

Knowledge and Preventive Behavior Regarding COVID-19 among School-children in Saudi Arabia: A Regional Survey

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ABSTRACT

Introduction: COVID-19 is the fastest spreading viral infection because it is highly contagious in nature and asymptomatic carriers, therefore individuals of all age groups are at risk. Most of the children who got infected have mild symptoms or are asymptomatic but still can spread the infection to others.

Aim: This study aimed to assess the knowledge and adoption of preventive behavioral practices regarding COVID 19 among school children in Saudi Arabia.

Subjects and methods: This is a cross-sectional study conducted among 336 school children (66.7% girls vs 33.3% boys) aging 7-12 years old in the Qassim region, Saudi Arabia. A self-administered questionnaire was distributed to the targeted students of primary schools. The questionnaire includes basic demographic data, knowledge of the potential sources of transmission and risk factors for infection, and preventive behavioral practices toward COVID-19. **Results:** The knowledge of the students regarding the potential sources of transmission and risk factors for infection were average, high, and low among 59.2%, 29.5%, and 11.3%, respectively. The level of preventive behavioral practices was high, average, and low among 48.5%, 38.4%, and 13.1%, respectively. The factor associated with increased knowledge was being aged 9 – 10 years old while the factor associated with increased preventive behavioral practices was being a female student.

Conclusion: Most of the school children were knowledgeable about the mode of transmission and risk factors of COVID-19 infection. They are even more aware of the preventive behavior necessary to control the spread of the disease. Continuous awareness about COVID-19 prevention is necessary to control the transmission of infection.

Keywords: COVID-19, school children, knowledge, preventive behavior, transmission.

INTRODUCTION

Respiratory epidemics and pandemics are alarming due to their rapid spread through interpersonal contact and droplets. COVID-19 is the fastest spreading viral infection because it is highly contagious in nature and asymptomatic carriers, therefore individuals of all age groups are at risk. Most of the children who got infected have mild symptoms or are asymptomatic but still can spread the infection to others ^[1]. Few studies have discovered comparative transmissibility of SARS-CoV-2 from asymptomatic patients ^[2-3].

These qualities could prompt a higher likelihood of school related transmission as students without manifestations could keep on attending school and spread the virus to others during lessons or other activities. Moreover, the infected students can in this manner transmit the infection to others in their family and community. Likewise, a few studies have discovered comparative transmissibility of SARS-CoV-2 from asymptomatic patients ^[4-5].

These qualities could prompt a higher likelihood of school-related transmission as children without manifestations could keep on attending school, spread the virus to others during school activities. Moreover, the infected children can in this manner transmit the infection to others in their family and community. That is why assessing the information and practice of preventive behaviors on COVID 19 among children in the schools is very important. The outcomes of the present study will provide substantial insight about the readiness of primary school students to deal with COVID-19.

SUBJECTS AND METHODS

This is a quantitative cross-sectional research using a standardized survey questionnaire which was collected from previous studies with some minor changes and a few additional questions. It was validated among 20 school children which will not be included in the analysis. The questionnaire consisted of three sections. The first section contained demographic data, the second one was about knowledge while the third section included questions about preventive behavior regarding COVID-19.

This study was conducted among 7-12 years old boys and girls of primary school students in the Qassim region. The sample size was calculated using the formula: $n = z^2 p(1-p) / d^2$ with 95% confidence level and 5% margin of error.

Where n = sample size, $z = 1.96$ $p = 0.5$, $d = 0.04$

Ethical considerations

Data of all students studying in various primary schools were collected after seeking permission from the school principal. These participants were contacted and written informed consents were obtained from the parents after a brief introduction of the study and ethical approval was taken from the ethical committee of Qassim University (QUCOM) before proceeding to the study.

Statistical Analysis

The SPSS for Windows, version 26.0 (IBM Corp., Armonk, NY, USA) was used to analyze all the data. The knowledge toward the sources of transmission and potential risk factors has been assessed using 12 items where the correct answers had been identified and had been coded with 1 while the incorrect answers had been coded with 0. The total knowledge score has been calculated by adding all 12 items and a possible score range from 3 to 12 points had been generated indicating that the higher the score the higher the knowledge toward the sources of transmission and potential risk factors of COVID-19.

