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Original Article

Mask-Wearing Behavior and Its Association With Knowledge About COVID-19 in the Rural Areas of Lorestan, Iran

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Abstract

Introduction: Coronavirus disease 2019 (COVID-19) is a respiratory disease caused by severe acute respiratory syndrome coronavirus 2. Considering the critical role of masks in controlling this disease, this cross-sectional study aimed to investigate the behavior of wearing masks in the rural areas of Iran and was conducted in ten villages, randomly selected (using simple random sampling) from the subordinate villages of Khorram-Abad district, Lorestan province.

Methods: Using convenient sampling, a researcher invited passersby to participate in the study in each selected village. The field phase of the study began on August 9, 2019, and continued until the end of October, culminating in the attainment of the target sample size of 600 participants. The questionnaire contained two sets of questions focusing on factors influencing the risk of catching COVID-19 and the participants' awareness of the disease's symptoms, respectively.

Results: Of the 600 passersby interviewed, 255 (42.5%) wore their masks correctly, 57 (9.5%) wore them incorrectly, and 288 (48.0%) did not wear a mask at all. Only gender showed a significant relationship with mask use (51.3% of women vs. 33.6% of men; $P<0.001$; T-test). Most participants (58.0%; 95% CI: 53.9–62.0%) believed that wearing a mask was the best way to prevent COVID-19 transmission ($P<0.001$; linear-by-linear test).

Conclusion: Our findings revealed that the rural communities of Lorestan province need to improve their knowledge of the correct way to wear a mask, making an educational campaign necessary.

Keywords: Mask, COVID-19, Knowledge, Behavior, Iran

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Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS) is a respiratory disease caused by the SARS-CoV-2 virus. On March 11, 2020, the World Health Organization (WHO) declared a coronavirus disease 2019 (COVID-19) pandemic (1). Respiratory droplets and contact are the main routes of transmission of the COVID-19 virus (2). Moreover, the incubation period of this disease is 2–14 days, during which infected people, asymptomatic or with mild symptoms, can transmit the disease to an uninfected person, thereby increasing the transmission of the disease in the community (1,3).

Although public vaccination programs began in December 2020 in high-income countries, inequity in vaccine distribution and delivery among low-income countries remains a significant threat to global epidemic control. To minimize the risk of COVID-19, people in these communities are required to follow alternative methods of infection control, such as quarantine (staying at home), hand wash with soap or alcohol-based disinfectants, travel restrictions, surface disinfection, and the use of mask (4). Nonetheless, it is recommended that these methods continue to be used even after vaccination because vaccines cannot wholly prevent infection and their role in preventing asymptomatic transmission of COVID-19 is unclear (5-10).

From the beginning of the pandemic, various authorities and even the WHO have offered different recommendations on whether or not to use masks, which occasionally contradict each other (11). Furthermore, there has been much debate at the global and regional levels about whether the general public should wear a mask during the COVID-19 pandemic. However, support for the use of masks has also increased with the continuation of the COVID-19 epidemic (8).

At the beginning of the pandemic, the WHO recommended masks only for healthcare workers or people with COVID-19 symptoms. Nevertheless, after a short time, the results of studies revealed that even a slight protective measure can have a significant effect on disease transmission, so the use of masks became mandatory

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even for the general public (12). According to evidence, masks are potentially effective in controlling disease and that using masks both indoors and outdoors, especially by people who demonstrate symptoms, may have a substantial effect on reducing disease transmission (13).

Knowledge and behavior regarding health are two important aspects of health literacy, particularly for the older population. Accordingly, understanding these aspects allows seniors to be more aware of their health conditions (14). Research has shown that social vulnerabilities are associated with lower health literacy (15). These vulnerabilities include an aging population structure, lower education levels, and living in rural areas, among others (14,16). For example, in the United States, COVID-19 incidence rates were primarily observed in metropolitan areas in May 2020. However, mortality and incidence rates in some non-metropolitan areas were surprisingly similar to hotspots such as New York City.

Disparities in health literacy have also been noted in the context of the pandemic. Rural areas were at risk for COVID-19, regardless of whether they were in developed or developing economies. Contributing factors included (1) the movement of people from urban to peri-urban and rural areas, (2) the education levels of populations, which affected their ability to understand health information, and (3) the availability of healthcare facilities, especially for communities with a significant aging population (9). Additionally, rural populations have been found to be disadvantaged due to the limited amount of relevant information that reaches them, as news coverage frequently focuses on urban developments (17,18).

