

# EVALUATION OF STUDENTS' SOCIAL HAND WASHING KNOWLEDGE, PRACTICES, AND SKILLS IN A UNIVERSITY SETTING

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## SUMMARY

**Background:** Handwashing is an effective and inexpensive way to prevent diarrhea and acute respiratory infections. This study aimed to evaluate the Turkish University students' social hand washing knowledge, practices, skills and related factors.

**Materials and methods:** All existing 1st year students in the Medical and Educational Faculty, plus all existing 2nd and 3rd year students in the Medical Faculty of Pamukkale University, Denizli, Turkey, from April to May, 2010, were eligible for the study. Participants filled in a questionnaire. The questionnaire tested the students' social hand washing knowledge (8 questions), practices (21 questions), and skills (10 questions) and it was prepared using previously published studies. Participants received 1 point for each correct answer provided. Final scores were calculated by summing up the points from all questions in the particular section divided by the number of questions in this section and multiplied by 100. The Family Affluence Scale was used to determine a socioeconomic status (SES).

**Results:** In all 303 students participated in this study. Participants' age ( $\pm$ SD) was  $20.1\pm 1.6$  and the age range was between 18 and 32. Sixty two point seven percent of the participants were women. Forty four point nine percent of the participants were medical students. Fifty one point eight percent of the participants were in low SES. Twenty seven point four percent of the participants wash their hands less than 5 times a day. main reason for skipping hand washing was the participants' belief of 'no need' (63.7%). The mean scores ( $\pm$ SD) of participants' hand washing knowledge, practices, and skills were  $71.2\pm 20.7$ ,  $60.3\pm 13.4$  and  $79.7\pm 18.4$ , respectively. All scores were significantly higher in women. A multivariate analysis showed that gender was the main factor affecting all scores.

**Conclusions:** Increasing quantity and/or quality of available campus based public health educational programs, creating hand-hygiene promotion programs to the general public and using the findings from this study are recommended.

**Key words:** hand hygiene, adolescents, social hand washing, education

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## INTRODUCTION

Infectious diseases are still the most common and deadly group of diseases for developing world. Annually, more than 3.5 million children under five die from diarrhea and acute lower respiratory-tract infections (1, 2). In case of proper hand washing there would be a significant reduction in the incidence of these diseases (3, 4). The first historical evidence on the importance of hand washing was revealed in a maternity clinic in Vienna in 1847. Cleaning hands by medical personnel reduced maternal mortality (5). Many other following studies indicated that handwashing reduced the spread of infectious diseases. Hospital acquired infections in the United Kingdom currently cost around £1bn a year and affect nearly 10% of patients, causing over 5,000 deaths a year (more than deaths on the road) and taking up thousands of bed days. It has been suggested that the incidence of hospital acquired infection could potentially be cut by 15% if hand hygiene recommendations are implemented (6). A meta-analysis reported that failure to washing hands increased diarrheal diseases 1.8 times. Handwashing can reduce

the risks of severe intestinal infections and shigellosis up to 48% and 59%, respectively and it had a potential to avert a million diarrheal deaths annually (7). An interventional study showed that children younger than 15 years living in households that received handwashing promotion and plain soap had a 53% lower incidence of diarrhea than the controls (8). Another meta-analysis reported that all eligible studies showed a 6.0 to 44.0% reduction in respiratory diseases with proper handwashing (9).

Currently, proper handwashing is not as widespread as desired worldwide. It has been reported that the frequency of hand washing with soap before handling food or after using a toilet was observed in only between 0% and 34.0% cases (4). Center for Disease Control and Association for Professionals in Infection Control and Epidemiology have created guidelines for hand washing (10). In addition, in order to emphasize the importance of hand washing, October 15 has been declared as the Global Hand Washing Day by UNICEF since 2008 (11). Our study evaluated university students' social hand washing knowledge, practices and skills and other related factors in a Turkish university setting.