By using 50% and 75% to determine the level of knowledge, participants were classified as low knowledge if the total score is less than 50%, 50% to 75% were classified as average knowledge and above 75% were classified as high knowledge. For the preventive behavioral practices, this has been assessed using 8 items where 4-point Likert scale categories ranging from “never” coded as 0 to “always” coded as 3 were the answer options. The

total preventive behavior score has been calculated by adding all 8 items and a score range from 3 to 24 points had been generated which indicates that the higher the score the higher the preventive behavior toward COVID-19. By using 50% and 75% to determine the level of behavior, participants were considered as low behavior if the score was less than 50%, 50% to 75% were considered as average behavior and above 75% were considered as high preventive behavior toward COVID-19 infection.

Demographic data were presented with numbers and percentages (categorical variables) or mean \pm standard deviation (continuous variables). The association between the basic demographic data in regards to the overall knowledge and preventive behavior scores had been calculated by using Mann Whitney Z-test as well as Kruskal Wallis H-test. Normality tests were performed using Shapiro Wilk test. A Pearson correlation coefficient was also conducted to determine the correlation between the knowledge score and behavior score. A p-value of <0.05 was taken as significant.

RESULTS

Table 1: Basic demographic data of the children (n=336)

Study variables	N (%)
Age group	
• 6 – 8 years	71 (21.1%)
• 9 – 10 years	125 (37.2%)
• 11 – 12 years	140 (41.7%)
Gender	
• Boy	112 (33.3%)
• Girl	224 (66.7%)
Nationality	
• Saudi	327 (97.3%)
• Non-Saudi	09 (02.7%)
School grade	
• Second grade	73 (21.7%)
• Third grade	69 (20.5%)
• Fourth grade	45 (13.4%)
• Fifth grade	67 (19.9%)
• Sixth grade	82 (24.4%)

Table 1 described the basic demographic data of the children. The most common age group was 11 – 12 years old (41.7%) with approximately two-thirds being girls (66.7%) and mostly were Saudi nationality (97.3%). Nearly one quarter (24.4%) were in sixth grade, followed by second grade (21.7%) and third grade (20.5%).

Table 2: Assessment of the knowledge toward the potential sources of transmission and risk factors of COVID-19 infection (n=336)

Statement	N (%)
Knowledge about the potential sources of transmission (mean ± SD)	5.06 ± 1.29
1. Large droplets such as cough and sneeze [agree]	310 (92.3%)
2. Touching contaminated items [agree]	296 (88.1%)
3. Hand shaking [agree]	288 (85.7%)
4. Skin contact [agree]	270 (80.4%)
5. From animals [disagree]	202 (60.1%)
6. From air [agree]	196 (58.3%)
7. Contaminated food [disagree]	139 (41.4%)
Knowledge of potential risk factors for infection (mean ± SD)	3.49 ± 0.84
8. Hand washing, covering nose and mouth while coughing, and avoiding contact with sick people can help in the prevention of COVID-19 transmission [yes]	318 (94.6%)
9. If a friend gets COVID-19, he /she should be avoided because of being a potential source of infection [yes]	312 (92.9%)
10. Wearing a mask regularly prevents getting the disease [yes]	297 (88.4%)
11. Only sick children should be wearing a mask to prevent the spread of the disease [no]	142 (42.3%)
12. Children are at a higher risk for COVID-19 [yes]	105 (31.3%)
Overall knowledge score (mean ± SD)	8.56 ± 1.59
Level of knowledge	
• Low	38 (11.3%)
• Average	199 (59.2%)
• High	99 (29.5%)

Texts in the square bracket indicate the correct answer.

Regarding the knowledge toward the potential sources of COVID-19 transmission, the major potential sources of COVID-19 transmission were large droplets from cough and sneeze (92.3%), followed by touching contaminated items (88.1%) and handshaking (85.7%). Our results further indicate that 41.4% of the children disagreed that touching contaminated food is a potential source of COVID-19 transmission.

The overall mean knowledge score of the potential sources of transmission was 5.06 (SD 1.29) out of 7 points. For the knowledge about the potential risk factors for infection, 94.6% of the respondents were aware that adherence to hand washing, covering nose and mouth while coughing, and avoiding contact with sick people is prevention for COVID-19 transmission, 92.9% knew that a friend being infected by the COVID-

19 should be avoided due to the risk of transmission and 88.4% knew that wearing mask regularly is the best prevention for not getting the disease. Approximately 42.3% of the respondents disagreed that only sick children should be wearing a mask while only 31.3% believed that only children are at a higher risk for COVID-19 infection.

