

HEALTH CARE WORKERS' ATTITUDE TOWARD SAFETY MEASURES DURING COVID-19 PANDEMIC: AN EXPERIMENTAL RESEARCH DESIGN APPROACH

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ABSTRACT	ARTICLE INFO
<p>The COVID-19 pandemic is the latest disease in human history. The COVID-19 pandemic disturbed the life of all humans especially, health care workers due to the lack of specific training to deal with such types of diseases. In this study using an experimental design approach, we examined the healthcare workers' attitude to adopt safety measures while treating COVID-19-affected patients. Method: Healthcare workers were approached using social media platforms like Facebook, Twitter, etc. After providing 15 days of online training to healthcare workers they were asked to rate the impact of the use of sixteen COVID-19-related safety measures. Out of twenty-five, we got twenty healthcare workers who practice these sixteen safety measures with a high frequency, they remained safe and healthy and did not infect with COVID-19. However, five healthcare workers who showed a poor attitude towards the use of the sixteen COVID-19-related safety measures were infected with COVID-19. The implications and conclusions are presented in the last sections of the study.</p>	<p><i>Keywords:</i> Health Care Workers; COVID-19; Safety measures; Experimental Research; Pandemic</p> <p><i>Article History:</i> Received: 20th Jan 2023 Accepted: 24th Feb 2023 Published: 7th Mar 2023</p>

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1. STUDY BACKGROUND

Coronavirus disease 2019 (COVID-19), is a human-related virus that transmits from person to person particularly through coughing, sneezing, or any sort of physical interaction and its common symptoms are sputum production, fever, cough, muscle pain, shortness of breath, diarrhea, and sore throat (Gu et al., 2020; Miri et al., 2020; Wu & McGoogan, 2020; WHO, 2020). COVID-19 is the latest pandemic in the history of the modern world. The origin of COVID-19 is Wuhan (Hubei province), a city in P.R. China. In December 2019, China officially declared the news regarding the Coronavirus breakout in the city of Wuhan (Koo et al., 2020; Y. Wu, Chen, & Chan, 2019). An emergency was declared in China due to this emerging scenario. A great challenge was in the front of world scientist community. Initially, medical scientists were not successful to develop, produce, and verify any specific antiviral treatment for COVID-19. Therefore, the COVID-19 breakout transferred all over the world in a couple of months and adopted the form of a pandemic (Lewnard and Lo, 2020; 24th March WHO, 2020).

After developing the situation of the pandemic, the second serious threat of COVID-19 was the shortcomings in the diagnostic capacity and surveillance which affected the ascertainment of cases in both low and high-resource settings (Cohen & Kupferschmidt, 2020). In such a surprising situation, it was not possible to arrange supplies for the treatment of COVID-19 patients. The medical staff (Doctors, Nurses) were also not aware and trained to deal with such types of viruses and pandemic situations. Therefore, the chances of causalities increased all over the world. Some countries such as the USA, India, France, Germany, and Brazil were seriously affected due to this shortage (Worldometers, 2023). Thus, the shortage of treatment facilities motivates us to shift our focus from panic to prevention. Hence, to prevent further cases of COVID-19, the focus of medical staff should be shifted from treatment to safety measures against COVID-19.

Healthcare workers (HCWs) are the front-line soldiers handling the patients of COVID-19. Thus, the active role of HCWs is the most suitable solution to prevent and deal with the COVID-19 pandemic. However, it is also understandable that the role of HCWs can be compromised due to the stressful nature of their job which is to provide direct care to COVID-19 patients. A regular workload on HCWs to deal with COVID-19 patients can disturb their health and social life (Chang, Xu, Rebaza, Sharma, & Dela Cruz, 2020; Givi et al., 2020; Wong et al., 2020; Zhang, Sun, Latour, Hu, & Qian, 2020).

Therefore, it is imperative to provide HCWs necessary awareness and training to develop their attitude to use COVID-19 safety measures against COVID-19 (Albarrak et al., 2019; Cheung, Ho, Cheng, Cham, & Lam, 2020; Wong et al., 2020). Although, a few of the studies have investigated the availability of safety measures and their importance for HCWs (Delgado, Roche, Fethney, & Foster, 2020; Duan & Zhu, 2020). However, as per the best knowledge of the authors of this study, the COVID-19 literature is silent on the research question that how HCWs can be protected from COVID-19 infection. This is an important gap in the literature as no study has been conducted on HCWs and COVID-19 from the perspective of promoting their attitude towards the use of safety measures against COVID-19. Secondly, this study used an experimental research design which provides more relevant and generalized results. Therefore, the focus of the current study is to respond to this research question, through two steps; First promoting HCWs' attitude towards the use of safety measures against COVID-19. Second, a questionnaire with 16 safety measures guides us that how the health of HCWs is improved with which safety measure.

