

Impact of COVID-19 on the Hygiene Practices of Adolescent in Makkah-KSA

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Abstract

Background: Since the Makkah region is a sacred place for Muslims worldwide due to Holy Mosque, it is considered the busiest place globally. Adolescents are 'silent carriers' of COVID-19 infection, and they require knowledge about proper hygiene practices. **Aims:** It is necessary to assess the impact of COVID-19 on adolescents' hygiene practices in Makkah. **Subjects and Methods:** A cross-sectional quantitative research method was used. The adolescents included in this study were primary, secondary and university students with ages ranging from 10 to 19. All subjects were from the Makkah region. The research variables comprised general hygiene, household hygiene, food-related hygiene, hand hygiene techniques and personal hygiene. **Sample:** A sample population of 303 adolescents. **Setting:** The research was conducted in primary, intermediate and secondary schools and among first-year university students in Makkah. **Tools:** The questionnaire was taken from Stevenson (2009) to evaluate perceptions about hygiene practices. **Results:** The results indicate a prominent difference between personal hygiene practices among adolescents before and after the COVID-19 pandemic. The intermediate level students showed a significant change in hygiene practices, while female adolescents were more concerned with hygiene than male adolescents. The knowledge collected from this study is important because it addresses changes to adolescent health, hygiene and psychology during the pandemic. **Conclusion:** Adolescents' hygiene practices were affected by the COVID-19 pandemic in Makkah. **Recommendations:** Although the findings were informative, further exploration using qualitative methods would enhance a greater understanding of the problem. Many parameters need to be explored to further explain the respondents' change in behaviours in terms of handling the pandemic situation. The researchers could use other studies to understand the hygiene situation during the pandemic.

Keywords: Adolescents, hygiene practices, covid 19

BACKGROUND

The increased burden of communicable diseases among adolescents due to poor personal hygiene practices and inadequate sanitary conditions remains a concern for the public health agendas of developing countries **(Vivas et al., 2016)**. Adolescents are particularly vulnerable to neglecting basic personal hygiene due lack of knowledge and practice **(Sarkar, 2013)**. Poor knowledge and practice of and attitudes towards elements of personal hygiene such as hand washing play a major role in the high incidence of communicable diseases and therefore have negative consequences for children's long-term overall development **(Ghanim et al., 2016)**. Improved awareness and hand hygiene practices, especially among children, have effectively reduced gastrointestinal and respiratory tract infections—the two leading causes of childhood morbidity and mortality around the world—by up to 50% **(Curtis & Cairncross, 2013)**.

The adolescent mindset is highly perceptive, which means that surroundings and human behaviour have an effect on adolescents' overall personality **(Foulkes & Blakemore, 2018)**. During the COVID-19 pandemic, adolescents were widely exposed to pandemic-induced stressors such as anxiety, emotional abuse, ADHD, OCD and depression after being isolated from outdoor extracurricular activities **(Nissen et al., 2020)**. Besides, fuss surrounding following hygiene practices to prevent infection multiplied the consequence. A study by **Bates et al. (2020)** showed that most parents witnessed a dramatic change in the attitude and behaviour of their adolescents during quarantine and lockdown. To assess the impact of COVID-19 on the hygiene practices of adolescents in Makkah, a constructive framework is proposed based on the concept of behavioural change. Studies have shown multiple theories that influence the attribute, such as the theory of reasoned actions and planned actions **(Rani et al., 2020)**. There are two main theories to consider in this regard. The first is the school-based behaviour intervention theory, which states that adolescents develop independent and healthy hygiene practices from educational institutions that will endure throughout their lives.

The second theory is family-level factor theory, which states that parental bonding plays an important role for developing healthy hygiene habits in adolescents. This study utilises these theories to construct an effective environment for its research methodology.

Hygiene practices never received much global attention before the COVID-19 pandemic. In recent months, however, there has been a sudden increase in demand for soap, hand sanitizer, liquid hand wash and other disinfectants **(Banks et al., 2021; Jatrana et al., 2021)**. The government of KSA has launched several campaigns and programs, especially in the Makkah region, to improve awareness and implementation of hygiene practices across all age groups **(Mahdi et al., 2021)**.

