Original Article

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Quick Response Code:

Website: www.jehp.net

DOI: 10.4103/jehp.jehp_158_17

Personal hygiene among college students in Kuwait: A Health promotion perspective

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Abstract:

BACKGROUND: Most infectious diseases result from a lack of knowledge and poor personal hygiene. Hand hygiene, in particular, is one of the most common means by which pathogens are transmitted. The aim of this study was to determine college student's knowledge and awareness of personal hygiene in Kuwait.

MATERIALS AND METHODS: A multi-dimensional health assessment approach was followed using a self-administered questionnaire that was distributed among students of two colleges (the College of Nursing and the College of Health Sciences). Item analysis was conducted on 33 items of the questionnaire and measure five types of hygiene practices: hand hygiene, body hygiene, special hair application, oral care, and clothes hygiene. The data collected in the questionnaires and results were analyzed using statistical software SPSS version 23. Statistical analysis was performed using ANOVA and Student's *t*-test. Internal consistency, reliability was good, with an overall Cronbach's Alpha value of 0.749.

RESULTS: Most respondents were female with 64%, while 80% of the college students were in the age of <20-year-old. Twelve items were underhand hygiene practices, and four items under body hygiene. Nine items were under oral care; three, items were under hair application. Three were under clothes hygiene.

CONCLUSIONS: This study showed that female students had a better knowledge and were more hygienic in hand hygiene, hair application, and body hygiene whereas, male students showed a better oral hygiene practice. Nevertheless, this study shows that the hygiene questionnaire is an acceptable and reliable measure of awareness and practice among college students.

Keywords:

College student, hand washing, Kuwait, personal hygiene

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Received: 28-10-2017
Accepted: 17-03-2018

Introduction

Personal hygiene can be defined as the practice of maintaining cleanliness and promoting and preserving body health. The term "hygiene" comes from the Greek word "Hygeia," which means goddess of health, cleanliness, and sanitation. Maintaining a high level of personal hygiene can help increase confidence and self-esteem, leading to a healthy lifestyle.[1] While the failure to keep up a standard of hygiene may have many implications. Not only there is a high risk of getting an illness or infection but also there are many social and psychological issues are possible due to poor hygiene.

Personal hygiene is one of the most effective methods of public disease prevention. In the literature, there is a direct correlation between the lack of personal hygiene and illness, the latter of which proper hand washing has been shown to reduce the risk of disease transmission.[2] Lack of hand hygiene is linked with outbreaks of viral gastroenteritis,[3] upper respiratory tract infections,[4,5] and Group B streptococcal

How to cite this article: Al-Rifaai JM, Al Haddad AM, Qasem JA. Personal hygiene among college students in Kuwait: A Health promotion perspective. J Edu Health Promot 2018;7:92.

colonization.[6] In the majority of developing countries, roughly 80% of diseases are associated with poor domestic and personal hygiene.[7]

Personal hygiene is particularly important among students because they spend most of their time in public places, such as schools, colleges, or universities in proximity with others. The transmission of infections to students may contribute to their absence from school, which in turn may affect their academic productivity in college.[4] Therefore, health knowledge and promotion are essential for students, their families, and communities at large. Indeed, a meta-analysis of the hand hygiene of 30 students showed that improvement in hand washing minimized the occurrence of upper respiratory tract infections by 21% and gastrointestinal illness by 31%.[8] Furthermore, Sarkar M.[9] in his study reported the health knowledge of students significantly improved after education. Teaching personal hygiene to students provides them with the knowledge in health, making them aware of the reduction of risk associated with poor hygiene practices, such as disease transmission. Health education made the college students capable to pass personal hygiene information to their families and community. Thus, leads to a better lifestyle, which can potentially increase their social hygiene profile. The development of policies, services, and research on such issues is integral to maintaining and raising the quality of health education.

In Kuwait, a few studies have been conducted on personal hygiene and those that have focused mainly on hand hygiene. A study by Al-Wazzan *et al*.,[10] on hand hygiene education among nursing staff in a Kuwait hospital showed nurses to increase implementation of the practice after training when managing patient care activities. No studies, however, have been undertaken on personal hygiene among college students in Kuwait.