In Iran, rural residents face significant challenges compared to their urban counterparts. They tend to have lower education levels and less awareness of disease prevention and control. This lack of knowledge is exacerbated by their remote living conditions and poor economic status, resulting in limited access to protective materials, health education, and medical services compared to those available in urban areas. Consequently, there is a substantial gap between rural and urban residents. These factors have significantly increased the difficulties associated with preventing and controlling epidemics in rural regions (19). During the COVID-19 pandemic, the rural population suffered considerable harm to their livelihoods due to disruptions in the marketing and sale of agricultural products, as well as widespread job losses among informal workers. Additionally, the pandemic has had a profound impact on villagers' incomes and the overall village economy (20). One major reason for the vulnerability of rural communities is that they are often less prepared to handle the direct and indirect effects of the COVID-19 crisis. This is primarily due to their lower socioeconomic status, limited educational opportunities, and inadequate access to healthcare services (21).

The results of various studies indicate that masks are an effective non-pharmacological intervention that reduces the spread of respiratory droplets containing the virus, prevents the transmission of the virus, and protects healthy people against infection. In addition, masks can increase alertness to avoid direct hand contact with the mouth or nose (6,22). Considering that the use of masks as one of the most important and influential measures to prevent the transmission of COVID-19 is recommended and emphasized even after vaccination, this study is conducted with the primary goal of estimating the frequency of mask use and the level of awareness of residents of the rural areas of Khorramabad district of the Lorestan province in the central regions of Iran, about this disease (23).

Materials and Methods

Study Design and Samples

Khorramabad district, the capital of Lorestan province, has a population of about half a million (380,000 people living in urban areas and the rest in rural areas) and is located in the Zagros Mountains in western Iran.

It should be noted that there was no official and scientific estimate of the frequency of mask use in the study population. Thus, to calculate the sample size, the frequency was considered to be about 50% (p). Considering the 5% probability of estimation error (d) and the 5% confidence interval (alpha), the required sample size increased to 385 people. The sample was equally distributed across 10 villages, each considered a cluster. Taking into account the cluster sampling method and the design effect (D) equal to 1.5, the final sample size reached 600 individuals (i.e., each cluster consisting of 60 participants).

As mentioned earlier, ten villages were randomly selected for the study using simple random sampling from the list of villages in the Khorramabad district. There were no criteria for selecting villages other than being located within the administrative boundaries of Khorramabad District. All interviews were conducted only on non-holiday days of the week and by one interviewer who was fluent in the local language. In each of the selected villages, an interviewer was stationed in the village's main square and invited passersby to participate in the study (convenient sampling). Moreover, the study required participants to be over 18, hold Iranian citizenship, and live in the village where it was conducted. After briefly explaining the study objectives and obtaining participants' consent to take part, the interviewer completed their questionnaire based on their responses during a short face-to-face interview. There were two sets of questions in the questionnaire; one set consisted of 12 three-choice questions about actions and factors influencing the risk of catching COVID-19 (with answers: increases, decreases, and has no effect). Further, the second set comprised seven questions regarding the participants' knowledge of the signs and symptoms of COVID-19, with response options being 'yes,' 'no,' and 'I do not know.' These questions were previously utilized in a published study (24). It is worth noting that the first question in the questionnaire asked about the participant's mask-wearing behavior, which was noted based only on the interviewer's direct observation. An English version of the questionnaire has been included as a supplementary file. Considering that the necessary conditions for obtaining

consent from the children's parents were not met, only people over the age of 18 were invited to participate in the study. Apart from this criterion, the invitation included no other criteria. As a reward for each interview, a package containing a surgical mask, gloves, and tissue paper was given to the interviewee.

At the end of the field stage of the study, the questionnaire data were compiled in a database and analyzed using Stata (version 11). Frequency tables, descriptive statistics, and the Chi-square test were utilized in the analysis. Additionally, the Student's T-test was employed to compare means unless the underlying assumptions were violated; the Wilcoxon test was applied in such cases. In addition, linear-by-linear association test was used in the analysis of ordinal variables. A significance level of $P < 0.05$ was maintained, and a 95% confidence interval was reported when applicable.