Hygiene practices are the only effective solution for countering increasing rates of COVID-19, and since adolescents are at higher risk for contracting the disease, it is important for research to be conducted that addresses the impact of disease on the hygiene practices of adolescents. This topic's practical and clinical significance lies in how many adolescents in Makkah customarily follow hygiene practices as part of their daily routine, rather than by being forced to do so.

Meanwhile, the Makkah region already holds prominent status among Muslims worldwide because of its Holy Mosque; therefore, it is necessary to assess the literacy of hygiene in that

region, especially among adolescents, which comes as a resultant behaviour due to educated behaviour of parents, teachers and guardians. Examining adolescent hygiene practices can also help us track the spread of COVID-19 across the region due to this age group being 'silent carriers', as identified by **Chisholm et al. (2018)**.

Identifying the perception of hygiene practices in adolescents help mitigate the mortality and morbidity rate and the economic losses that can still prevail in people's lives even after vaccination against COVID-19. Greater understanding of this helps suppress spikes of new COVID-19 cases and reduce lockdown conditions (**Alkhalidi et al., 2021**). It is evident that KSA still has limited research on behavioural and perceived COVID-19 risk (**Hillis et al., 2017**). Our study addresses the important question in correlation with the current intervention to propagate education programs in schools, colleges and at home as a means to promote good hygiene practices among adolescents in Makkah.

METHOD

Research Design

A descriptive cross-sectional design was used to assess the relationship between the health hygiene practices of adolescents before and after COVID-19 in Makkah.

Setting

We utilised multisite studies to enable a large and more diverse study of participants from different area of Makkah. Information collected through the online Google Forms were distributed to primary, intermediate and secondary schools and the university in Makkah, the collected responses were utilised for both before COVID-19 and after COVID-19 changes in hygiene habits

Participants

The convenience sampling method was chosen to collect and analyse the data from all available adolescents in Makkah who met the inclusion criteria. Convenience sampling is a method for selecting people for inclusion in a sample based on their availability. It has also known as accidental sampling, and it is the easiest and least representative of all the sampling techniques. It is also the most used sampling strategy in nursing research studies (**Boswell & Cannon, 2017**). A concern with the convenience sampling method is that the available participants may not be representative of the population in terms of key variables (**Polit & Beck, 2017**).

Sample Size

The researchers used Steven K. Thompson's (2012) equation to calculate the sample size. The following were used to generate a convenient sample of 303 adolescents:

Outcome Measure

Socio-Demographic Data:

The study collected sociodemographic data from the study participants, including age, sex, education level.

The second part comprised 23 items covering five subscales of general hygiene, household hygiene, food-related hygiene, hand hygiene and personal hygiene. The general hygiene subscale contained eight items, household hygiene contained three items, food-related hygiene

contained three items, hand hygiene contained five items and the personal hygiene subscale comprised four items. The scale covered different aspects that could explain personal hygiene practices behaviour among adolescents during the COVID-19 pandemic.

The scoring system aimed to collect the views of the respondents from the questions in the first and second sections of the electronic self-administered questionnaire. The respondents were required to answer the questions on a four-point Likert scale comprised of 'always' (scored as 4), 'usually' (3), 'occasionally' (2) and 'never' (1). The personal hygiene practices score was categorised into three levels: high (4–5), moderate (3), and low (1–2). The scoring system is a convenient way to collect insights from the participants selected for the study, as **Polit and Beck (2015)** advised

Ethical Consideration

The study obtained ethical approval from the Al-Qura University Institutional Review Board (248/2022). All the study participants provided informed consent regarding their voluntary nature of the participation. Participants were assured that their information kept confidential.

Data Analysis

Descriptive statistics were calculated for sociodemographic characteristics and the main study outcomes. Percentages of responses were calculated according to the number of respondents per response, with respect to the number of total responses to a question. The scores from the main study variable subscales were expressed as mean and standard deviation. Moreover, Chi-square test was used to calculate the association between the study main outcomes and sociodemographic data. Furthermore, the Pearson correlation tests were used to examine the relationship between the sociodemographic data and the main study outcomes. All tests were two-tailed, with a significance level of $p < 0.05$. Statistical analysis was performed using SPSS Statistic 26.0.