The aim of this study was to assess and evaluate the level of personal hygiene knowledge among college students in Kuwait, with the identification of the weak areas and gaps in students' personal hygiene knowledge and also to determine the reliability and validity of hand hygiene practices, and to correlate between different hygiene practices.

Materials and Methods

Study population and study sample

A cross-sectional study of personal hygiene and its applications among 233 students from two colleges under The Public Authority for Applied Education and Training (PAAET) in Kuwait: The college of (Health Sciences and the College of Nursing). Of the study's 233 students, 150 were female and 83 were male.

Ethical clearance and informed consent

This study was approved by the Ethical Review Committee of PAAET, PAAET Research System Guide Ref No. 2012/612 in accordance with the Helsinki Declaration for the inclusion of human patients in research. The purpose and procedures of this study were explained to all the participants. Informed consents were obtained from agreed participants before samples and data collected.

Research instrument

The study was voluntary, and permission was given by the students to participate. The content of the questionnaire was explained and hence that each question would be understood and genuinely answered. The questionnaire was administered to the participated students and included a set of questions regarding the age range, the gender, and personal hygiene practices, such as hand hygiene knowledge, body hygiene, oral care, clothes hygiene, and personal hygiene knowledge.

The questionnaire was divided into six parts. Part 1 concerned data with student's personal hygiene knowledge and includes "Yes or No" questions. The score of >75% would be considered a good result, a range of <75%–50% was considered moderate, and anything <50% was considered poor. Part 2 of the questionnaire concerned data on hand hygiene attitudes and practice and consisted of 12 items with a 5-point scale ranging from very often, often, sometimes, rarely, and never. Part 3 included four items on body hygiene, which one was removed, and remaining three items with a 5-point scale ranging from very often, often, sometimes, rarely, and never. Part 4 consisted of nine items on oral hygiene, which 3 items were removed with a 5-point scale ranging from very often, often, sometimes, rarely, and never. Part 5 consisted of five items on hair application and 1 was removed with a 5-point scale ranging from very often, often, sometimes, rarely, and never. Finally, the last part 6 consists of three items on clothes hygiene with a 5-point scale ranging from very often, often, sometimes, rarely, and never. The survey was written in English and translated into Arabic.

Statistical analysis

The data collected in the questionnaires and results were analyzed using statistical software SPSS version 23 (SPSS, Inc., Chicago, IL, USA). The qualitative variables were estimated and presented as frequencies and percentages. Descriptive statistics were performed using mean and standard deviation (SD), and for the comparison of genders and training options, an independent *t*-test was used. For the measurement of reliability, Cronbach's alpha was used,[11] and principal component analysis, Bartlett's sphericity test, and the Kaiser-Meyer-Olkin (KMO) Index (KMO) were used to

reduce the number of items for each hygiene factor.[11] KMO statistics should be >0.600, and Bartlett's tests should be statistically significant (e.g., $P < 0.05$). KMO is used for assessing sampling adequacy and evaluates the correlations and partial correlations to determine if the data are highly correlated.[11]

An ANOVA test was also performed to measure whether, or not age group influenced hygiene factors. Finally, to better understand the relationships between hygiene factors, Pearson correlation was performed.

Internal consistency reliability

Reliability testing also referred to as internal consistency was done to assess the consistency of responses among a group of questions. A Cronbach's alpha coefficient was used to measure reliability. The purpose of the test was to determine if a group of questions all effectively measure the same construct, concept, or idea. This was used to ensure that all items making up a composite score are consistent with each other, a correlation value <0.2 indicates that the corresponding item does not correlate very well with the scale overall. Thus, it may be dropped.[11]

A Cronbach's reliability test calculates the reliability coefficient alpha (α), which indicates the degree of consistency among items,[12] suggest the following guidelines for evaluating α values: >0.9 excellent, >0.8 good, >0.7 acceptable, >0.6 questionable, >0.5 poor, and ≤0.5 unacceptable. A Cronbach's reliability test assumes that the items being tested are measuring a single construct (i.e., the construct is unidimensional) and that students are independent of each other.[13]

An independent sample *t*-test was conducted to examine whether, or not the mean of A9 was significantly different between the female and male categories of D2 (gender). Before the analysis, assumptions as to the normality and homogeneity of variance were assessed. The Shapiro–Wilk test was conducted to determine whether A9 could have been produced by a normal distribution.[14] Levene's test for equality of variance was used to assess whether, or not the homogeneity of variance assumption was met.