2. METHODS

Participants and Procedure

The question of this study was “what are the safety measures and attitudes should adopt by HCWs while treating COVID-19 patients? This study used social media platforms to contact the expected participants related to the medical field. On different social media platforms such as Facebook, LinkedIn, and Twitter, a brief message was shared on social media regarding the study's needs and objectives. It was requested to social media users (HCWs) to participate in this study because it is very important to protect front-line soldiers (HCWs). It is explained to the participants that organizations all over the world are striving hard to provide a safe and secure environment to their workers, especially in the healthcare sector which is fighting at the forefront. We are aware that doctors, nurses, and paramedical staff are extremely engaged in their duties and their time is much precious, however, this study is also designed for their safety”. For confidentiality, it was mentioned in the message that “all answers are strictly confidential and no one outside the research team will ever see your response. There are no ‘right’ or ‘wrong’ answers. So, please respond to all questions as naturally as you can”. Contact information of the leading author was mentioned in the brief message “If you have any questions or comments about the survey, contact at the given e-mail address”. Twenty-five HCWs agreed to this experimental study. These HCWs are working in nine different hospitals in Pakistan.

Experimental Design Approach

An experimental design approach within-group is used, where twenty-five HCWs provided their responses against the questionnaire used to measure their attitude to adopt safety measures against COVID-19. HCWs were asked to rate their attitude regarding safety measures during COVID-19 patients' treatment. This study used five points trending Likert scale ranging from 1 to 5, where 1=never, 2=rarely, 3=occasionally, 4=frequently, and 5=always. Table-1, a questionnaire comprises of 16 items regarding safety measures against COVID-19 is used. To measure the HCWs' health differences (e.g., whether they were infected after 15 days, or remained safe), two options were given in the questionnaire. First, while treating COVID-19 patients, I am still

safe and healthy. Second, while treating COVID-19 patients, unfortunately, I am infected by COVID-19'. An instrument bearing sixteen items regarding safety measures while treating COVID-19-affected patients is used.

These sixteen items are derived from literature and through communication with physicians who have firsthand experience dealing with COVID-19 patients. From these sixteen safety measures, five safety measures were extracted from the previous study conducted by Almutairi, McCarthy, & Gardner (2015). These safety measures are previously used to measure the effectiveness of safety measures against EBOLA virus disease. As per experts' opinion, EBOLA is similar to COVID-19, therefore safety measures like "I wash hands with alcoholic soap, I avoid touching the eyes, nose, and mouth, I cover my nose and mouth with a tissue when coughing or sneezing, I throw the tissue in the trash after I use it, I use a face mask to cover my nose and mouth in, crowded places, If I have flu (or any coronavirus symptoms) symptoms appeared, I avoid normal activities such as going to work for school, travel, shopping, etc." were used to prevent EBOLA back in 2015. This study used the same items in this experimental research. Four items (safety measures) are extracted from studies conducted by Abel & McQueen (2020), Bukhari, Mahmood, & Zahra, (2020), Rothstein (2015), and Weber (2008). The remaining six items (safety measures) are adopted from hospitals' SOPs (Standard Operating Procedures) where HCWs were approached by authors for data collection. For instance, these safety measures were "I take bath after duty with warm water. I avoid extra activities, I am using disinfectant homemade to apply on the body and dress before entering to home and also family members are asked to use disinfectant homemade when they came to meet. I do not share my car with anyone. I use hand sanitizer before touching something. When I attend the patients of COVID-19, I completely cover myself with PPEs (Personal Protection Equipment)".

Table 1 Safety Measures

Nos.	Safety Measures and Behaviors of HCWs Against COVID-19
1	I wash my hands regularly
2	I maintain social distancing
3	I avoid touching the eyes, nose, and mouth
4	I cover my nose and mouth with a tissue when coughing and sneezing
5	I use a face mask to cover my nose and mouth in crowded places
6	I throw the tissue in the trash after I use it
7	I drink hot water
8	I take fresh foods thoroughly cooked
9	I disinfect surface
10	If I have flu (or any coronavirus symptoms) symptoms appeared, I avoid normal activities such as going to work for school, travel, shopping . . . etc.
11	Taking bath after duty with warm water
12	Avoiding extra activities
13	Using disinfectant homemade...To apply on the body and dress before entering to home...or any family member came in ...apply that first
14	I do not share my car with anyone
15	Sanitizer hands Before touching something
16	When I attend the patient of COVID-19, I compete to cover myself with PPEs

3. RESULTS

Twenty HCWs selected the first option which states that ‘while treating COVID-19 patients, they remained safe and healthy and 05 HCWs selected the second option which states that ‘while treating COVID-19 patients, unfortunately, they are infected by COVID-19’. For the results, we presented that the differences in the health outcomes were due to the level of attitude that was required to use COVID-19 safety measures. Before proceeding further, in table 2, we reported the results of demographic characteristics.

Table 2, Demographics of COVID-19 Affected and Non-Affected HCWs

Categories	Percentage (Non-COVID-19 Patients)	Percentage (COVID-19 Patients)
Gender		
Male	95.0	80.0%
Female	5.0%	20.0%
Age	-	-
< 25	10.0%	20.0%
26-30	45.0%	60.0%
31-35	30.0%	20.0%
36-40	10.0%-	-
> 40	5.0%	-

Frequency of Using COVID-19 Safety Measures by HCWs.