Results

The fieldwork and data collection phase, which included conducting interviews, commenced on August 9, 2019, and extended through the end of October 2019. Of the 600 passersby (302 females and 298 males) who accepted the invitation to the interview, 255 (42.5%) were wearing their masks correctly, while 57 (9.5%) were wearing them incorrectly. Further, the remaining 288 (48.0%) were not wearing a mask at all.

The age range of participants was from 18 to 76 years (mean and median 41.4 and 40 years, respectively), and the average age difference between men and women was about 0.2 years ($P = 0.847$). The participants' average level of education was 9.5 years, and the difference between the levels of education of men and women was about 1 year ($P = 0.008$). Table 1 presents the distribution of mask-wearing behavior by gender, age group, and level of education. Based on the results (Table 1), only gender displayed a substantial relationship with how the mask was worn; more precisely, 51.3% of women, compared to 33.6% of men ($P < 0.001$), were wearing their masks correctly. Although a higher percentage of the educated groups used the mask correctly, there was no statistically significant difference ($P = 0.479$). Most participants (58.0%; 95% CI: 53.9–62.0%) indicated that wearing a mask was the most useful way to prevent the transmission of COVID-19 ($P < 0.001$). Having a history of COVID-19, or even the death of a first-degree relative, did not make a remarkable difference in mask-wearing behavior ($P = 0.171$).

In this study, about 35% of the study participants were aware of the need to disinfect their cell phones when returning home, and 26% were aware of the risk of shaking hands with friends and colleagues. Furthermore, 15% were of the need to wash their hands and face frequently with soap and water, and 10% had knowledge of the dangers of touching their masks, noses, and mouths during the day. Only 10–15% of participants knew about other risk factors (attending parties and ceremonies, attending indoor places such as offices and mosques, driving without a mask, eating in groups, throwing away a mask when returning home, using a hand-made cloth mask, and removing a mask when sneezing and coughing).

As for the symptoms of COVID-19, more than half of the participants chose gastrointestinal symptoms, about 20% body and muscle pain, and about 13% shortness of breath; only about 10–13% were aware of other symptoms (headache, runny nose, fever, and dry cough).

Discussion

Since the beginning of the COVID-19 epidemic, social distancing, masking, and hand washing have been promoted as strategies to reduce the prevalence of COVID-19 in the community. People typically wear masks to protect themselves; however, wearing masks, in addition to promoting the general health of the community, prevents transmission of respiratory droplets and disease to others as well (25).

The results of this study, which was conducted to investigate the frequency of mask use and the level of awareness of residents of rural areas of Khorramabad about COVID-19, revealed that only 42.5% of people living in these areas properly wear masks (full coverage of the nose and mouth) and 48% do not use a mask at all. This might be comparable with the findings of another study in Hong Kong, reporting that none of the participants were using face masks correctly (26). In another similar study in southeastern Wisconsin in the USA, only 41% of the observed people were wearing a mask (27).

While direct observations of people's behavior show similar results, studies investigating this behavior in other ways (e.g., collecting information using web-based questionnaires) provide completely different results. For instance, the results of another study in Brazil demonstrated that almost all participants (99.1%) wore masks, and 34.2% stated that they only wore them because they were mandatory. For example, the findings of a web-based survey in Brazil indicated that more than 99% of participants use masks, although 34.2% of them mentioned that they only wear masks out of compulsion (22).

With regard to the results of this project, the target groups of health education interventions can be better defined according to the relationship between the demographic characteristics and the behavior of wearing masks in the study population. For example, in the present study, 51.3% of women were correctly using their masks compared to 33.6% of men. In line with this study, other studies have shown that gender is an important and influential variable in preventive behaviors, and women are usually not only healthier than men but also have more motivation to meet health standards and extend this to the family (24,26,27).