A Kruskal–Wallis rank sum test was conducted to assess if there were significant differences in A9 regarding the levels of D1. A Kruskal–Wallis test is a nonparametric alternative to a one-way ANOVA and does not share the ANOVA's distributional assumptions.

Pearson correlation analysis

Pearson correlation was applied in this study to examine the relationships between the five factors (hand hygiene, body hygiene, oral care, special hair application, and clothes hygiene).

Results

Demographic profile

A total of 233 college students participated in this study, many which were <20-year-old (n = 186, 80%). The majority students were female (n = 150, 64%). More than half of the respondents had received training for hand washing (n = 161, 69%). The most common source of training was home (n = 83, 36%), and most college students indicated that they knew something about hygiene, with their answer to the question "*How much do you know about hand hygiene?*," being "yes" (n = 164, 70%).

Statistics for numeric variables

The study's participants showed special interest in looking after the personal hygiene. Ranging from 1.50 to 5.00, *"Clothes Hygiene"* was ranked first with an average of 4.69 (SD = 0.56), followed by "*Body Hygiene*," which, ranging from 1.67 to 5.00, ranked second with an average of 4.34 (SD = 0.73). Ranging from 1.17 to 5.00, *"Oral Care"* ranked third with an average of 3.84 (SD = 0.69). Ranging from 1.17 to 5.00, *"Hand Hygiene"* ranked fourth with an average of 3.82 (SD = 0.54). The participants appeared to show less concern for *"special_hair_application*," which, ranging from 1.00 to 5.00, showed an average of 3.26 (SD = 1.43).

The internal consistency of all variables was calculated and showed a Cronbach's alpha coefficient of 0.749, which indicated acceptable reliability [Table 1].

Given that, the KMO (Kaiser-Mayer-Olkin) of the first analysis of the draft Hygiene Questionnaire was 0.9 and all variables had loadings 0.4, the sample size of 160 was considered to be adequate to enabled factor analysis to be undertaken [Table 1].

Cronbach's alpha was computed for the revised Hygiene Questionnaire after construct validation was computed and was 0.749, which indicates an acceptable correlation between the items and the questionnaire is consistently reliable [Table 1].

The KMO value was found to be high at 0.714, while the Cronbach's alpha was 0.749, which indicated the sample size to be adequate and therefore, satisfactory for factor analysis. An independent sample *t*-test was used in this study to compare the means of two independent variables (female and male). No significant difference was found between males and females across the majority of factors in Table 2 below, except for A9, B1, B3, B4, C3, DD1, and DD3 [Table 3].

The results of the Shapiro–Wilk test was significant at $W = 0.89$, $P < 0.001$, which suggested that A9 was unlikely to have been produced by a normal distribution.

Table 1: Overall reliability - Cronbach's alpha, corrected item-total correlation, principal component analysis, Kaiser-Meyer-Olking, and Bartlett's test