Table 3 shows the HCWs' attitude toward the use of COVID-19 safety measures. Respondents were asked to rate their attitude towards using COVID-19 safety measures while treating COVID-19 patients. Results in Table 3 represent a comparison between non-infected HCWs with COVID-19 and infected HCWs with COVID-19. The statistical figures proved that the HCWs who were infected with COVID-19, their usage of safety measures frequency is low.

COVID-19 COVID-19 Therefore, we believe that 5 HCWs who were infected are because of their low attitude towards the use of COVID-19 safety measures.

Table 3 HCWs Attitude

Safety Measures	HCWs Non-COVID19 Patients	HCWs COVID-19 Patients
1- I wash hands with alcoholic soap		
Never	-	-
Occasionally	5.0%	20.0%
Sometimes	-	-
Often	10.0%	20.0%
Always	85.0%	60.0%
2- I maintain social distancing		
Never	-	-
Occasionally	15.0%	20.0%
Sometimes	-	-
Often	20.0%	20.0%
Always	65.0%	60.0%
3- I avoid touching the eyes, nose, and mouth		
Never	-	-
Occasionally	10.0%	40.0%
Sometimes	-	20.0%
Often	25.0%	-
Always	65.0%	40.0%
4- I cover my nose and mouth with a tissue when coughing or sneezing		
Never	-	-
Occasionally	5.0%	-
Sometimes	5.0%	20.0%
Often	5.0%	-
Always	85.0%	80.0%
5- I use face mask to cover my nose and mouth in crowded places		
Never	5.0%	20.0%
Occasionally	10.0%	-
Sometimes	-	-
Often	10.0%	20.0%
Always	75.0%	60.0%
6- I throw the tissue in the trash after I use it		
Never	-	20.0%
Occasionally	5.0%	-
Sometimes	-	-
Often	15.0%	-
Always	80.0%	80.0%
7- I drink hot water		
Never	15.0%	20.0%
Occasionally	10.0%	20.0%
Sometimes	10.0%	20.0%
Often	35.0%	20.0%
Always	30.0%	20.0%
8- I take fresh foods thoroughly cooked		
Never	-	-
Occasionally	25.0%	20.0%
Sometimes	-	-
Often	-	-
Always	30.0%	20.0%
9- I disinfect surface		
Never	10.0%	20.0%
Occasionally	10.0%	20.0%
Sometimes	-	-
Often	25.0%	-
Always	55.0%	60.0%

10- If I have flu (or any coronavirus symptoms) symptoms appeared, I avoid normal activities such as going to work for school, traveling, shopping . . . etc.		
Never	20.0%	40.0%
Occasionally	5.0%	-
Sometimes	5.0%	-
Often	5.0%	20.0%
Always	55.0%	40.0%
11- Taking bath after duty with warm water		
Never	5.0%	80.0%
Occasionally	-	-
Sometimes	-	-
Often	-	-
Always	95.0%	20.0%
12- Avoiding extra activities		
Never	5.0%	80.0%
Occasionally	-	-
Sometimes	-	-
Often	20.0%	20.0%
Always	75.0%	-
13- I am using disinfectant homemade to apply on the body and dress before entering to home and also family members are asked to use disinfectant homemade when they came to meet		
Never	-	20.0%
Occasionally	5.0%	60.0%
Sometimes	-	-
Often	40.0%	20.0%
Always	55.0%	-
14- I do not share my car with anyone		
Never	5.0%	20.0%
Occasionally	-	60.0%
Sometimes	-	-
Often	40.0%	-
Always	55.0%	-
15- Sanitizer hands before touching something		
Never	-	-
Occasionally	-	60.0%
Sometimes	5.0%	20.0%
Often	40.0%	20.0%
Always	55.0%	-
16- When I attend the patient of COVID-19 I compete to cover myself with PPEs		
Never	-	-
Occasionally	-	-
Sometimes	5.0%	20.0%
Often	-	20.0%
Always	95.0%	60.0%

4. DESCRIPTIVE STATISTICS

The purpose of displaying separate results for COVID-19 victims is to show that they are infected due to having a low attitude toward the use of COVID-19 safety measures. Although, the results in table 3, clearly show that five (5) HCWs were infected because of their relatively poor attitude toward the use of COVID-19 safety measures. However, it was important to display the average mean of the respondents which also indicates the within-group difference between HCWs non-COVID-19 victims and HCWs COVID-19 victims. In table 4, the mean of non-COVID-19 HCWs was 4.48 which shows their higher use of COVID-19 safety measures, and the mean of HCWs infected with COVID-19 was 3.33 which indicates the lower use of COVID-19 safety measures.

