituation has social and educational discrepancies among people. Especially, education and habituation status of parents designate to person's hygiene practice. The isolation of *S. aureus*, *Escherichia coli*, *Klebsiella* spp. from students' hands in our study supported the evidence of lower hand hygiene first and followed by personal hygiene habituations. In symptomatic factors were investigated. Isolation of high pathogen microorganisms and enteric bacteria in addition

Table 8. Linear regression analysis result.

Independent variable component	β	95% Confidence interval		p
Sex	0.299	3.1	4.4	0.000
Number of sister/brother	-0.041	-0.3	0.0	0.149
Age	0.015	-0.2	0.3	0.586
Mother's education	0.081	0.08	0.7	0.014
Mother's social status	-0.089	-3.0	-0.7	0.001
Father's education	0.031	-0.1	0.5	0.306
Attending to baby nursery	-0.022	-1.2	0.5	0.445
Teaching of hygiene education	0.123	1.1	2.8	0.000
(Constant)		37.2	48.1	0.000

Table 9. Hand cultures from students.

Microorganism	Female	Male	Statistics	N	%
	%	%			
<i>S.epidermidis</i>	97.7	97.5	>0.05	344	98.3
<i>S.saprothicus</i>	37.5	38.8	>0.05	145	41.4
<i>Bacillus</i> spp.	25.0	24.0	>0.05	81	23.1
<i>E.coli</i>	18.2	19.8	>0.05	57	16.3
<i>Klebsiella</i> sp.	15.9	11.6	>0.05	45	12.9
<i>S. aureus</i>	11.4	17.4	>0.05	43	12.3
<i>Streptococcus</i> sp.	12.5	7.4	>0.05	32	9.1
<i>Corynebacterium</i> spp.,	9.1	9.9	>0.05	29	8.3
<i>Enterobacter</i> sp.	12.5	6.6	>0.05	27	7.7
<i>Aspergillus</i> spp.	2.3	2.5	>0.05	8	2.3
<i>Proteus</i> sp.	2.3	1.7	>0.05	5	1.4
Total	100.0	100.0	>0.05	350	100.0

Table 10. Hand flora samples collected from students due to schools.

School No	<i>S. epidermidis</i>		<i>S. saprothicus</i>		<i>Bacillus</i> spp.		<i>E. coli</i>		<i>Klebsiella</i> spp.		<i>S. aureus</i>	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
1	37	97.4	5	13.2	4	10.5	12	31.6	11	28.9	4	10.5
2	34	100.0	16	47.1	10	29.4	8	23.5	8	11.0	2	5.9
3	36	94.7	9	23.7	3	7.9	5	13.2	1	2.6	6	15.8
4	44	100.0	19	43.2	6	13.6	3	6.8	2	4.5	4	9.1
5	40	95.2	25	59.5	21	50.0	6	14.3	7	16.7	3	7.1
6	44	100.0	43	97.7	21	47.7	3	6.8	10	22.7	6	13.6
7	32	100.0	7	21.9	8	25.0	3	9.4	4	12.5	2	6.3
8	34	97.1	5	14.3	4	11.4	5	14.3	0	0	8	22.9
9	43	100.0	16	37.2	4	9.3	12	27.9	2	4.7	8	18.6
TOTAL	344	98.3	145	41.4	81	23.1	57	16.3	45	12.9	43	12.3
Statistics	P=0.34		P=0.001		P=0.001		P=0.012		P=0.001		P=0.29	

to normal flora microorganisms showed inappropriate hand hygiene.

Some studies carried out in Turkey and Mexico noted that lack of hygiene conditions in toilets and inappropriate

hygiene practices of children resulted mostly in parasitic diseases (Ulukanligil and Seyrek, 2003; Quihui et al., 2006). As a result of our assessed data, 18.5% of students whose mean age was 16 reported not having

Table 11. Hand flora samples collected from students due to classes.

Class	<i>S. epidermidis</i>		<i>S. saprophiticus</i>		<i>Bacillus sp.</i>		<i>E. coli</i>		<i>Klebsiella sp.</i>		<i>S. aureus</i>	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
9.class	90	97.8	37	40.2	24	26.1	21	22.8	12	13.0	17	18.5
10. class	86	97.7	27	30.7	16	18.2	11	21.0	11	12.5	7	8.0
11. class	78	100.0	33	42.3	17	21.8	10	12.8	11	14.1	9	11.5
12. class	82	97.6	40	47.6	18	21.4	15	17.9	7	8.3	8	9.5
Total	336	98.2	137	40.1	75	21.9	57	16.7	41	12.0	41	12.0
Statistics	P=0.61		P=0.15		P=0.64		P=0.21		P=0.68		P=0.14	

had any education about hand hygiene and only 11.2% of them said they have been taught hand hygiene in school. This data supported our foresight about teaching hygiene education started initially with families and continued to develop in educational institutions. Basically, educational periods in families' starts with ardent observation of contemporary affairs, hence a child becomes aware of his environment. In summary, children do whatever parents do. In this study, hygiene habituations of parents were also questioned and determined to be poor. This finding was correlated with laboratory investigation and pathogen microorganisms from students' whose hands were isolated. Results from student's analysis shows that, general hygiene practices and awareness and habituation of hand hygiene were inadequate. Several important requirements for school toilets such as absence of hand drying material was noticed in 92% of toilets, soap was available permanently in 17%, no suitable area to wash hands were available in approximately 1/3 of toilets, which demonstrates the inadequate hygiene conditions of school toilets.

Besides this, it was determined that 43% of students are used to washing hands with only water. Another predisposing factor for inappropriate hygiene practice was the inappropriate area of physical conditions of schools. A study about hand washing habituation of students performed in Sivas, Turkey demonstrated that the rate for washing hands after using the toilet was at 98% and another study in Ankara, Turkey determined that this rate was at 8.6% (Orsal et al., 2002; Cetinkaya et al., 2005). Öztürk et al. (2004) reported that 22.4% of students washed their hands before and after using the toilet. In our study, although 88.3% of students expressed washing their hands after using the toilet, but *E. coli* was isolated from hands of 23.5 to 31.6% (mean of 16.3) of students from 1, 2 and 9 numbered school. In comparison with answers on the data collection form, this result showed that some students did not provide true answers in their completed data collection form. Several field screening studies related with house environment were performed recently. Although most of them were related to microorganisms except *S. aureus*, they have demonstrated the transmission potential of pathogens via hands and inanimate surfaces during daily activities. In

addition, several studies about contaminated hands and clothes and inanimate surfaces in house could be significant transmission factors for MRSA (Scott and Bloomfield, 1990; Rheinhaben et al., 2000; Cogan et al., 2002; Barker et al., 2003; Kusumaningrum et al., 2003; Curtis et al., 2003). In our study, *S. aureus* was isolated from a total of 41 students (12%) but methicillin resistance for them was not performed.

All studies about personal hygiene habituation of students in our country were based on the data collection data forms and no study was performed in hand flora sampling. In this regard, in our study performed together filled in the data collection form with sampled hand flora of students, has enabled us to obtain more results about hand hygiene status of students. As a result of the study, both inadequate personal hygiene habituation in high school students and also inappropriate toilet hygiene status in school have been potential barriers. Taking simple precautions such as making available hand sanitizers like soap permanently in school toilets could provide increase toilet hygiene status and also teaching hygiene education by giving priority to groups which have lack of education could provide increase in personal hygiene of students. We suggest that those male students, who have mothers with lower education level and who's mother are working should be given priority in hygiene education.

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