## MATERIAL AND METHODS

The sampling frame consisted of all existing 1st year students in the Medical and Educational Faculty, plus all existing 2nd and 3rd year students in the Medical Faculty of Pamukkale University, Denizli, Turkey. There was not any sample selection procedure; we intended to reach everybody in the sampling frame. This approach was mainly aimed to include an equal number of students from both Faculties in the final sample. The study was conducted from April to May, 2010. All necessary permissions from the University management and verbal consents from all participants were obtained. ‘Social hand washing’ in this study was defined as a mechanical cleaning process, specifically removing dirt and pathogenic bacteria by using water and solid or liquid soap with no antiseptic properties (12). Participants were asked to fill in a questionnaire. The questionnaire was prepared by using previously published studies (4, 10, 13, 14). The questionnaire included questions on student’s socio-demographic characteristics and information on students’ social hand washing knowledge, practices, and skills. It was piloted on a small group of students from another Faculty before the study. There were 8 questions to evaluate hand washing knowledge, 21 questions to assess hand washing practice, and 10 questions to estimate hand washing skills. Participants received 1 point for each correctly answered question concerning their knowledge, practice and skill in respect of investigated issue. Final scores were calculated by summing up the points from all questions in the particular section divided by number of the questions in this section and multiplied by 100. Correct responses for social hand washing knowledge questions were ‘disagree’ responses for 1st, 3rd, 4th, and 6th propositions, and ‘agree’ responses for the 2nd, 5th, 7th, and 8th propositions in Table 2. Correct responses for social hand washing practice questions were ‘never’ responses for 3rd, 6th, 11th, and ‘always’ responses for the rest of the questions in the Table 3. In the evaluation of social hand washing skill score, only ‘always’ response received 1 point for all questions. The socio-economic status (SES) of the participant was determined by using the Family Affluence Scale (FAS) (15). The FAS score was determined by recoding the eight point scores (0 to 7) into three categories [low (0–3), middle (4–5) and high (6–7) FAS level].

SPSS for Windows 17th Version was used for statistical analysis. Percentages and means were calculated as usual. Student t-test and ANOVA were used for determining the differences between means where appropriate. A linear regression model was the method of choice in order to see the unconfounded associations.

## RESULTS

In total 303 students participated in the study, the mean age ( $\pm$ SD) was 20.1 $\pm$ 1.6. The age range was between 18 and 32. Sixty two point seven percent of the participants were women. Forty four point nine percent of the participants were medical students. Sixty seven point six percent of the students were in their 1st year in both Faculties; and 18.2%, in their 2nd; 14.2%, in their 3rd year in the Medical Faculty. Distribution of participants by SES was as follows: fifty one point eight percent of the participants fall in low, 37.0%, in middle, and 11.2%, in high SES category.

Twenty seven point one percent of the participants wash their hands 11 times and more a day. Forty five point five percent wash their hands 6–10 times a day. Twenty seven point four percent wash their hands less than 5 times a day. Table 1 listed the reasons for skipping hand washing as ‘far from the sink’ (3.0%), ‘lack of time’ (2.3%), ‘afraid of the side effects of hand washing’ (6.6%), ‘forgetting’ (19.5%), and ‘no need’ (63.7%).

The distribution of answers with regards to hand washing knowledge, practices and skills questions are displayed in Table 2, Table 3, and Table 4, respectively. The tables show that a significant number of participants failed to provide correct answers to the questions on hand washing.

Table 5 shows that the mean ( $\pm$ SD) scores of participants’ hand washing knowledge, practice and skill are 71.2 $\pm$ 20.7, 60.3 $\pm$ 13.4, and 79.7 $\pm$ 18.4, respectively. Hand washing knowledge, practice and skill scores in women are significantly different from the scores of men (all p-values <0.001). The mean score of participants’ hand washing knowledge in Educational Faculty students is higher than that in Medical students, however it was not statistically significant (p>0.05). Similarly, the mean of hand washing practice and skill scores was higher in the former group and it was significantly different (both p-values <0.001). Living location made only several differences on the practice scores. There was no association between SES of students and hand washing knowledge, practice and skill scores.