RESULTS

Sociodemographic Characteristics of the Study Participants

Table (1) Percent distribution of the studied sample according to socio-demographic characteristics.

t Variables	No (n = 303)	%
Gender:		
Female	248	81.8
Male	55	18.2
Education:		
Primary	35	11.6
Intermediate	54	17.8
Secondary	123	40.6
University	91	30.0

Table 1 shows the distribution of the studied sample according to their socio-demographic characteristics. The majority (81.8%) of the studied sample were female, while 18.2 % were male. In terms of educational level, less than half (40.6%) of the studied sample were

secondary school students, one third (30%) were university students and 17.8% and 11.6% were intermediate and primary school students, respectively.

Part two: Total Mean and Standard Deviation of Participants' Hygiene practices Variables.

Table (2): Differences of hygiene practices variables among studied sample before and after COVID -19

Hygiene practices variables	No =303				t	P
	Before COVID 19		After COVID 19			
	X	SD	X	SD		
General hygiene	3.37	.39	3.68	.32	17.2	0.01*
Householdhygiene	3.08	.69	3.30	.69	8.6	0.01*
Food-relatedhygiene	3.68	.48	3.76	.42	4.5	0.01*
Hand hygiene technique	2.96	.47	3.21	.39	13.0	0.01*
Personal hygiene	2.54	.71	2.60	.72	2.6	0.01*
Overall scale	3.14	.31	3.30	.30	13.3	0.01*

Table 2 shows that there were statistically significant differences ($p = .01$) between hygiene practices variables in study sample, namely general hygiene ($t = 17.2$), household hygiene ($t = 8.6$), food-related hygiene ($t = 4.5$), hand hygiene technique ($t = 13$) and personal hygiene ($t = 2.6$), while the highest mean scores were 3.6, 3.3, 3.7, 3.2 and 2.6, respectively, for the post-COVID-19 findings. Moreover, there were statistically significant differences ($t = 13.3$; $p = .01$) concerning all hygienic behaviour, while the highest mean score was for after COVID-19.

Table (3) Differences of hygiene practices between male and female before and after COVID-19 regarding their gender

Variable		No =303				t -test	P value
		Male =55		Female=248			
		Mean	Sd.	Mean	Sd.		
General hygiene	before	3.31	0.451	3.38	0.382	1.21	0.201
	After	3.56	0.354	3.70	0.301	2.69	0.01*
Household hygiene	before	2.88	0.622	3.12	0.706	2.28	0.03*
	after	3.14	0.625	3.34	0.699	2.0	0.04*
Food-related hygiene	before	3.72	0.375	3.67	0.50	0.724	0.470
	after	3.81	0.305	3.75	0.445	0.832	0.441
Hand hygiene technique	before	2.86	0.449	2.98	0.445	1.66	0.097
	after	3.08	0.448	3.23	0.380	2.63	0.009*
Personal hygiene	before	2.68	0.564	2.58	0.616	0.993	0.321
	after	2.60	0.599	2.52	0.651	0.760	0.448
Total hygiene	before	3.09	0.292	3.14	0.316	1.18	0.239
	after	3.24	0.280	3.31	0.305	1.63	0.103

Table 3 shows clearly that there were statistically significant differences in the study sample in terms of hygiene practices variables after COVID-19 for general hygiene ($t = 2.69$; $p = .01$) and hand hygiene technique ($t = 2.63$ $p = 0.009$), while the highest mean scores were 1.1 and 3.3, respectively, for females. Moreover, there were statistically significant differences regarding household hygiene for the female sample pre-COVID-19 ($t = 0.0$; $p = .03$) and post-Covid-19 ($t = 0.031$; $p = 0.04$), where the highest mean score was for post-COVID-19. It was also found that there were no statistically significant differences ($t = 0.7, 0.8, 1.6, .2.6$ and $0.9, 1.6$; $p = 0.4, 0.4, 0.3, 0.4$ and $0.2, 0.1$) in study sample in terms of food-related hygiene, personal hygiene, and total hygiene for before and after COVID19 between male and female participants, respectively.