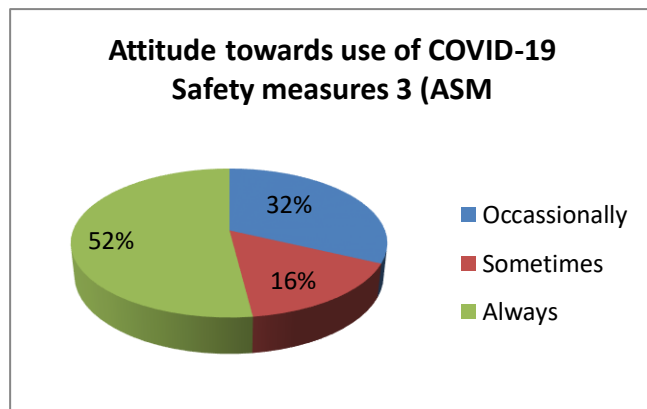
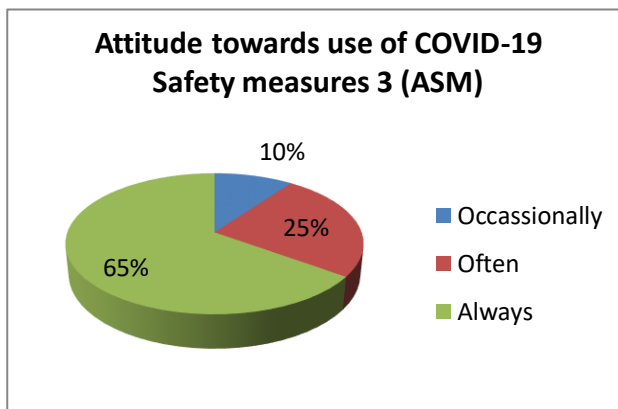
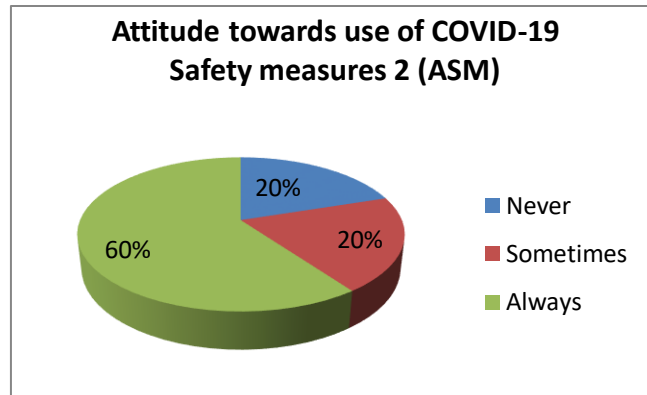
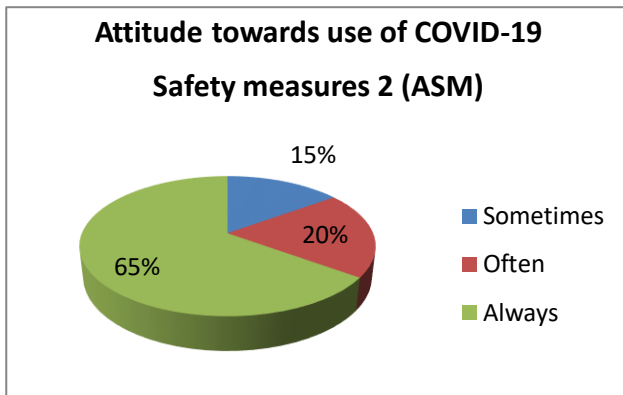
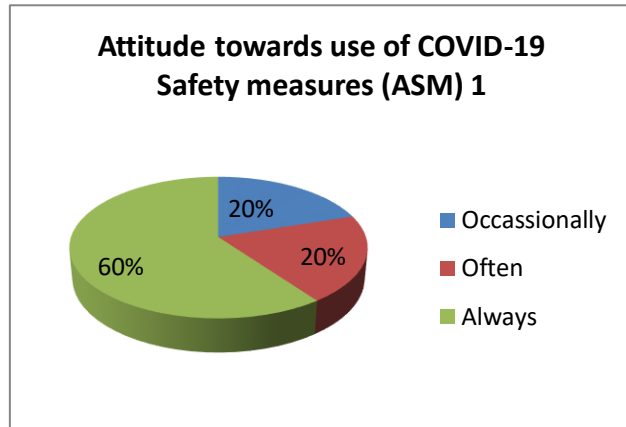
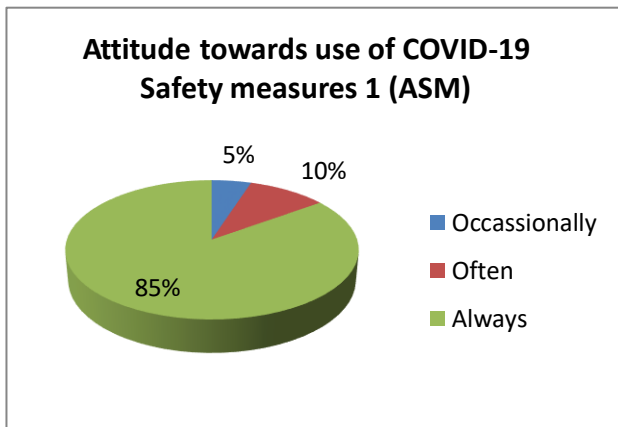
Table 4, Descriptive Statistics