Factor	Code	Item	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted	PCA
Hand hygiene	A1	I wash my hands with water and soap	93.0129	113.349	0.495	0.736	0.710
	A2	I use antibacterial soap and water when washing my hands	93.6395	112.611	0.279	0.741	0.557
	A3	I use hand sanitizer often	94.8197	109.769	0.362	0.735	0.756
	A4	I leave sanitizer on my hands for 20 s	95.0987	108.322	0.346	0.736	0.728
	A5	I wash my hands with water and soap before and after the laboratory always	93.5408	110.275	0.374	0.735	0.472
	A6	I cut my nails regularly	93.3734	110.692	0.431	0.733	0.558
	A7	I wash my hands after clipping my nails	93.2833	109.307	0.418	0.733	0.560
	A8	I wash my hands with water and soap before and after using the restroom	93.0773	112.537	0.417	0.736	0.690
	A9	Soap is available in the restroom of the college	94.6609	112.846	0.169	0.75	0.699
	A10	Sanitizers are distributed in laboratories, corridors, and restrooms of the college	94.9828	111.069	0.214	0.747	0.727
	A11	I use paper towels to dry my hands in and out of college	93.5279	111.061	0.305	0.739	0.359
	A12	I use an air blower to dry my hands	94.4721	111.138	0.258	0.742	0.324
Body hygiene	B1	I bathe and wash my hair with shampoo and water daily	93.3648	112.19	0.369	0.737	0.391
	B3	I think that cotton swabs are the best way to clean one's ears	93.6695	114.291	0.141	0.751	0.794
	B4	I use deodorant when needed	93.2489	116.343	0.104	0.751	0.761
Oral care	C2	I brush my teeth once daily	93.5107	112.38	0.236	0.744	0.368
	C3	I brush my teeth whenever needed, especially after eating sweets	93.6652	111.129	0.324	0.738	0.557
	C4	I change my toothbrush every 3 months	93.7468	109.112	0.398	0.733	0.730
	C7	I use mouth wash whenever needed	94.309	107.645	0.336	0.737	0.707
	C8	I use floss more than once daily	95.3047	107.575	0.362	0.735	0.599
	C9	I believe tooth hygiene prevents tooth decay	93.0343	113.783	0.417	0.738	0.559
Special hair application	DD1	I use my personal razor for removing hair	94.3777	110.572	0.188	0.751	0.856
	DD3	I use a personal hair shaver	94.6567	111.545	0.149	0.755	0.856
Clothes hygiene	E1	I change my clothes daily	93.1459	114.961	0.28	0.742	0.799
	E3	I wash my clothes frequently	93.0172	114.948	0.313	0.741	0.808

KMO and Bartlett's test=0.714, Cronbach's alpha=0.749. PCA=Principal component analysis, KMO=Kaiser-Meyer-Olking

The result of the independent sample *t*-test was significant at t (231) = −3.27, with P = 0.001 suggesting that the mean of A9 was significantly different between the female and male categories of D2. Indeed, the mean of A9 in the female category of D2 was significantly lower than the mean of A9 in the male category [Table 3].

A Shapiro–Wilk test was conducted to determine if B1 could have been produced by a normal distribution. The result of the independent sample *t*-test was significant at t (231) = −2.878, with P = 0.004 suggesting the mean of B1 to be significantly different between females and males, with a mean difference of 0.340. Therefore, the

Table 2: Comparison of hygiene based on training (yes or no)