Table (4) Differences of hygiene practices between male and female before and after COVID-19 regarding their educational level

Variable		Primary =35		Intermediate =54		Secondary =123		University =91		F	p-value
		Mean	Sd.	Mean	Sd.	Mean	Sd.	Mean	Sd.		
General hygiene	before	3.74	0.301	3.28	0.34	3.36	0.41	3.40	0.36	2.23	0.085
	After	3.67	0.34	3.64	0.34	3.67	0.33	3.71	0.28	0.541	0.654
Household hygiene	before	3.08	0.73	3.05	0.76	3.20	0.66	2.95	0.67	2.20	0.088
	After	3.30	0.78	3.34		3.39	0.65	3.16	0.65	1.95	0.122
Food-related hygiene	before	3.57	0.71	3.69	0.50	3.68	0.44	3.71	0.48	0.727	0.536
	After	3.62	0.68	3.82	0.36	3.75	0.377	3.80	0.37	1.83	0.141
Hand hygiene technique	before	2.88	0.39	2.94	0.51	2.97	0.43	2.99	0.45	0.518	0.670
	After	3.09	0.46	3.21	0.44	3.22	0.36	3.23	0.40	1.27	0.284
Personal hygiene	before	2.87	0.54	2.45	0.66	2.51	0.71	2.71	0.77	3.96	0.009
	After	2.93	0.45	2.48	0.66	2.40	0.74	2.61	0.74	5.57	0.001
Total hygiene	before	3.17	0.31	3.08	0.35	3.14	0.31	3.15	0.29	0.800	0.494
	After	3.32	0.34	3.30	0.32	3.29	0.30	3.30	0.28	0.166	0.919

Table 4 shows the differences in hygiene practices between male and female participants before and after COVID-19 relative to their educational level. Table 4 clarifies that there were highly statistically significant differences ($t = 3.9, 5.5$; $p = .009, 0.001$) in study sample for personal hygiene variables before and after COVID-19 in terms of educational level, while the highest mean scores were 2.8 and 2.9, respectively, for primary school. Meanwhile, there were no statistically significant differences in other hygienic behaviour before and after COVID-19 in respect to intermediate, secondary and university educational levels.

DISCUSSION

The COVID-19 pandemic was identified in December 2019 and spread quickly, leading the WHO to declare a global pandemic on 11 March, 2020. Hygiene practices were the only effective solution for countering the increasing rate of COVID-19 infection in KSA, and adolescents were at higher risk of contracting the disease. This research has been conducted to address the impact of COVID-19 on the hygiene practices of adolescents. WHO statistics have shown that adolescents and older people have a higher risk of contracting COVID-19. In particular for the adolescent population in Makkah, it was not easy to see how everything changed while their minds were nurturing. All their physical activities stopped, and they

were forced to perform hygiene practices. All these restrictions have led to a psychological impact on their minds. Therefore, it is necessary to assess the impact of restrictive hygiene practices on adolescents in KSA using subgroups such as personal hygiene, hand hygiene, food hygiene, household hygiene and general practice.

The results show that the study is critical for assessing the impact of COVID-19 on the hygiene practices of adolescents in Makkah. Out of an estimated 383 potential participants, only 303 responded to the questionnaire. This makes the overall response rate 60.8% of the total participant population. Of the participants, 81% were female adolescents and 18% were male. The sample size of the two-tailed test indicates dimension and sub-scale correlation. The standardisation of the test was performed with the help of statistical analysis. In our case, it was the p-value correlation. If the p-value is less than 0.01, then the results of the subgroup are not reliable. However, if the p-value is greater than 0.01, then the results of the subgroup with the help of these outcomes, the direct and indirect impact of COVID-19 on general hygiene, household hygiene, food-related hygiene, hand hygiene technique and personal hygiene, can be assessed for the adolescents in Makkah.

