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Evaluating the health effects of hand sanitiser and face mask use in school children: post covid scenario

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Abstract

The current study was intended to investigate school children's understanding, mindset, habits, and perceived risks concerning using hand sanitizers and face masks during the COVID-19 pandemic. A survey-based quantitative research methodology was employed for data collection from the students of 6th to 10th classes studying in government boys' and girls' high schools in Lahore city. A sample of (N=200) was approached in this study using a non-random convenience sampling technique. The data was gathered using a structured questionnaire personally administered among school children. The statistical analyses, including descriptive and inferential analysis were performed using SPSS v22.0 software. The study's conclusions showed that students had good attitudes, knowledge, and behaviours regarding using facemasks and hand sanitisers. The t-test showed gender disparities in schoolchildren's knowledge and attitudes about using facemasks and hand

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sanitizer. No statistically significant variation was found between the face mask and hand sanitizer behaviours with gender. The schoolchildren perceived moderate risks of skin issues, including acne, itching on the face, lightheadedness, difficulty breathing, discomfort, and skin irritation from wearing facemasks. They also perceived moderate risks of dermatological issues including scaling, blistering, peeling, hand dryness, flaking, itching and redness after using hand sanitisers. Additionally, the study discovered that the consumption of wholesome foods and filtered water may impact schoolchildren's health and BMI.

Keywords: COVID-19, BMI, School going children, health status, facemasks

1 Introduction

The COVID-19 epidemic has affected both human and global economic dynamics. (Bloom et al., 2020). In early 2020, Coronavirus 2019 erupted, infecting individuals throughout the world. The condition was once mostly unknown. However, our understanding of the virus and the disease it causes developed as COVID-19 became more widespread (Patini & Soltani, 2020).

Around the middle of December 2019, the COVID-19 pandemic was declared as a result of the global spread of the SARS-CoV-2 epidemic, which had its origins in Wuhan, China. Covid-19, a pandemic that has hit the world, has forced a safe social distance for human society. The education system, which is a crucial component in deciding the economic destiny of a country, has been devastated. The World Health Organization, 11 February 2020 suggested that the infection be officially known as COVID, an acronym for coronavirus illness (Arab-Zozani & Hassanipour, 2020).

Viruses have immobilized the healthcare system of almost every country and increased the danger of death and morbidity every day. More than 1000 individuals have been killed in 15 countries during this pandemic. Pakistan, a population of 197 million, is a low- and middle-income country. The four provinces are Punjab, KPK, Sindh and Baluchistan, while the three regions are the Territory of Islamabad, Gilgit–Baltistan, Azad Jammu, and Kashmir. On February 26, 2020, the first two validated COVID-19 cases in Pakistan showed the imminent tempest (Hayat et al., 2020).

Acute respiratory disease, severe cough, pneumonia, fever, and physical pain all have a high mortality risk of COVID-19, especially among the old and those with underlying professional disease (Lai et al., 2020). Human beings are the major transmission source via human-to-human interactions; when the individual with moderate symptoms or no symptoms is infected with a healthy person, SARS-CoV-2 is transmitted, according to Kratzel et al., 2020.

At the onset of the COVID-19 outbreak, various healthcare organisations' main agenda was not limited to treatment methods. The health and precautionary procedures including wearing a mask, handwashing, strict quarantine, disinfection of various surfaces, and social distancing as health protocols for the breakage of the transmission chain (Amanollahi et al., 2021; Alimohamadi et al., 2022; Sharun et al., 2022; Hashemi et al., 2022).

The hand is major in transmitting infectious organisms, mainly when individuals live close together (Pires et al., 2017). Infective agents in households, colleges and college dorms can be transferred person by person. Not only via hand-to-hand touch but also by inanimate things like doorknobs, the seated ground is spreading in intimate contact with infectious pathogens (Meadows & Saux, 2004).