Factor	Code	Item	*t*-test for equality of means						
			t	df	Significant (two-tailed)	Mean difference	SE difference	95% CI of difference	
								Lower	Upper
Hand hygiene	A1	I wash my hands with water and soap	−0.074	231	0.941	−0.00612	0.08267	−0.169	0.15675
	A2	I use antibacterial soap and water when washing my hands	0.763	231	0.446	0.11215	0.14697	−0.17743	0.40173
	A3	I use hand sanitizer often	0.814	231	0.417	0.13268	0.16307	−0.18862	0.45397
	A4	I leave the sanitizer on my hands for 20 s	0.475	231	0.635	0.09075	0.1909	−0.28537	0.46687
	A5	I wash my hands with water and soap before and after the laboratory always	−0.438	231	0.662	−0.0666	0.15193	−0.36594	0.23274
	A6	I cut my nails regularly	−0.35	231	0.727	−0.04546	0.12985	−0.30131	0.21038
	A7	I wash my hands after clipping my nails	−0.631	231	0.529	−0.09593	0.15207	−0.39555	0.20369
	A8	I wash my hands with water and soap before and after using the restroom	0.011	231	0.991	0.00121	0.10772	−0.21104	0.21346
	A9	Soap is available in the restroom of the college	1.324	231	0.187	0.26199	0.19781	−0.12775	0.65173
	A10	Sanitizers are distributed in the laboratories, corridors, and restrooms of the college	1.639	231	0.102	0.33885	0.20669	−0.06839	0.7461
	A11	I use paper towels to dry my hands in and out of college	0.198	231	0.843	0.03244	0.16397	−0.29064	0.35551
	A12	I use an air blower to dry my hands	1.171	231	0.243	0.21368	0.18248	−0.14586	0.57322
Body hygiene	B1	I bathe and wash my hair with shampoo and water daily	1.517	231	0.131	0.18806	0.12393	−0.05612	0.43224
	B3	I think that cotton swabs are the best way to clean one's ears	−0.616	231	0.538	−0.11223	0.18205	−0.47093	0.24646
	B4	I use deodorant when needed	−0.175	231	0.861	−0.02614	0.14927	−0.32025	0.26797
Oral care	C2	I brush my teeth once daily	1.405	231	0.161	0.23818	0.16951	−0.09579	0.57216
	C3	I brush my teeth whenever needed, especially after eating sweets	1.26	231	0.209	0.19548	0.15509	−0.11009	0.50105
	C4	I change my toothbrush every 3 months	2.125	231	0.035	0.33877	0.15944	0.02463	0.6529
	C7	I use mouth wash whenever needed	0.625	231	0.533	0.12811	0.20503	−0.27587	0.53208
	C8	I use floss more than once daily	−0.238	231	0.812	−0.04658	0.19565	−0.43206	0.33889
	C9	I believe tooth hygiene prevents tooth decay	1.38	231	0.169	0.12362	0.0896	−0.05292	0.30016
Special hair application	DD1	I use my personal razor for removing hair	2.473	231	0.014	0.57143	0.23103	0.11623	1.02663
	DD3	I use a personal hair shaver	2.902	231	0.004	0.6903	0.23785	0.22167	1.15894
Clothes hygiene	E1	I change my clothes daily	4.308	231	0.000	0.42443	0.09852	0.23031	0.61855
	E3	I wash my clothes frequently	0.512	231	0.609	0.04796	0.09372	−0.13669	0.23262

SE=Standard error, CI=Confidence interval

participants' body hygiene was deemed significantly different between females and males.

The results of the study sample, *t*-test were significant at $t(231) = -1.991$, with $P = 0.048$ suggesting the mean of B3 to be significantly different between females and males, with a mean difference of 0.347. Therefore, the participants' body hygiene was considered significantly different between the females and males. The *P* value of the third factor was 0.048, which indicated that the value of B3 was not distributed normally. The result of sample *t*-test was also significant at $t(231) = -2.700$, $P = 0.007$, suggesting the mean of B4 to be significantly different between females and males, with a mean difference of 0.383. Therefore, the participants' body hygiene was considered significantly different between the females and males. The *P* value for the fourth variable was 0.007, which indicated the value of B4 not to be distributed normally [Table 3].

The result of the sample *t*-test was significant at $t(231) = -2.515$, with $P = 0.013$ suggesting the mean of C3 to be significantly different between females and