Based on the findings (Table 1), the relationship between the level of education and the form of wearing a mask is significant only for a significance level less than 0.10 ($P = 0.075$). The relationship between education and disease might be discussed in two ways. One is from the difference it creates in the level of health awareness, and the other is from the point of view of the socio-economic level. In similar studies in India and Ethiopia, people with higher levels of education had better performance and

Table 1. Mask-Wearing Status of Study Participants According to Demographic Variables and Answering Questions

Does the Interviewee Wear the Mask Correctly	Is the Interviewee Wearing the Mask Correctly?			
Age	**Correct No (%)**	**Incorrect No (%)**	**No mask No (%)**	***P* value***
18–30 years	55 (44.35)	9 (7.26)	60 (48.39)	0.153
31–40 years	71 (39.66)	15 (8.38)	93 (51.96)	
41–50 years	67 (41.36)	13 (8.02)	82 (50.62)	
51–60 years	54 (46.96)	15 (13.04)	46 (40.00)	
>60 year	8 (40.00)	5 (25.00)	7 (35.00)	
Education level				
Illiterate	16 (39.02)	3 (7.32)	22 (53.66)	0.075**
1–11 years	106 (40.00)	29 (10.94)	130 (49.06)	
12–14 years	94 (42.73)	17 (7.73)	109 (49.55)	
15 and higher	39 (52.70)	8 (10.81)	27 (36.49)	
Gender				
Female	155 (51.32)	29 (9.60)	118 (39.07)	<0.001
Male	100 (33.56)	28 (9.40)	170 (57.05)	
Have you or someone in your family been infected with Corona?				
Yes	90 (44.33)	17 (8.37)	96 (47.29)	0.710
No	165 (41.56)	40 (10.08)	192 (48.36)	
Has anyone from your family died due to COVID-19?				
Yes	11 (64.71)	1 (5.88)	5 (29.41)	0.171
No	244 (41.85)	56 (9.61)	283 (48.54)	
How is COVID-19 transmitted?				
Food	16 (41.03)	3 (7.69)	20 (51.28)	0.157
Drinks	6 (20.69)	5 (17.24)	18 (62.07)	
Air born	229 (44.29)	48 (9.28)	240 (46.42)	
Others	4 (26.67)	1 (6.67)	10 (66.67)	
In everyday work, what is the best way to prevent coronavirus infection?				
Wearing mask	161 (46.26)	28 (8.05)	159 (45.69)	<0.001
Vaccination	11 (26.83)	12 (29.27)	18 (43.9)	
Talk less	3 (15.00)	1 (5.00)	16 (80.00)	
Social distancing	80 (42.33)	15 (7.94)	94 (49.74)	
Others	0 (0.00)	1 (50.00)	1 (50.00)	

Note. COVID-19: Coronavirus disease 2019. *Chi-square test, **Linear by linear test.

preparedness to prevent COVID-19 (24,28-30).

In the present study, about 86% of the interviewees were aware of the transmission of the virus through the air, but only about 44% were using the mask correctly. Although 58% of the interviewees believed that the best way to control the disease was to wear a mask, 45% of them did not wear a mask during the interview. These results conform to the those of another study conducted in the rural areas of southern Nigeria (29), suggesting that merely being aware of the possibility of risk does not lead to behavior change.

The sampling method used in this cross-sectional study (survey) was a mixture of cluster random and convenient sampling methods. Undoubtedly, using convenient sampling increases the possibility of selection bias in the study. In addition, the main focus of this study was only on how to wear a mask properly, while the type of mask, which is also important for controlling disease transmission, was not considered at all. These points warrant consideration in future studies.

Conclusion

The findings of this study revealed that the knowledge of the study population (the rural communities of the Lorestan province) about COVID-19 prevention measures and symptoms is not satisfactory, highlighting gaps in specific aspects of knowledge and behavior, especially in the field of proper use of masks. Our findings further demonstrated that the preventive behavior of using a mask is mainly influenced by gender and, to some extent, educational status. Therefore, in addition to widespread vaccination, it is necessary to conduct educational campaigns to raise awareness about preventive measures against COVID-19.

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Artificial Intelligence Disclosure
None.

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Competing Interests
The authors declare that they have no competing interests.

Data Availability Statement
The datasets used and analyzed during the current study are available upon reasonable request from the corresponding author.

Ethical Approval
Participation in this study was voluntary for all interviewees. Before the interview, each participant received a brief explanation of the study's objectives, and their informed consent was obtained for participation. Furthermore, the study findings are reported in a manner that would prevents the identification of specific individuals, their addresses, or their neighborhoods. Finally, the Ethics Committee on Medical Research of Isfahan University of Medical Sciences reviewed and approved the study protocol (ethical certification code: IR.MUI.RESEARCH.REC.1400.013).

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