The overall mean knowledge score of the potential risk factors for infection was 3.49 (SD 0.84) out of 5 points. The total of the knowledge about the potential sources of transmission and potential risk factors for infection has a mean score of 8.56 (SD 1.59) out of 12 points with low, average, and high knowledge were detected among 11.3%, 59.2%, and 29.5%, respectively.

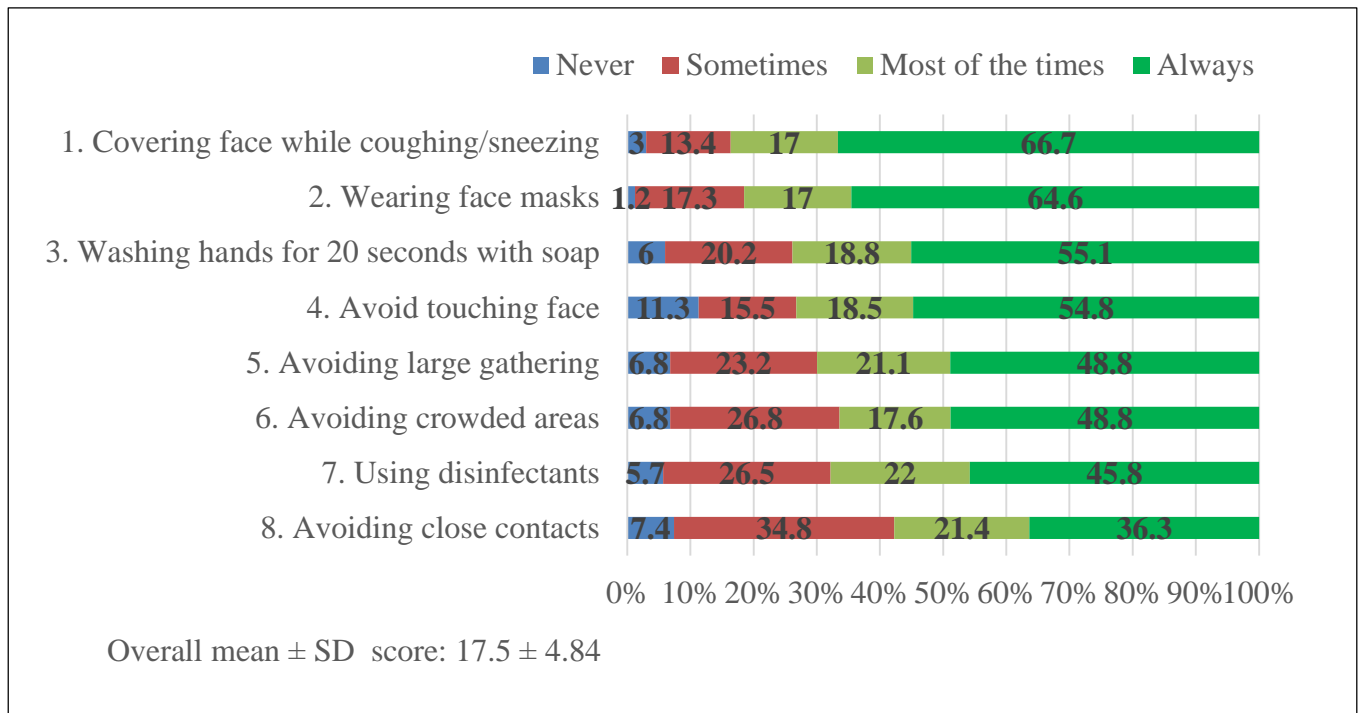


Figure 1: Preventive behavioral approaches to reduce risk of COVID-19 infection

In **Figure 1**, the highest preventive behavioral approach was seen in covering the face while coughing/sneezing (always: 66.7%), followed by wearing face masks (always: 64.6%), washing hands for 20 seconds with soap (always: 55.1%) and avoid touching the face (always: 54.8%). The overall mean preventive behavior score was 17.5 (SD 4.84) out of 24 points.