Table 6 indicates that gender was the main factor related to the students’ hand washing knowledge, practice and skill scores in the regression analysis. Student’s type of study also affected student’s hand washing practice and skill scores.

## DISCUSSION

This study examined university students’ social hand washing knowledge, practices and skills. It also determined the associations with some socio-demographic features. It is not possible to define the universally recommended number of daily hand washings to ensure proper hand hygiene as it depends on type of daily activities, however, approximately one third of the students

**Table 1.** Answers to the questions about participants’ hand washing

Questions	Answers	N=303 n (%)
How many times a day do you wash your hands?	Never	2 (0.7)
	1–2 times	3 (1.0)
	3–5 times	78 (25.7)
	6–10 times	138 (45.5)
	11 and over	82 (27.1)
Main reason for skipping handwashing	Far from the sink	9 (3)
	No need	193 (63.7)
	No time	7 (2.3)
	Side effects	20 (6.6)
	Keep forgetting	59 (19.5)
	Others	15 (5)

**Table 2. Answers to the questions about participants' hand washing knowledge**

	Agree n (%)	Disagree n (%)	Do not know n (%)
1. Cold water should be used for hand washing.	76 (25.1)	<b>132 (43.6)</b>	95 (31.4)
2. Medium hot water should be used for hand washing.	<b>223 (73.6)</b>	27 (8.9)	53 (17.5)
3. Hot water should be used for hand washing.	91 (30)	<b>141 (46.5)</b>	71 (23.4)
4. No need to remove watch and bracelets.	76 (25.1)	<b>200 (66.0)</b>	27 (8.9)
5. Needs to remove rings.	<b>225 (74.3)</b>	59 (19.5)	19 (6.3)
6. No need to wash wrists.	24 (7.9)	<b>268 (88.4)</b>	11 (3.6)
7. Hands need to be washed at least 15 seconds.	<b>257 (84.8)</b>	21 (6.9)	25 (8.3)
8. Need drying after washing the hands.	<b>281 (92.7)</b>	12 (4)	10 (3.3)

A bold number indicates the appropriate answer for this specific question.

**Table 3. Answers to the questions about participants' hand washing practices**

	Always n (%)	Sometimes n (%)	Never n (%)
1. I wash my hands before meals.	<b>214 (70.6)</b>	85 (28.1)	4 (1.3)
2. I wash my hands after meals.	<b>226 (74.6)</b>	77 (25.4)	0 (0.0)
3. I wash my hands before using restroom.	72 (23.8)	161 (53.1)	<b>70 (23.1)</b>
4. I wash my hands after using restroom.	<b>286 (94.4)</b>	14 (4.6)	3 (1.0)
5. I wash my hands when come home.	<b>203 (67)</b>	92 (30.4)	8 (2.6)
6. I wash my hands after handshaking.	52 (17.2)	178 (58.7)	<b>73 (24.1)</b>
7. I wash my hands before going to bed	<b>121 (39.9)</b>	151 (49.8)	31 (10.2)
8. I wash my hands after using public transportation.	<b>160 (52.8)</b>	123 (40.6)	20 (6.6)
9. I wash my hands after waking up in the morning.	<b>243 (80.2)</b>	52 (17.2)	8 (2.6)
10. I wash my hands after touching animals.	<b>275 (90.8)</b>	24 (7.9)	4 (1.3)
11. I wash my hands only if they are soiled.	291 (96)	11 (3.6)	<b>1 (0.3)</b>
12. I wash my hands before preparing meals.	<b>268 (88.4)</b>	29 (9.6)	6 (2.0)
13. I wash my hands after money exchange.	<b>148 (48.8)</b>	131 (43.2)	24 (7.9)
14. I wash my hands after blowing the nose.	<b>266 (87.8)</b>	32 (10.6)	5 (1.7)
15. I wash my hands after touching garbage.	<b>289 (95.4)</b>	14 (4.6)	0 (0.0)
16. I wash my hands before touching sick people.	<b>119 (39.3)</b>	151 (49.8)	33 (10.9)
17. I wash my hands after touching sick people.	<b>216 (71.3)</b>	73 (24.1)	14 (4.6)
18. I wash my hands after combing my hair.	<b>94 (31.0)</b>	153 (50.5)	56 (18.5)
19. I wash my hands after cleaning my home.	<b>262 (86.5)</b>	34 (11.2)	7 (2.3)
20. I wash my hands after washing dishes.	<b>256 (84.5)</b>	38 (12.5)	9 (3.0)
21. I wash my hands after doing laundry.	<b>218 (71.9)</b>	51 (16.8)	34 (11.2)