In the findings of this research, there was found to be positive values and statistically significant test results of $p < 0.01$ to show a correlative relationship for all hygiene variables being linked to each other. Perceiving the critical variables as indicated in Table 1, the vast majority of the highest item-subscale correlation was found for household hygiene, followed by food-related hygiene, personal hygiene, hand hygiene and general hygiene, respectively. Food-related hygiene showed the highest subscale value among adolescents in Makkah. This means that adolescents are more concerned about food safety and aware of safety standards in the Makkah region. One similar study on the perception of food safety practices in Lebanon during COVID-19 was presented by **Dimassi et al. (2021)**, which found there to be relatively low awareness of food safety and hygiene, contributing to food poisoning and higher likelihood to contracting COVID-19. The researchers indicated that the low perception of food-related hygiene was due to lower education levels among men and women. In contrast, this is significantly higher in Makkah, leading to a higher perception of food-related hygiene practices among adolescents in Makkah.

The second highest hygiene subgroup during the present study was found to be personal hygiene. Based on the extended survey, it is evident that a lack of knowledge related to personal hygiene increases the chances of infectious diseases such as COVID-19. The study by **Saffari et al. (2012)** was performed to assess personal hygiene practices among military personnel in Iran, finding there to be a moderate perception of personal hygiene among the participants and indicating that there is a need for education on hygiene in the Iran military. Research by **Lal & Kavita (2016)** proposed there to be no link between awareness and personal hygiene practices, even at higher levels, because it mainly depends on public awareness and education on the causes and effects of not following a healthy personal hygiene. The high perception of personal hygiene in Makkah showed that the government had effectively spread the public awareness message.

In terms of hand hygiene practices, it was found that 95% of primary school children in KSA, the results from which showed that 90% of the students were aware of proper hand hygiene practices before eating and using the toilet, whereas only 71.7% were found to

brush their teeth regularly. Conflicting research results were found by **Rezkiki et al. (2021)**, who tested an adolescent population of 82 participants in Indonesia for hand hygiene. The results indicated a 63.41% negative perception and 36.58% positive perception towards hand hygiene among adolescents after COVID-19. The difference may be due to demographic changes and level of restriction and health education in that country. Despite the positive perception, is a clear indication that adolescents in KSA are aware that hand hygiene will help minimise the risk of contracting COVID-19.

The fourth subgroup was the general hygiene practice, which attracted moderate perception among the adolescents. In comparison with the research, a similar study was conducted by **Stevenson (2009)**, who showed that household and general hygiene variables were insignificant among adolescents in KSA. Integrating the research questions with other states, a study by **Elsabagh et al. (2016)** showed that children in Finland, Romania, Greece, Turkey and Malta took care of their hygiene practices more than children in India. This shows that our research variables' redundancy correlates with the results obtained from previous theoretical and scientific research.

The fifth sub-group was household hygiene, for which there was found to be the least awareness among the adolescents in Makkah. The main reason for this concerns the participants being the age group in which they are mostly interested in sports, leisure and other activities, especially among male population, which is interested in outdoor activities. One such study was performed by **Gharpure et al. (2020)**, which assessed knowledge of practices surrounding household cleaning and disinfection to prevent COVID-19 in the US. It determined that, despite high knowledge gaps, the majority of the population were aware of household practices and how to disinfect the home during the COVID-19 pandemic. However, the study comprised participants with median age of 46 years. In our study, the low value is a result of their interest level and activities, which are not limited to household chores or indoor work.

Perceiving the critical variables as indicated in Table 1, it was found that the vast majority of the highest item-subscale correlation was to be found for household hygiene, followed in order by food-related hygiene, personal hygiene, hand hygiene and general hygiene. With the relationship between the hygiene sub-scale and overall scale, it was found that all subscales were related to each scale as a whole. The positive values and statistically significant test results of $p < 0.01$ showed the correlative relationship that all hygiene variables were linked to each other. This means adolescents with general hygiene practices were more likely to experience household, food-related, hand hygiene, personal and H123 hygiene. The least correlative relationship was observed for personal hygiene that only depended on H123, as indicated in Table 2. The participants who possessed the six hygiene characteristics were placed in the category of those whose hygiene practices were impacted by the COVID-19 pandemic. A similar study was considered to back up the learning element that proposed that, when it comes to hygiene practices, food hygiene is mostly considered and valued, but after the COVID-19 pandemic, personal, general, household hygiene and sanitation have become more dominant (**Donde et al., 2021**). Based on the extended survey by **Hazazi et al. (2018)**, it is evident that the lack of knowledge related to personal hygiene increases the chances of infectious diseases such as COVID-19. The study incorporated 95% of primary school children in KSA, the results from