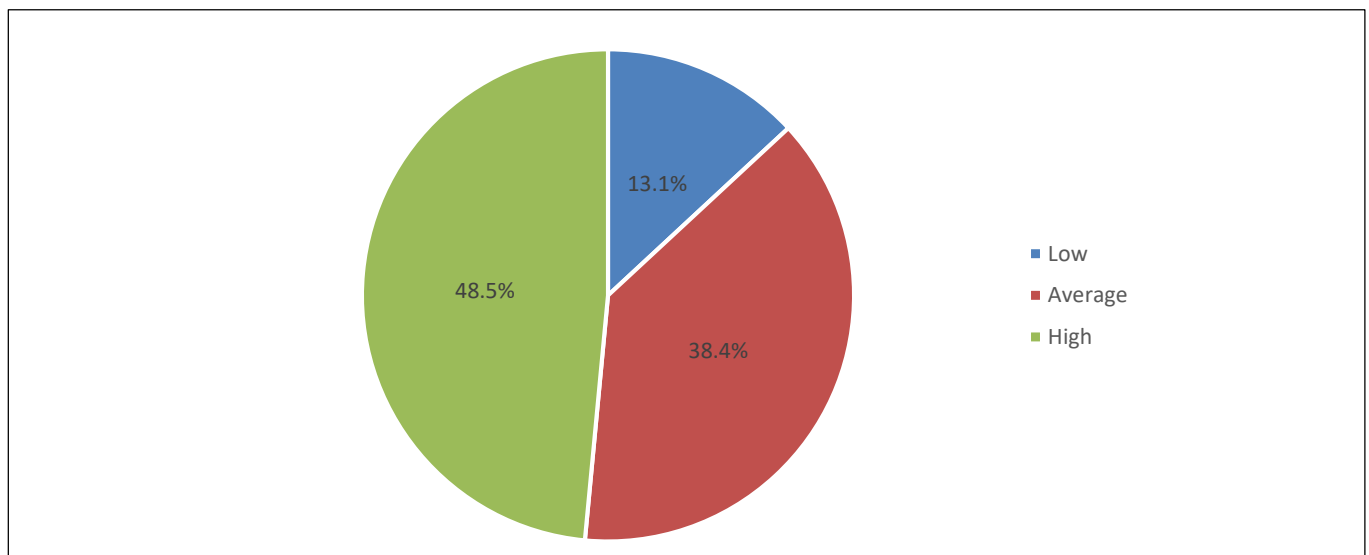


Figure 2: Level of preventive behavioral approach

In **Figure 2**, high, average, and low preventive behavior was found among 48.5%, 38.4%, and 13.1%, respectively.