Some hand sanitisers are now on the market. They are Ethanol-based (62%-95% concentration). Several forms of these sanitizers, such as lotions, wipes, foams, and gels dry quickly. There are two types of hand sanitisers: those without alcohol and those without alcohol. Liquid, foam and

gel hand sanitisers based on alcohol are available. Although 62 per cent of alcoholic hand sanitisers are frequently used, the majority of hand sanitizers with alcohol include alcohol from between 60% and 85% (Verma et al., 2013)

The WHO states that alcohol sanitisers usually consist of different combinations of ethanol, isopropyl alcohol, and hydrogen peroxides (WHO, 2020). If misused, these formulations can harm human and environmental health. When discharged by evaporation, these chemicals have proven to have dangerous environmental effects. (Slaughter et al., 2014). It produces mild gastrointestinal discomfort when eaten at a low dosage of hydrogen peroxide (3 per cent solution) (Moon et al., 2006).

Sanitisers are primarily used to quickly eradicate germs by damaging proteins and rupturing the bacteria's outer cell membranes. Sanitisers are chemical products applied to the hands that reduce the amount of harmful bacteria to a safe level. Every man's regimen of everyday hygiene should include using a sanitiser. Substances or techniques for killing germs are known as sanitation to maintain a stable, disease-free environment. Sanitary techniques prevent the return of undesirable organisms after the application of a sanitizer (Shobayo et al., 2014).

Face masks are a form of personal protective equipment to prevent transmission of germs and viruses in the respiratory system (Liu & Zhang, 2020). Throughout the COVID-19 pandemic, face mask use increased, and Asia and Europe have seen a surge in this trend. The whole population must cover the lips and nose of several nations. During the COVID-19 epidemic, people used face masks more often and for lengthy periods. (Szepietowski et al., 2020)

After seeing the coronavirus pandemic, the WHO suggested that the first step in prevention was to maintain social distancing and use hand sanitisers and facemasks. Consequently, every country proceeded to lock down sick individuals to segregate them. Educational schools, colleges and universities have all closed down. All school, university and college tests, including entrance examinations, have been suspended and indefinitely postponed. The lockdown thereby destroyed every student's timetable. Although it is unique in education history, COVID-19 offered numerous possibilities to go from a challenging paradigm of the classroom to a new digital model era (Jena, P. K. 2020).

In one study, positive attitudes were found to be 1.7 times as prevalent among individuals toward face masks and COVID-19 when they had strong knowledge of them (AOR = 1.728, 95% CI = 1.150, 2.596) than when they had inadequate knowledge. Drivers with family members who have ever been infected with the coronavirus are twice as likely as their counterparts to wear face masks while driving or working (AOR = 2.173, 95% CI = 1.015, 4.652). In an additional study, out of 404 total study population, the majority of participants, i.e., 63.1%, 58.9%, 66.8% and 63.9%, did not use soap to wash their hands, refrain from touching their mouths and noses, and use face masks in public or crowded areas, respectively (Molla & Abegaz, 2021). The side effects rate increases when sanitiser and disinfectant use is done without sufficient knowledge or experience (Gharpure et al., 2020; Rai et al., 2020). The study's primary goal was to ascertain the health risks associated with face masks and hand sanitizer use among school-age children in District Lahore, Punjab, Pakistan (10–18 years old).

2 Materials and Methods

The study was carried out between January and March of 2021. A structured questionnaire was designed to collect information. The current study was conducted in three phases; one involved creating a questionnaire while maintaining all the elements that characterize the health risk assessment of face masks and hand sanitiser and their impact on students' health.

2.1 Study Area

After Karachi, Pakistan's second most populous city is Lahore, i.e., capital of Punjab province. In the northeastern region of Punjab, the city of Lahore is situated. The surrounding districts are Gujranwala, Faisalabad, Sheikhupura, Hafizabad, Nankana Sahib and Narowal. Lahore is a place of 11,126,285 inhabitants (PBS, 2017). District Lahore, spanning 1772 km2, comprises five tehsils, including Shalimar, Lahore Cantt, Raiwind, Model Town and Lahore City. Lahore is one of Pakistan's financial centres, with a 2014 GDP of $58.14 billion (Lahore Fact Sheet, 2016).