Attitude Towards COVID-19 Safety Measures	Minimum	Maximum	Mean	SD
HCWs Non- COVID-19 Patients	3.56	5.00	4.48	0.43
HCWs COVID-19 Patients	1.69	4.50	3.33	1.05

Comparison of Within-Group Differences in Attitude Toward the Use of COVID-19 Safety Measures

HCWs Non-COVID-19 Patients

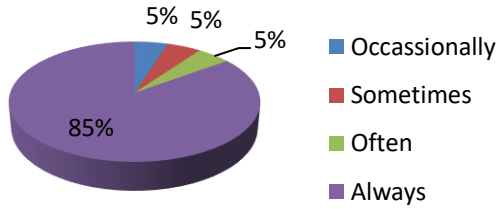
HCWs COVID-19 Patients



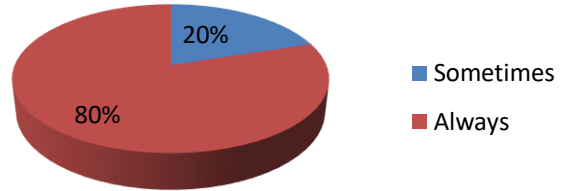
HCWs Non-COVID-19 Patients

HCWs COVID-19 Patients

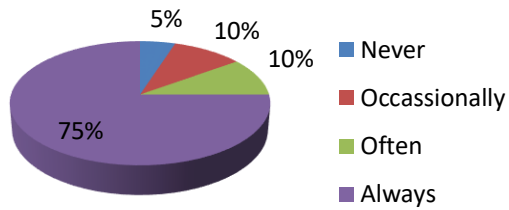
Attitude towards use of COVID-19 Safety measures 4 (ASM)



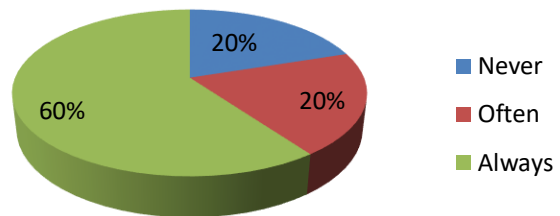
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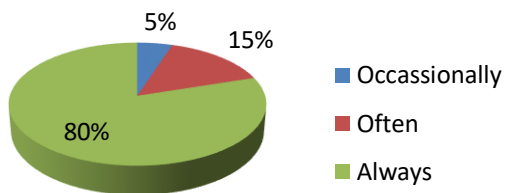
Attitude towards use of COVID-19 Safety measures 5 (ASM)



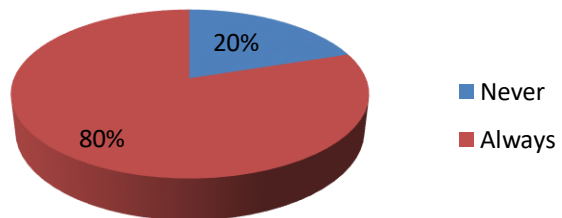
Attitude towards use of COVID-19 Safety measures 5 (ASM)



Attitude towards use of COVID-19 Safety measures 6 (ASM)



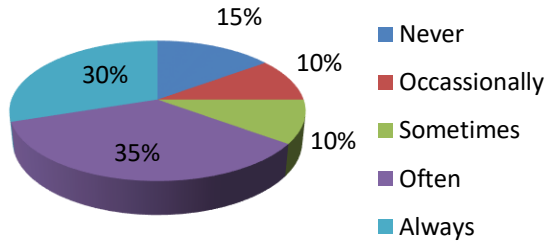
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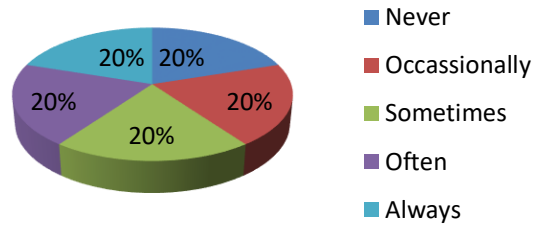
HCWs Non-COVID-19 Patients

HCWs COVID-19 Patients

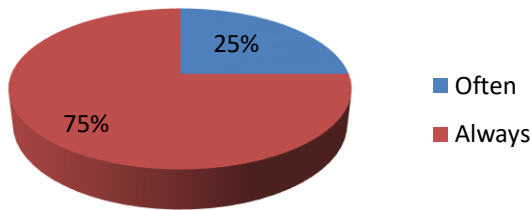
**Attitude towards use of COVID-19
Safety measures 7 (ASM)**



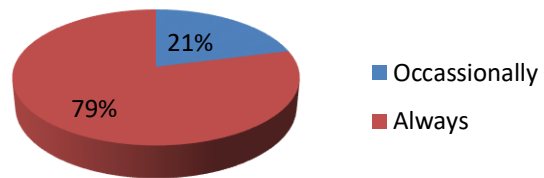
**Attitude towards use of COVID-19
Safety measures 7 (ASM)**