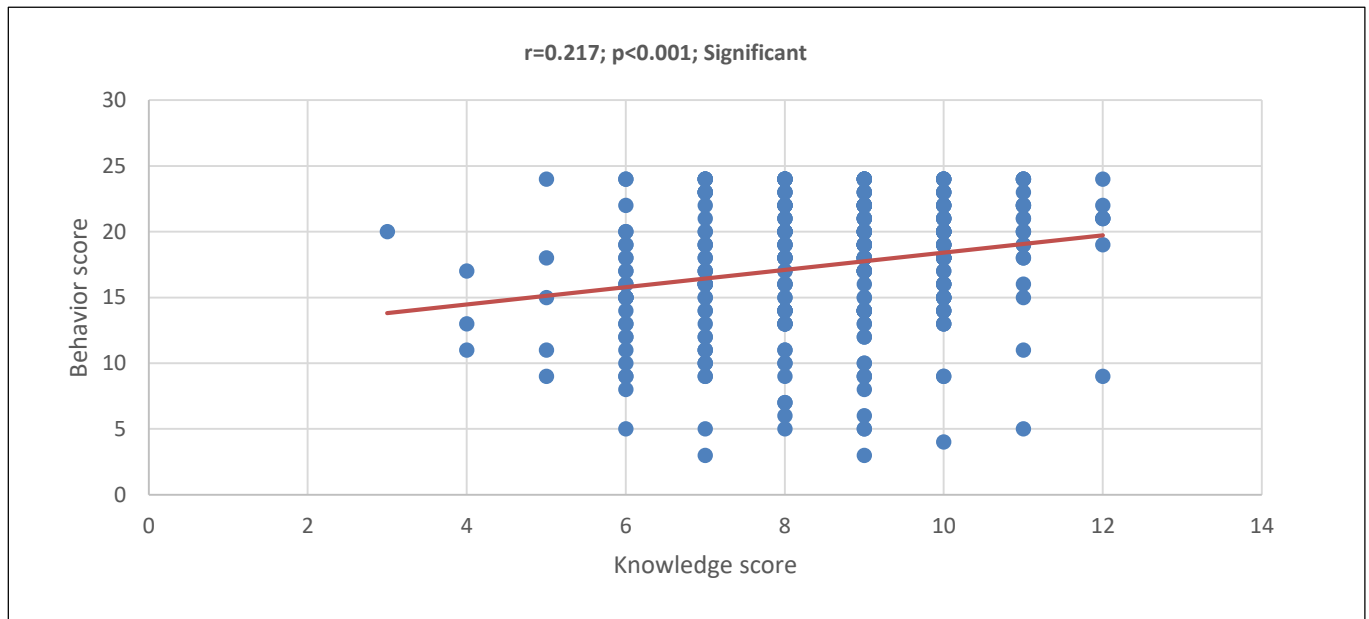


Figure 3: Correlation (Pearson-r) between the knowledge score and behavior score

In Figure 3, there was a positive significant correlation being observed between the knowledge and behavior score ($r=0.217$; $p<0.001$).

Table 3: Association between the basic demographic data among the knowledge score and preventive behavior score (n=336)

Factor	Knowledge Score (12) Mean \pm SD	Z/H-test; P-value	Behavior Score (24) Mean \pm SD	Z/H-test; P-value
Age group ^a				
• 6 – 8 years	8.59 \pm 1.63	H=14.951; P=0.001 **	16.8 \pm 5.76	H=3.216; P=0.200
• 9 – 10 years	8.89 \pm 1.46		18.1 \pm 4.52	
• 11 – 12 years	8.24 \pm 1.65		17.3 \pm 4.58	
Gender ^b				
• Boy	8.56 \pm 1.53	Z=-0.098; P=0.922	16.6 \pm 5.45	Z=2.022; P=0.043 **
• Girl	8.55 \pm 1.64		17.9 \pm 4.45	
School grade ^a				
• Second grade	8.59 \pm 1.63	H=18.619; P<0.001 **	17.1 \pm 5.71	H=1.484; P=0.686
• Third grade	9.01 \pm 1.27		18.1 \pm 4.75	
• Fourth grade	9.29 \pm 1.34		17.4 \pm 4.31	
• Fifth grade	8.28 \pm 1.64		17.7 \pm 4.22	
• Sixth grade	7.96 \pm 1.67		17.1 \pm 4.88	

^a P-value has been calculated using Kruskal Wallis H-test.

^b P-value has been calculated using Mann Whitney Z-test.

** Significant at $p<0.05$ level.

In **Table 3**, a higher knowledge score was associated with age group 9 – 10 years ($H=14.951$; $p=0.001$) while a lower knowledge score was associated with being grade sixth students ($H=18.619$; $p<0.001$). For preventive behavior, a higher preventive behavior was associated with being a girl ($Z=2.022$; $p=0.043$).

DISCUSSION

This study investigated the knowledge of school children regarding COVID-19, its potential sources, and its risk factors for infection. We also examined their level of preventive behavioral practices aiming to reduce the risk of infection. The findings of our study revealed that the knowledge of school children toward the potential sources and its risk factors for infection was adequate. Approximately 60% of the students were considered as having average knowledge, 29.5% were high and only 11.3% were considered as low knowledge level (mean score: 8.56, out of 12 points). Several papers reported a good knowledge about COVID-19, its symptoms, transmission, and guidelines [6-11]. However, in a study conducted in Northwest Ethiopia [12], only 23.5% of the secondary school students had good knowledge about COVID-19. The researcher further emphasized the need for effective interventions to strengthen the knowledge of secondary school students, concluding that COVID-19 related information should be disseminated in all academic sessions to improve the knowledge and engagement of students in the prevention of COVID-19 infection.

Our results also suggest that age groups 9 – 10 were more associated with a good level of knowledge. Surprisingly, we have learned that a low level of knowledge was more common among sixth-grade level. This indicates that there may be some deficiencies regarding information dissemination among the sixth-grade level students. Thus, it is the role of the teachers to reinforce education to improve the knowledge of the primary students. In the Qassim region [6], a study reported that medical interns who were graduating at government universities were more knowledgeable in COVID-19 preventive measures than those who were graduating at private schools. Governmental universities likely provided more information about the virus better than private universities because the most recent development of the disease was emanated from governmental institutions. However, in Iran [7], a study found no significant correlation between the knowledge score according to age sex, province, knowing someone with COVID-19, indicating that the socio-demographic data of the students were not relevant to the level of knowledge. Our findings fare better than the previous study as we found age group and grade school level were both relevant factors of the knowledge.