Figure 1. Map showing the location of the school - Source: Google Map

2.2 Questionnaire Survey

A survey using questionnaires was used to evaluate students' health. Two hundred female students from classes VI to X in the elementary and secondary divisions, ages 10 to 18, participated in the study. A questionnaire was broken up into sections to analyze several factors, including water sources, diseases brought on by overusing face masks and hand sanitizers, health, and the impact of these products. Meetings were scheduled, and schools were visited to explain the purpose of the study. Written consent from the head of the institution was requested before moving forward. Meetings were held under the direction of the principals/head teachers of the Government boys' and girls' high schools, Lidher, to learn more about the health concerns that students were facing due to the use of face masks and hand sanitisers. Every section of the questionnaire detailed the study's objectives and the impact hand sanitisers and face masks have on students' health.

The questionnaire was written in English, but all its questions and components were explained in Urdu. Following the initial school visit, a questionnaire was made. Questions on health and

socioeconomic status, hand sanitiser risks, and face mask use were included; some were open-ended, and some had fixed answers. In the personal profile, information about siblings, gender, height, weight, age, and class were all listed. On the other hand, inquiries concerning the father's job, average monthly income, and level of education within the family were used to ascertain socioeconomic status. Conversely, concerns about the dangers of using face masks and hand sanitisers were raised. These inquiries were made to gather health data regarding the likelihood that school-age children would use face masks and hand sanitisers.

2.3 Body mass index (BMI)

The body mass index (BMI) indicator of unhealthy weight or potential health problems in the future was calculated using a person's height and weight (Centers for Disease Control CDC, 2011). The following formula was used to calculate the BMI of the female students:$BMI = Weight(kg) \div height(meter^2)$

3 Data analysis

The qualitative data was collected through a questionnaire, tabulated, and converted into quantitative data. Following survey analysis and information collection, numbers were allocated to each questionnaire, and the analysis was performed in the Statistical Package for the Social Sciences (SPSS). Descriptive data analysis i.e., frequency, mean, percentages, standard deviation and inferential data analysis i.e., regression, ANOVA and t-test were performed using SPSS v22.0. Now that the details have been examined, the errors have been fixed. After the data was entered into SPSS, different insights were applied. The findings ought to be analyzed in light of the study's goals and the determined frequencies. Tables and graphs were used to display data.

4 Results

The results of this study on health risk assessment of students at government schools in Lahore in the age range of 10-18 simply show that using hand sanitiser and face masks may impact students' health. It also highlighted the degree of awareness, perspective, and practice of school children regarding using face masks and hand sanitizer.

Data Interpretation and Analysis

The current study was intended to analyze the influence of face masks and hand sanitizers on the health of pupils. A self-structured questionnaire was developed to conduct the survey. Data was gathered through personal visits. Following data collection, the organization, tabulation and data analysis were performed using SPSS. In this study, based on school, gender and class of students, it was hypothesised that no statistically significant difference exists with regard to the usage of face masks and hand sanitiser.

Table 1 Gender differences on "knowledge, attitude, practices and risk of facemasks and hand sanitisers use" among school children.

Variables	**Male(n=96)**		**Female(n=104)**		t	p
	Mean	SD	Mean	SD		
Knowledge	2.67	.67	2.86	0.66	-2.03	.043
Attitude	2.76	0.98	3.01	0.83	-1.93	0.05
Practices	2.77	0.99	3.05	0.08	-1.44	0.15
Risks	1.94	0.47	1.87	0.45	1.15	.27

The t-test was used to evaluate gender discrimination in the level of awareness regarding the use of face masks and hand sanitisers among students. The findings revealed a statistically significant difference ($p<0.05$) in knowledge level between two schools on the utilization of face masks and hand sanitizers (Table 1). A considerable difference between the two groups, i.e., boys and girls,

were evident. It may be concluded that a statistically significant difference exists between both groups ($t = -2.03$, $p < 0.043$).