Table 3: A comparison of hygiene between males and females

Factor	Code	Item	*t*-test for equality of means						
			t	df	Significant (two-tailed)	Mean difference	SE difference	95% CI of difference	
								Lower	Upper
Hand hygiene	A1	I wash my hands with water and soap	−0.012	231	0.990	−0.001	0.080	−0.158	0.156
	A2	I use antibacterial soap and water when washing my hands	0.522	231	0.602	0.074	0.142	−0.206	0.354
	A3	I use hand sanitizer often	−3.164	231	0.002	−0.488	0.154	−0.792	−0.184
	A4	I leave sanitizer on my hands for 20 s	−1.215	231	0.226	−0.223	0.184	−0.585	0.139
	A5	I wash my hands with water and soap before and after the laboratory always	−0.285	231	0.776	−0.042	0.147	−0.331	0.247
	A6	I cut my nails regularly	0.429	231	0.668	0.054	0.125	−0.193	0.301
	A7	I wash my hands after clipping my nails	−0.588	231	0.557	−0.086	0.147	−0.375	0.203
	A8	I wash my hands with water and soap before and after using the restroom	−0.488	231	0.626	−0.051	0.104	−0.255	0.154
	A9	Soap is available in the restroom of the college	3.271	231	0.001	0.613	0.187	0.244	0.982
	A10	Sanitizers are distributed in laboratories, corridors, and restrooms of the college	0.229	231	0.819	0.046	0.201	−0.349	0.441
	A11	I use paper towels to dry my hands in and out of college	−0.036	231	0.971	−0.006	0.158	−0.317	0.306
	A12	I use an air blower to dry my hands	−1.591	231	0.113	−0.280	0.176	−0.626	0.067
Body hygiene	B1	I bathe and wash my hair with shampoo and water daily	2.878	231	0.004	0.340	0.118	0.107	0.572
	B3	I think that cotton swabs are the best way to clean one's ears	−1.991	231	0.048	−0.347	0.174	−0.691	−0.004
	B4	I use deodorant when needed	−2.700	231	0.007	−0.383	0.142	−0.662	−0.103
Oral care	C2	I brush my teeth once daily	0.830	231	0.408	0.136	0.164	−0.187	0.459
	C3	I brush my teeth whenever needed, especially after eating sweets	−2.515	231	0.013	−0.373	0.148	−0.664	−0.081
	C4	I change my toothbrush every 3 months	−1.469	231	0.143	−0.227	0.155	−0.532	0.078
	C7	I use mouth wash whenever needed	−0.897	231	0.371	−0.177	0.198	−0.567	0.212
	C8	I use floss more than once daily	−0.976	231	0.330	−0.184	0.188	−0.555	0.187
	C9	I think tooth hygiene prevents tooth decay	1.457	231	0.146	0.126	0.086	−0.044	0.296
Special hair application	DD1	I use my personal razor for removing hair	7.622	231	0.000	1.539	0.202	1.141	1.937
	DD3	I use a personal hair shaver	8.000	231	0.000	1.654	0.207	1.247	2.061
Clothes hygiene	E1	I change my clothes daily	−0.381	231	0.704	−0.038	0.099	−0.232	0.157
	E3	I wash my clothes frequently	−0.351	231	0.726	−0.032	0.090	−0.210	0.147

SE=Standard error, CI=Confidence interval

males, with a mean difference of 0.373. Therefore, the participant's oral care was deemed significantly different between females and males. As the *P* value for this variable was 0.013, the value of C3 was not distributed normally. The independent sample *t*-test was significant at t (231) = −7.622, with P = 0 suggesting the mean of DD1 to be significantly different between the females and males, with a mean difference of 1.539. Therefore, the participants were considered significantly different between females and males. As the *P* value for this variable was 0, DD1 was not distributed normally [Table 3].

The mean of DD3 was significantly different between the females and males regarding special hair appliances, with a mean difference of 1.654. Therefore, the participants were deemed significantly different between the females and males in this regard. As the *P* value for this variable was 0, DD3 was not distributed normally [Table 3].

The independent sample of *t*-test applied for the DD1 to examine whether the mean is significantly different among those who had received hygiene training. With t (231) = −2.473 and P = 0.014, the mean for

using a personal razor to remove hair was found to be significantly different between those who answered either yes or no. In addition, as the $P = 0.014$, a significant difference was found among those who had received hygiene training in relation to DD1 [Table 2].

The same independent *t*-test samples were used to examine DD3 regarding whether the means were significantly among those who used personal hair shavers. With $t\ (231) = -2.902$ and $P = 0.004$, the mean for personal hair shaver users was found to be significantly different among those who had received hygiene training in relation to DD3. As the *P* value was 0.004, a significant difference was found between those who answered yes or no regarding DD3 [Table 2].

The sample independent *t*-test was also applied to examine whether the mean for those who answered yes or no to hygiene training was significantly different regarding clothes hygiene. With $t\ (231) = -4.308$ and $P = 0$, the mean was found to be significantly different between those who answered yes or no regarding changing clothes daily. The $P = 0$, which showed a significant difference between those who answered yes or no regarding E1 [Table 2].