A bold number indicates the appropriate answer for this specific question.

in this study wash their hands less than 5 times a day which is possible an insufficient number for proper hand hygiene. Most of the participants washed their hands 6–10 times a day. Although it has been completed in a different population in this country in 2009, another study determined only 41.5% of participants washing their hands 11 times a day which was recommended as the cut off point for proper hand washing in the study (14). These findings may indicate widespread insufficient hand hygiene in this population. Also, low scores related to participants' social hand washing knowledge, practice and skills may indicate a need of an extensive public health education program on the topic.

Our study also indicated that the main reasons for skipping hand washing were participant's believes of 'no need' and 'keep forgetting'. Another study encompassing health workers inquired about the reasons for not washing their hands pointed out similar attitudes such as 'not think about it at the moment, forgetting, and being busy' (16). In another study, the most frequent responses were 'no need' and 'lack of time' (14). Other relevant studies on hand washing showed that 'skin drying effect of hand hygiene products, soap or paper towels unavailability', 'lack of time', 'lack of knowledge', 'not thought and forgotten', 'lack of role models in school or among adults' were the main obstacles in

**Table 4.** Answers to the questions about participants' hand washing skills

	Always n (%)	Sometimes n (%)	Never n (%)
1. Folding sleeves and removing jewellery such as watch and rings	<b>156 (51.5)</b>	119 (39.3)	28 (9.2)
2. Getting some soap a hand	<b>278 (91.7)</b>	22 (7.3)	3 (1.0)
3. Turning the faucet on	<b>288 (95.0)</b>	13 (4.3)	2 (0.7)
4. Making soap lather with some water	<b>289 (95.4)</b>	13 (4.3)	1 (0.3)
5. Turning off the faucet and rubbing the hands	<b>196 (64.7)</b>	77 (25.4)	30 (9.9)
6. Clenching the fingers cleaning between the fingers of both hands (without forgetting the thumb)	<b>226 (74.6)</b>	72 (23.8)	5 (1.7)
7. Cleaning hands by rubbing wrists	<b>186 (61.4)</b>	107 (35.3)	10 (3.3)
8. Turning on the faucet and washing hands by rubbing and removing all foam on hands	<b>272 (89.8)</b>	28 (9.2)	3 (1.0)
9. Shedding some water on the tap and turning it off	<b>255 (84.2)</b>	43 (14.2)	5 (1.7)
10. Drying hands	<b>274 (90.4)</b>	28 (9.2)	1 (0.3)

A bold number indicates the appropriate answer for this specific question.

**Table 5.** Participants' hand washing knowledge, practice, and skill scores by some socio-demographics features

Variables		n (%)	Knowledge score Mean±SD	Practice score Mean±SD	Skill score Mean±SD
Gender	Women	113 (37.3)	65.5±24.0 (1)	63.3±11.8 (1)	82.7±16.0(1)
	Men	190 (62.7)	74.6±17.7 (1)	55.4±14.3 (1)	75.0±23.2(1)
Department	Education	167 (55.1)	71.6±19.4	62.8±13.3 (1)	83.8±17.1(1)
	Medicine	136 (44.9)	70.8±22.3	57.2±12.8 (1)	75.0±20.9 (1)
Living Location	With family	76 (25.1)	75.0±18.3	61.6±12.7 (1)	79.7±19.1
	Dormitory	94 (31)	73.0±18.1	61.4±14.2 (2)	81.5±18.4
	Relatives	7 (2.3)	55.4±23.7	53.9±18.8 (3)	78.6±37.6
	With friends	99 (32.7)	68.5±23.1	57.2±12.6 (1,2)	77.1±19.4
	Alone	21 (6.9)	66.6±24.8	63.4±11.9	84.7±16.9
	Other	6 (2)	75.0±19.4	74.2±4.7 (1,2,3)	85.0±16.4
Socioeconomic status (SES)	Low	157 (51.8)	70.5±21.7	59.0±12.9	80.7±18.9
	Middle	112 (37.0)	72.8±19.4	61.7±13.8	79.6±20.4
	High	34 (11.2)	69.5±21.1	61.5±13.8	76.8±17.9
Total		303	71.2±20.7	60.3±13.4	79.7±18.4