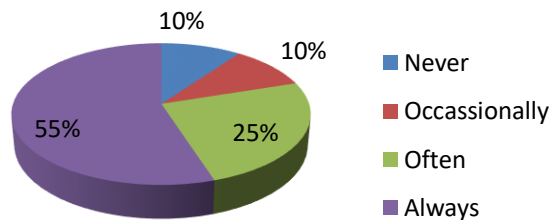
**Attitude towards use of COVID-19
Safety measures 8 (ASM)**



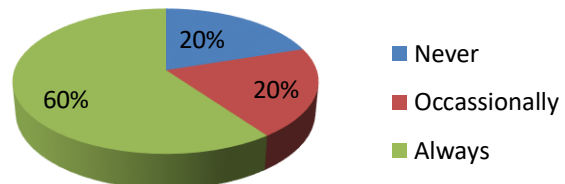
**Attitude towards use of COVID-19
Safety measures 8 (ASM)**



**Attitude towards use of COVID-19
Safety measures 9 (ASM)**



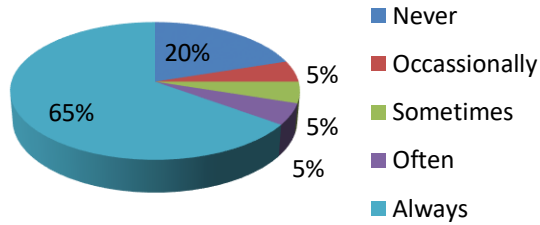
**Attitude towards use of COVID-19
Safety measures 9 (ASM)**



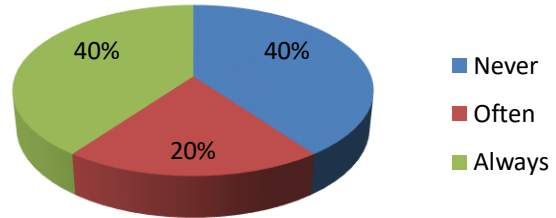
HCWs Non-COVID-19 Patients

HCWs COVID-19 Patients

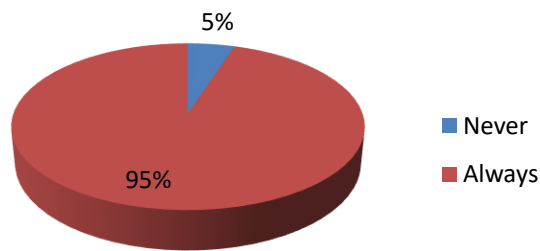
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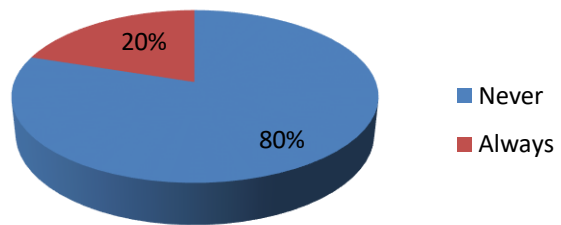
Attitude towards use of COVID-19 Safety measures 10 (ASM)



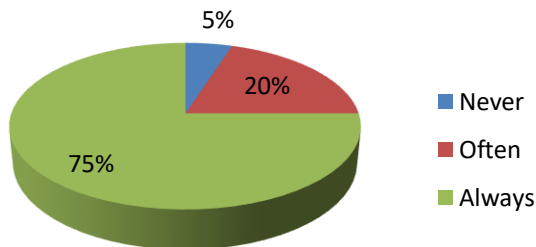
Attitude towards use of COVID-19 Safety measures 11 (ASM)



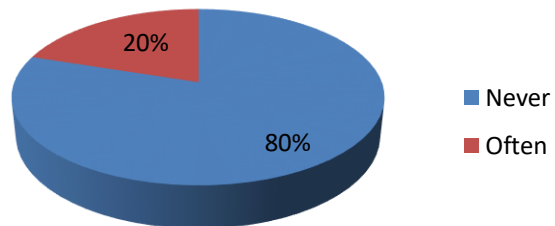
Attitude towards use of COVID-19 Safety measures 11 (ASM)



Attitude towards use of COVID-19 Safety measures 12 (ASM)



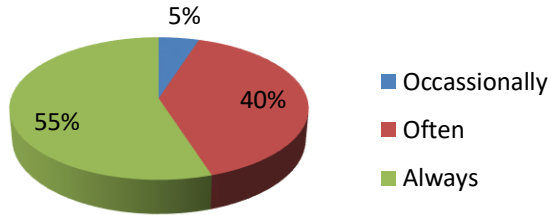
Attitude towards use of COVID-19 Safety measures 12 (ASM)



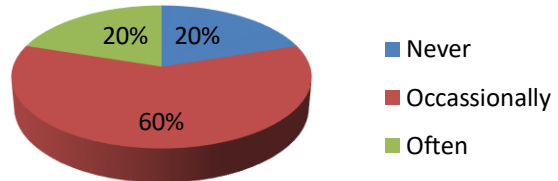
HCWs Non-COVID-19 Patients

HCWs COVID-19 Patients

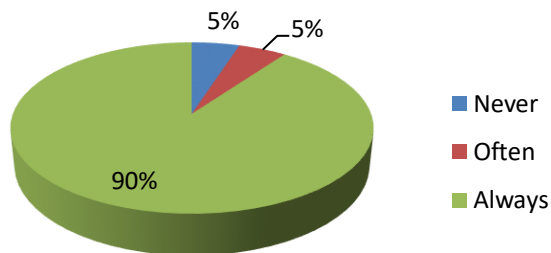
**Attitude towards use of COVID-19
Safety measures 13 (ASM)**