Likewise, the t-test findings for the attitude of students with regard to the utilization of facemasks and hand sanitizers (Table 1) revealed a statistically significant difference ($p=0.05$, $t = -1.93$). On the contrary, with reference to gender, the difference between practices of using hand sanitisers and face masks was not computed to be statistically significant ($t = -1.44$, $p > 0.15$).

Considering the usage of face masks and hand sanitizers, Table 1 revealed the non-significance value ($p>0.05$) of the variation in the risk between two schools. As a result, it may be concluded that the difference in means between the two groups was insignificant. The findings led to the following conclusion: based on gender, the difference ($t = 1.15$, $p > 0.27$) existed in the mean.

Table 2: School-based differences in KAP and risk of using hand sanitizers and face masks among students

Variables	**Boys GHS (n=96)**		**Girls HS(n=104)**		**t**	**p**
	Mean	SD	Mean	SD		
Knowledge	2.6016	.72691	2.9303	.58961	3.524	.001
Attitude	2.7674	.98660	3.0160	.82749	-1.447	0.15
Practices	3.100	.69137	3.100	.53656	-.489	.626
Risks	1.8918	.44717	1.8918	.44717	-.538	.591

The difference is significant at $p\leq 0.05$

The t-test was used to evaluate the school-based differences in the level of knowledge on using face masks and hand sanitizers among students. The findings (Table 2) revealed that the level of knowledge was different since the means of the two schools differed ($t = 3.524$, $p < 0.05$). As a result, we might conclude that the means of the two groups differ significantly. The t-test findings (Table 2) revealed an insignificant difference in attitude between both types of schools ($t = -1.447$, $p = 0.15$). Concerning practices, a similar conclusion may be deduced. The difference in means between both groups was insignificant since the p-value was greater than 0.05. Moreover, it was revealed that the risk variation between both schools for using face masks and hand sanitizers and face masks was larger than 0.05 (Table 2). As a result, it may be concluded that the difference in means between the two groups is small. There was a gender mean difference ($t = -.538$, $p = .591$). In the study, it was hypothesised that no significant impact on the BMI of students exists due to the type of food and water quality. Male students were computed with higher BMI (M+SD) (22.5+5.0) than female students (20.36+5.51) as tabulated in Table 3.

Table 3: Body Mass Index of Male and Female

Variable	Gender	Mean	SD	Mini	Maxi
BMI	Male (n=96)	22.54	5.1	11.9	35
	Female (n=104)	20.36	5.5	11.8	39

Significant difference ($p\leq 0.05$)

In order to evaluate the effect of quality of water as well as type of food, the model summary is presented in Table 4. The adjusted R2 of the variables were computed to be 0.85 and 0.91, indicating a variance of 85 per cent and 91 per cent, respectively. The p-value was found to be significant at the level of 0.05. It may be inferred that the variables in the model exhibited a linear connection.

Table 4: Effect of water quality and type of food on BMI of students

Independent	Unstandardised Coefficients	Standardized Coefficients

Variable	R^2	Beta	B	t	p
Most liked Food (Healthy/ Junk)	0.92	16.94	0.92	32.91	0
Source of drinking water	0.95	10.45	0.95	44.2	0

P-value is significant at the level of 0.05

5 Discussion

According to the findings, most pupils were aware of using facemasks and hand sanitisers. A strong association between gender and knowledge was observed when using such preventive items i.e., facemasks and hand sanitizers. Furthermore, the current study found that the knowledge level of female students about the usage of facemasks and hand sanitisers was higher than that of male students. There was a substantial association between students' knowledge and their schools' evaluation of school-based variation. This data implied that in female schools, the knowledge level about the usage of preventive items was higher than in male schools. The current survey discovered that knowledge disparities between classes were statistically negligible. Every student in every class is aware of usage. Since the medicine for COVID-19 is not available, the utilization of preventive measures including facemasks and hand sanitizers is of utmost importance for eradicating the disease. According to their norms, respondents were aware of wearing face masks and avoiding large gatherings. While measuring preventive measures, respondents were less anxious and more willing to adapt changes, ultimately demonstrating a good attitude towards government announcements. According to research, to control COVID-19, individuals must prioritise it by the government's instructions (Kaur et al., 2020).