Regarding the knowledge about the potential sources of COVID-19 transmission, most students (92.3%) were aware that the droplets coming from cough and sneeze is a source of transmission. School students were also known for the other sources of infections including touching contaminated items (88.1%), handshaking (85.7%), skin contact (80.4%), and from the air (58.3%). However, 58.3% do not believe that touching animals can be a source of

transmission along with contaminated food (41.4%). Regarding the knowledge of potential risk factors for infection, nearly all of the students (94.6%) were aware of the importance of regular hand washing, covering the nose and mouth when coughing, and avoiding contact with infected people are the best method to prevent COVID-19 transmission. Similarly, avoiding friends who get infected by the virus and wearing masks regularly were other methods to help contain the virus. Incidentally, 42.3% of our students knew that wearing masks should not be only for sick children, but it should also be applied to all with fewer than 32% believing that children were also at higher risk for infection. Consistent with our reports, various studies documented the effectiveness of face masks in containing the spread of the virus [13-18], while hand washing had been reported as one of the major preventive practices against virus transmission [19-24]. In Nepal [25], a considerable proportion of school children were wearing masks regularly whenever going outside, however, only half of them (50%) were washing their hands with soap and water more than their usual routine.

Our study also found that the majority of Qassim school children were having good preventive behavioral practices. Based on our criteria, 48.5% of the students were classified into high level, 38.4% were average and only 13.1% were classified into low preventive behavioral practices level. These concurred with reports published in Indonesia [9], Thailand [10], and Ethiopia [12] where school students had shown good preventive behavioral practices toward COVID-19 infection. Further, Handebo et al [12], noted that the increase in the engagement in preventive behavior was significantly related to being female and health professionals being a source of information, however, a decreased engagement in the preventive behavior was concomitant with having a father working in a non-governmental institution. In our study, being a female student would have a direct influence on having good preventive behavioral practices. In South Korea [26], a study suggests that there was an association between the adherence to COVID-19 preventive behaviors and adolescents' perceived susceptibility, perceived severity, subjective norms, perceived behavioral control, and intention. The authors further noted that the mitigation of social isolation is necessary to promote and increase compliance with preventive behavior toward COVID-19.

It is important to note that the correlation between knowledge and preventive behavioral practices was positively highly statistically significant. Indicating that the increase of knowledge is correlated with the increase in preventive behavioral practices among students. A similar finding was indicated by Sumarni et al [9], where they found that the knowledge showed a significant relationship with preventive behavior to prevent COVID-19 among school students. However, Petpaiboon et al [10], came up that there was a positive

significant correlation between preventive behaviors and attitudes toward preventive behaviors with the presence of rules. The present study implied that to achieve a positive attitude in the absence of rules, teachers, and staff should demonstrate a sense of trust to students, this act may influence students to show better preventive behavior toward COVID-19.

Apart from covering the face while coughing or sneezing, wearing face masks, and washing hands for 20 seconds with soap and water as regular preventive practices to reduce the risk of infection. Our study cited other factors for preventive behavior practices such as avoiding touching the face, avoiding large gatherings and crowded areas, using disinfectants, and avoiding close contacts. In Iran ^[7], most high school students understood that physical distancing among people is necessary while everyone should initiate to isolate themselves upon symptoms onset and should avoid unnecessary in-person contact with family and friends. There are many ways to reinforce preventive measures, some of these include; awareness campaigns using social media, TV, radio, and print ads. Achieving best efforts globally, vaccination of all students and teachers is highly recommended so we can finally defeat the pandemic and we go back to in-person education.

CONCLUSION

Most of the school children were knowledgeable about the mode of transmission and risk factors of COVID-19 infection. They are even more aware of the preventive behavior necessary to control the spread of the virus. Of all the students, intermediate school children demonstrated better knowledge than the rest of the students while female students exhibited better preventive behavioral practices than their male counterparts. Despite good knowledge and adequate preventive behavioral practices, still, there is a room for improvement. Continuous awareness about the appropriate measures to prevent the transmission of COVID-19 infection is necessary to achieve better results in fighting the disease. The government, health authorities, school administration, and teachers had vital roles in providing education related to COVID-19 and how to contain it.

ACKNOWLEDGMENTS

The researcher would like to thank the following medical students for their help in the data collection: Sara Alomar, Rola Alseghair, Aseel Alsamaani.

Financial support and sponsorship: Nil.

Conflict of interest: Nil.

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