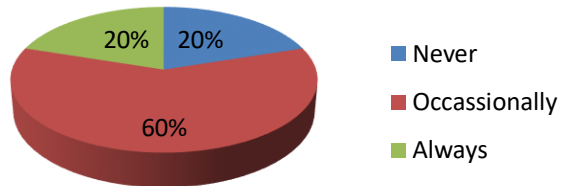
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Safety measures 13 (ASM)**



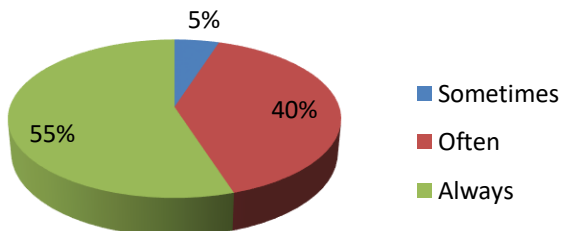
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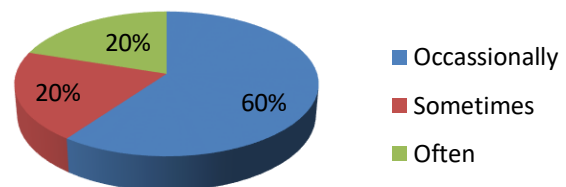
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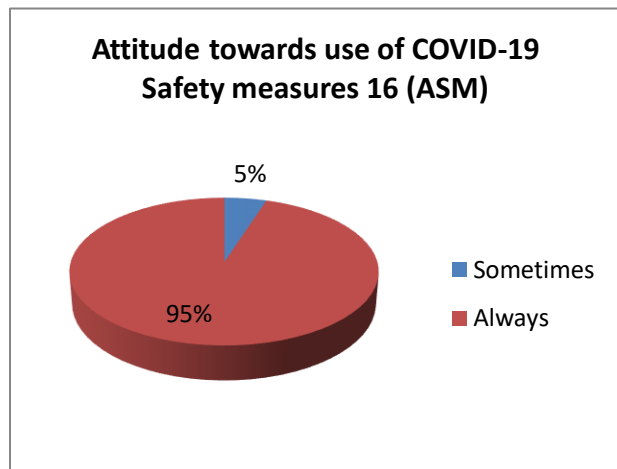
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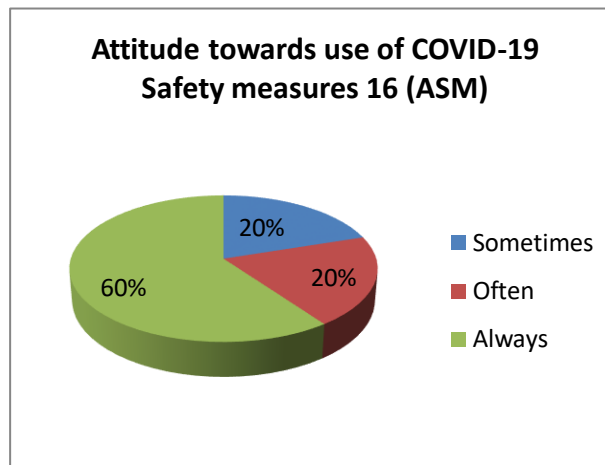
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Safety measures 15 (ASM)**



HCWs Non-COVID-19 Patients



HCWs COVID-19 Patients



5. DISCUSSION AND IMPLICATIONS

Using the experimental design of within-group differences, the purpose of the current study was to explore; how HCWs who are treating COVID-19 patients could be protected by developing their attitude toward the use of COVID-19-related safety measures. The results show that among 25 HCWs, only 5 HCWs were infected with COVID-19 because of their poor attitude toward the use of COVID-19 safety measures. Data were collected using a questionnaire developed through previous studies and the current practices of COVID-19 safety measures which were used in the different hospitals where COVID-19 patients are treated.

There are various implications of the current study. First, using experimental design, theoretically, the current study contributes to the COVID-19 literature by responding to the research question like ‘how the attitude towards the use of COVID-19 safety measures could be promoted. Second, the 16 COVID-19 safety measures which were used are validated by the respondents as those who were using these measures with high frequency, all remained safe. The theoretical contribution of the current study has shifted the attention of researchers from simply investigating the safety measures importance for COVID-19 to the usage of experimental design and training HCWs to use safety measures and find who is protected and who is infected, to the true and relevant safety measures are relevant that help to protect from the COVID-19 infection.