According to the findings of the current investigation, students were seen utilizing face masks and hand sanitisers. The current study revealed a statistically insignificant difference in the usage of preventive items based on gender. Among school children, a discernible difference in the use of facemasks and hand sanitizers and facemasks was absent. Furthermore, the habits of students were found to be insignificantly associated with school based on school-based variation. This conclusion implies the absence of difference in using facemasks and hand sanitiser in schools for males and females. As per the current study, the practising level was statistically negligible across class disparities. The findings are inconsistent with a recent study by Kumar and colleagues (2020), who found that health care personnel's usage of face masks was inadequate in terms of knowledge, attitude, and conduct. Moreover, it was found that health care personnel, regardless of positive attitude towards using face masks, had moderate-to-poor comprehension and practice. The awareness of the correct use of face masks may be enhanced through social media networks among healthcare personnel and the general public.

According to the current study, students perceived moderate risks of skin problems, i.e., redness, itching, hand dryness, scaling, flaking, peeling and blistering upon the usage of hand sanitisers. Various health issues associated with face masks may include face acne, itching, dizziness, inhalation issues, irritation and discomfort. The day-to-day basis consumption of hand sanitisers may have unfavourable side effects, and balancing the advantages of sanitiser in avoiding disease transmission against the risk of misuse remains difficult. The most prevalent skin responses associated with the usage of alcohol-based sanitizers are irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD). The predominant symptoms of ICD are purities, bleeding and dryness. However, ACD includes allergy symptoms as well as respiratory discomfort. Hand sanitiser might sometimes be hazardous (Himabindu et al., 2020). To examine the spectrum of hand sanitisers, their efficacy, formulation qualities, adverse consequences and recommendations for improving formulation efficiency and safety, a study was conducted by Jing et al. (2020). The efficacy of alcohol-based sanitizers against coronavirus was demonstrated inconsistent with prior

research. The frequent utilization of sanitizers is connected with the elevation in the risk of resistant to antibiotics and certain viral infections (Mahmood et al., 2020). This study emphasizes the dangers and serious health implications to humans connected with the frequent use of alcohol-based hand sanitizers. The findings support examining the appropriateness, compliance, and barriers of using preventive items in primary schools.

Szepietowski and colleagues (2020) also support the current study's findings. The connection between irritation and utilization of face masks is not evident. Itching was more prevalent in those who wore masks for longer durations of time. Almost one-third of those who were annoyed scraped their faces before or after removing the mask. The development of itching and face scraping may result in lesser protection. The COVID-19 pandemic has resulted in the enormous utilization of facemasks for prevention by healthy person. However, while utilizing facemasks, several people take incorrect precautions. It is vital to guide the usage of face masks while advocating their use to avoid COVID-19. (Hayat et al., 2020).

Majority of students were found with health issues as a result of wearing a facemask. According to our findings, students using facemasks had a mean SD of 3.98+1.299. After utilizing face masks, it was found that the majority of school-going children (Mean+SD) reported acne (2.93+1.336). It is determined that students with a mean SD of 3.723+1.244 and 3.07+1.046 experience pain and dizziness when wearing facemasks. There has been little study on the hazards of schoolchildren using hand sanitizers and face masks. There was little information available on the utilisation of preventive measures i.e., face masks and hand sanitizers.

6 Conclusion

The utilisation of hand sanitisers and face masks during COVID-19 is strongly connected with students' health conditions. Schoolchildren have solid knowledge, a positive attitude, and good habits when using hand sanitisers and facemasks. According to the study, schoolchildren have a modest level of risk perception. They believe using hand sanitisers might lead to skin issues like scaling, flaking, peeling, itching, blistering redness and hand dryness. Furthermore, upon wearing face masks, schoolchildren experienced breathing issues, discomfort, dizziness, itching, acne, and inflammation on their faces. The study revealed that the consumption of nutritious food and filtered water influenced the health condition of schoolchildren using BMI.

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