(1), (1,2), (2), (3), (1,2,3) = p<0,05, p-values come from either a t-test or a posthoc ANOVA test.

promoting hand washing as the habit of proper hand hygiene (14, 16–18).

The highest number of participants in this study correctly stated that one should dry his hands after washing. However most of them did not know that the temperature of the water was an important factor for hand hygiene. Also, the high number of participants stated that they wash their hands after handling garbage and wash their hands after using a toilet. Another study showed that most of the participants wash their hands after using restrooms (14). Not surprisingly, number of participants who claimed that 'washing hands before meals' was lower than in those claiming 'washing hands after using restrooms'. Larson et al. performed a study where participants were asked similar questions on hand washing. 'Washing hands after using restrooms received full marks, however 'washing hands before meals' scored less (17).

In this study, the associations between participants' social hand washing knowledge, practice and skill scores, type of Faculty, living location and SES were evaluated. A multivariate analysis showed that gender was the main factor affecting these three scores. Study on the topic did not show any difference between women and men, however it showed significantly more positive attitude scores in women (14). However, study from Africa did not show any difference in frequency of hand washing between genders (19). Participants' type of the study was also associated with the scores in the current study. Although, the knowledge score was insignificantly higher in the Educational Faculty students, practice and skill scores were significantly higher among the students of Educational Faculty. Surprisingly, a study evaluated the compliance to hand hygiene guidelines among health care workers and the medical students were found to be the most compliant (18). This was contrary to our findings and it may indicate a need for further studies on the topic.

**Table 6.** Multivariate analysis for determining associations between hand washing knowledge, practice, and skill scores and some socio-demographics features

Variables	$\beta$	SE	95% CI for $\beta$	p-value*
Knowledge score				
Gender	9.0	2.4	4.2–13.7	<0.001
Practice score				
Gender	7.1	1.6	3.9–10.4	<0.001
Department	-5.5	1.6	-8.7–(-2.3)	0.001
Age	1.3	0.5	0.4–2.2	0.004
SES	0.8	0.4	0.03–1.7	0.042
Skill score				
Department	-8.6	2.3	-13.2–(-4.0)	<0.001
Gender	6.7	2.3	2.0–11.0	0.005
Age	1.6	0.6	0.3–2.9	0.017

\*p-values come from a stepwise linear regression model. The model started with gender, age, department, living accommodation and socioeconomic status (SES).

There are several limitations of the study. One important limitation was the way of selection of the study group. In addition to all first year students from both Faculties, we also included the 2nd and 3rd year medical students in the study because of the low number of students in the Medical Faculty classes. However, we analyzed the data using only the 1st year students from both Faculties and verified the results. In addition, we used a multivariate analysis and included age, as a proxy to class variable, in order to adjust the findings. Secondly, we did not use a structured observation in order to determine the participants' hand washing skills. Logistic concerns were the main reason for this approach. We were inclined to consider this population as highly educated and capable to evaluate their attitudes as to their hand washing skills.

In conclusion, we need to find a way to improve hand hygiene of our students. It is also possible to say that gender is the most significant factor related to every aspect of hand hygiene. Therefore, supporting quantity and/or quality of available campus based public health education programs, development of hand-hygiene promotion programs for the general public and use of the findings from this study is recommended.

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#### Conflict of interest

None.

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