By responding to the research question that how HCWs are protected, we also responded to the suggestions of numerous studies on COVID-19 which recommended using safety measures that provide HCWs to safeguard themselves from COVID-19 infection. For instance, Repici et al. (2020) investigated the coronavirus (COVID-19) outbreak to provide guidelines to the department of endoscopy and stated that it is mandatory to wash hands with alcoholic-based hand rub or alcoholic soap before and after treating COVID-19 patients. Jones et al. (2020) studied important considerations required for contact lens practitioners during the COVID-19 pandemic and reported that it is vital for the public not to touch their eyes, nose, and mouth to protect from COVID-19 infection.

WHO on 19th March 2020, suggested avoiding touching the eyes, nose, and mouth, throwing the tissue in the trash after using it for coughing or sneezing, covering the face with a mask, and finally maintaining social distancing from the person with respiratory symptoms. Almutairi et al. (2015) worked on preventive measures required to deal with the Ebola outbreak (i.e., same as COVID-19) and also supported to use of safety measures like washing hands with alcoholic soap, avoiding touching the eyes, nose, and mouth, cover my nose and mouth with a tissue when coughing or sneezing, throw the tissue in the trash after use, use a face mask to cover my nose and mouth in the crowded places, and when have flu (or any coronavirus symptoms) symptoms appeared, then avoid normal activities such as going to work for school, travel, shopping, etc. Tillu et al. (2020) studied the public health approach of Ayurveda and Yoga for COVID-19 Prophylaxis and stated that drinking hot water helps people to shield their selves against COVID-19. Ali and Alharbi (2020) also supported that drinking hot water frequently is helpful during the COVID-19 pandemic. Panda et al. (2020) studied Ayurveda practitioners’ consensus to work on the strategies for the treatment and prevention of COVID-19. Panda and colleagues also support that taking warm water and food is a useful tool to handle COVID-19.

On 19th March 2020, WHO (2020) stated it is important to disinfect the hospital environmental surfaces like equipment, and food services utensils. Disinfect surface eliminates the risk of COVID-19 which not only protects HCWs but also keeps the environment conducive to patients' health improvement (accessed 17 January 2020; accessed 20 January 2020; (Neely & Nading, 2017). Extra activities like going to the park, and any other public places are uselessly prone to greater risk and symptoms of COVID-19. As a healthcare worker, the most important way of life is to get quarantined all the time after duty (Sohrabi et al., 2020; Zandifar & Badrfam, 2020). As COVID-19 is transmitted from human to human, therefore at a greater level, it is important, not to share anything with others like the car, etc. As using Acoholic soap is a good source, but all the times it's not possible to wash hands, therefore hand sanitizer is another option to use before and after touching anything (Cascella, Rajnik, Cuomo, Dulebohn, & Di Napoli, 2020; Repici et al., 2020). Finally, the hospital management should make it a law for HCWs to cover their selves with personal protective equipment before attending to any COVID-19 patients.

As we found the support of 16 safety measures from other studies' suggestions and through using experimental design, in the current study, the empirical data validated these measures, as most of the HCWs who were using these measures with high frequency, remained safe, and we suggest that practitioners should apply these findings in the health care settings. In hospital settings, there should be a code for using COVID-19 safety measures. Moreover, HCWs should also be stressed to use safety measures at their homes as well. Therefore, using these measures HCWs can be protected from COVID-19, so the war against COVID-19 could be won with the active role of HCWs. Since there is no special vaccine is invented to use for COVID-19 patients, therefore the implications of the current study are also valid post-COVID-19.

6. CONCLUSION

Since the start of COVID-19 in December 2019, this virus is transmitting from all parts of the world and has taken the lives of people in millions including HCWs. Despite the fact, technological advancement and advanced medical technologies, the human being on this earth couldn't challenge yet the COVID-19. There is no vaccine made yet and right now the only solution is to show a strong attitude toward the usage of COVID-19-related safety measures. Besides, the active role of HCWs is required, as they are the frontline soldiers who are working day and night to treat COVID-19 patients. For this purpose, we conducted an experimental study, and HCWs were trained to use COVID-19-related safety measures. Data were collected after 15 days, and we found that out of 25 HCWs, 20 of them who used safety measures with the frequency of always, they were safe and healthy, but five (5) HCWs who showed poor attitude towards the use of COVID-19 related safety measures, they became the victim of COVID-19.

Despite the strengths of the current study, some limitations need the attention of future researchers. First, although it was difficult to engage HCWs for the experimental research during this pandemic, however still we suggest future researchers conduct more studies with more sample sizes. Second, even though 16 COVID-19-related safety measures were validated by the data of the current research study, however, research studies have suggested using more COVID-19-related safety measures like first instead of using N-95 masks, using powered air-purifying respirators (PAPRs) which a protection range of 25 to 1000, however, protection range of N95 is only 10 (Institute of Medicine, 2015; Tay et al., 2020), second, use of video screen to examine the COVID-19 patients and third disposable endoscope is also useful (Givi et al., 2020). Use of these safety measures along with 16 safety measures used in the current study, our suggestion to future researchers is to conduct more experiments, to better understand what are the other COVID-19-related safety measures that can protect HCWs against COVID-19.

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