which show that 90% of the students were aware of proper hand hygiene practices before eating and after using the toilet, whereas only 71.7% were found to brush their teeth regularly. The household and general hygiene variables were insignificant among the adolescents in KSA. Integrating the research questions with other states, a study by **Elsabagh et al. (2016)** showed that the children in Finland, Romania, Greece, Turkey and Malta would take care of their hygiene practices more than children in India. This shows that our research variables' redundancy correlates with the results obtained from previous theoretical and scientific research. Also, the instruments presented in our research work are similar to the framework of the previous studies. Considering the demographic characteristics of the participants, the majority were in high school (40.6%), followed by university (30%) and intermediate (17.8%) and primary (11.6%) levels of education. The gender frequency data showed that almost 18.2% of males and 81.8% of females framework. The Cronbach alpha of the research was found to be >0.8 , which indicates its significance. Based on this evidence, it is clear that the demographic data and Cronbach alpha are similar to the previous research work. To address the differences in the hygiene practices of the male and female groups, a two- sample t-test was performed, as indicated in Table 6.

In terms of general hygiene, females reported higher general hygiene than males, and the results were the same after the COVID-19 pandemic. Before COVID-19, females reported higher household hygiene than males, and it was the same after COVID-19. Nevertheless, females reported less food-related hygiene than males before and after the COVID-19 pandemic. In terms of hand hygiene, female hygiene remained dominant before and after COVID-19, compared to male practices. Females reported less personal hygiene than males, and in terms of general hygiene practices before and after COVID-19, females reported it to be higher than the the male participants. In a nutshell, almost every hygiene variable was found in concordance to female hygiene improvement compared to those of male adolescents after the impact of COVID-19 in Makkah. A similar research study on gender role and attitudes toward handwashing has been conducted, showing the female adolescent population to be more concerned with and aware of hygiene practices than males.

The final part of the research study dealt with the differences in hygiene practices according to educational level before and after COVID-19. This segment of our research utilised ANOVA analysis, as indicated in Table 7. This study segment highlighted the differences in hygiene practices based on the academic level of the participants, who comprised a 35-sample population for primary school students, a 54-sample population for intermediate students, a 123-sample population for secondary students and a 91-sample population for university students. It was found from the results that the significance level for all parameters was greater than 0.05, which shows that there was no statistical difference due to differences in the educational background of the adolescent.

However, in terms of personal hygiene, the significance level was less than 0.05, which means that there were statistically significant differences due to the educational level variable either before or after COVID-19. Besides, the greatest difference between before COVID-19 and after COVID-19 for all the parametric values for primary school level was found to be 0.22; it was 0.36 for general hygiene at the intermediate level, 0.31 for general hygiene at the secondary level and 0.31 for general hygiene at the university level.

Intermediate had the greatest difference compared to the others, among all study levels. This shows that intermediate level adolescents changed their hygiene habits significantly. Furthermore, among the variables, the results for personal hygiene were statistically significant, and general hygiene saw the greatest difference of change in habits among the adolescents. Our results are comparatively similar to the research results of **Al- Hanawi et al. (2020)**, which shows the validity of the conducted research work.

CONCLUSION

Personal hygiene is the most inexpensive and practical way to minimise the transmission of COVID-19. Promoting the broadest engagement of personal hygiene practice among adolescents and the community should be strengthened. The present study concluded that the hygiene practices of adolescents were affected by the COVID-19 pandemic in the Makkah region. Among the various parameters, personal hygiene practice was the one affected by all the groups. When tested for different educational levels, intermediate adolescents showed that their hygiene practices had changed after the COVID-19 pandemic to become more rigorous.

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