An ANOVA test was applied to determine any significant differences between the means related to age group in this study. SPSS was used to evaluate the *f*-test statistics shown in the table for comparison with the significant level ($P < 0.05$). A high significant difference was found between the *f*-value and the significant value of A9, the availability of soap in the restroom. As the *f*-value is greater than the significance level value (0.05), then will have significant differences at a 95% interval level of confidence. In other words, the participants' responses to soap availability in restrooms can be defined by the age group means differences. In addition, E3, washing clothes frequently, showed a significant difference between the *f*-test value and the significant value. The *f*-value is significantly greater than the *P* value in this study, indicating a significant difference regarding washing clothes based on the age group of the participants. Therefore, the model was deemed significant at a 95% interval confidence level.

The result of Pearson correlation showed that there was a significant positive correlation between Hand_Hygiene and Body_Hygiene ($r = 0.21$, $P = 0.002$). The correlation coefficient between Hand_Hygiene and Body_Hygiene was 0.21, indicating a slight relationship. As Hand_Hygiene increases, Body_Hygiene tends to increase. There was also a significant positive correlation between Hand_Hygiene and Oral_care ($r = 0.44$, $P < 0.001$), as well as a significant positive correlation between Hand_Hygiene and Clothes_Hygiene ($r = 0.31$, $P < 0.001$), indicating that as Hand_Hygiene increases, Clothes_Hygiene tends to increase. Finally, there was a significant positive correlation between Body_Hygiene and Oral_care ($r = 0.15$, $P = 0.020$), indicating that as Body_Hygiene increases, Oral_care tends to increase.

A Kruskal–Wallis rank sum test was conducted to assess if there were significant differences in A9 between the levels of D1. The results of the Kruskal–Wallis test was significant, $\chi^2\ (2) = 6.69$, $P = 0.035$, indicating that the mean rank of A9 was a statistically significantly difference between levels of D1. Table 4 presents the results of the Kruskal–Wallis Rank Sum Test. The results of the Kruskal–Wallis test were significant, $\chi^2\ (2) = 6.54$, $P = 0.038$, indicating that the mean rank of E3 was statistically significantly different between levels of D1 [Table 4].

Discussion

The respondent demographic of this study showed the student population regarding gender and age. The mean age of the participants was <20 years, which is reflective of the young population in Kuwait. The majority of respondents (64%) were female. Educational level regarding hygiene was high among the participants, with most of them understanding the concept very well. Most the college students (61%) already knew about hygiene products by the relatively large number of respondents. Furthermore, sources of information on hygiene were not different among the college students, with the majority gaining their knowledge at home, which represents a barrier to keeping up with current hygiene practices.

After consideration, certain study items were deleted because they affected the internal consistency of the variables. Certain items were also revised more than once after considering their importance in the study. For example, item A9, "Soap is available in the restroom of the college," and item DD1, "I use my personal razor

Table 4: Kruskal–Wallis test for measuring significant differences between age groups

D1: age group	*n*	Mean rank	χ^2	df	Asymp sig
A9: Soap is available in the restroom of the college					
<20	186	121.42	6.695	2	0.035
From 21-28	42	104.79			
>29	5	55.00			
Total	233				
E3: I wash my clothes frequently					
<20	186	119.81	6.539	2	0.038
From 21-28	42	102.25			
>29	5	136.50			
Total	233				

for removing hair," were very important in preventing diseases among participants, potentially preventing serious illness. Body, hand, oral, and clothing, hygiene need to be considered in greater detail. Therefore, the final items of this study were narrowed down to 25 due to the removal of some items.

Validity refers to the suitability, importance, and practicality of the specific implications of this study's test scores. The most common approach for measuring validity is factor analysis, which serves to measure the interconnections of items with each other, with the factor scores representing the outcome of correlation analyses.[15]

The results of this study suggest the hygiene practices questionnaire to be valid regarding helping to improve practices among college students. The strength of the relationship between the variables was good and met the study's expectation, showing a high KMO at 0.714. The 25 items of the hygiene practice questionnaire showed high internal consistency in reliability analysis, with an overall Cronbach's alpha value of 0.749. According to Bautista *et al*.,[16] to have high internal consistency in the reliability analysis of variables, a Cronbach's alpha of 0.5 or higher should be achieved. The results of this study show the questionnaire survey to be a reliable tool that can be applied for further studies to analyze the hygiene practices of science students in Kuwait.

This study showed that females tend to care more about special hair appliance practices compared to males. The independent *t*-test conducted in this study also showed a significant difference in other regards. For instance, females tend to be more particular in removing hair from different body parts, and in using a personal razor, shavers for removing hair more than men. These two factors are integral when it comes to hygiene practices, as a lack of these two variables can lead to infections and other serious illnesses, such as cancer and HIV. This finding is similar to Sax *et al*.[17] Snow *et al*.[18] and Tai *et al*.[19] each of which showed female staff members to take personal hygiene practices more seriously than male students.

The study also found hand hygiene to be significantly different between the male and female respondents because females tended to have greater soap availability in restrooms within their colleges. This finding is relatively similar to Snow *et al*.[18] who found that women tended to wash their hands more often than men. The current study also found that body hygiene was significantly different between females and males, with females tending to be more concerned with their hygiene in relation to others, whereas, males show a greater focus on body hygiene practices than the female students.

Oral care was found to be significantly different for both males and females, with males tending to show greater attention to oral care compared to females. This finding contrasts with that of Snow *et al*.,[18] who found women to focus more on various factors of hygiene than men. This study found that men tend to brush their teeth more often than women, especially after eating sweets.

The overall demographic factors of this study were roughly the same for all participants, which were approximately of the same age group of <20-year-old, except for lack of soap availability in restrooms, which can be easily solved by health facilities.

This study is limited to the participation of nursing and science students within colleges in Kuwait, and therefore larger populations should be examined. The findings of this study should be considered carefully before generalization to other hygiene practices in the country.

Conclusions

The aim of this study was to determine hygiene levels and knowledge among nursing and science students. The study sought to determine whether demographic characteristics and five different factors of hygiene were related to hygiene practices among the participants. The participants' homes were the important places of hygiene knowledge and practice. The current study offers a significant contribution to the examination of hygiene practice among science and nursing students in Kuwait. The study utilized a descriptive quantitative design and included 233 participants, 64% of which were female. The results showed a significant difference in various factors related to hygiene practices between the male and female participants. The five variables of this study were hand hygiene, oral care, body hygiene, clothes hygiene, and special hair application. These variables showed internal consistency, and each of the practices showed reliability and validity.

The present study emphasizes the need for further improvement in the existing training programs to address the gaps in hygiene knowledge and practice by college students when they go to the health workforce. The study result reveals a good rate of hygiene knowledge between male and female among Kuwaiti college students, but different in compliance among college students with females being more compliance to personal hygiene than male students, that could be due to deficiencies in their educational program and knowledge learning resources. We would highly recommend that college schools seek to modify and enrich their curriculum to improve personal hygiene practices among their students and to develop a comprehensive health and hygiene intervention programs in Kuwaiti health colleges. An improved understanding

of infection control and hygiene among health college students could play a major role in reducing disease transmission when the current health college students graduate and join the health care workforce in the future.

In conclusion, college-based personal hygiene education is vital to decrease the rates of transmissible diseases. Health practitioner such as nurse students and health sciences students play an important role in hygiene, health promotion after they graduate and start working within the health care system and they are more receptive to learning and are very likely to adopt healthy behaviors at a college training education. They can also be agents of change by spreading what they have learned in college to their family and community members.

Despite the exploratory nature of our study, we do believe that its results will add useful information to the scant knowledge about college students' personal hygiene behavior, knowledge, and practice in Kuwait. We hope that the results of this study may motivate further studies within this field and be helpful in planning, hygiene health training, targeting nursing and health sciences students or other healthcare professionals. To the best of our knowledge, this is the first study to undertake on personal hygiene among college students in Kuwait.

Future studies using direct observation are recommended to verify this study's result before an overview can be done on a population, in this case, university students.

Acknowledgment

We would like to thank all the young college people who generously took part in the research. We are particularly grateful to them for allowing us to share sensitive details about their personal hygiene practices. We would like to thank college of Nursing and college of health sciences at the Public Authority of Applied Education and Training (PAAET) for the generous academic support.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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