



Knowledge, Perception, Practice, and Stress Level regarding COVID-19 among Health Care Workers in Sohag University Hospital

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ABSTRACT

Background: The knowledge and attitude of healthcare workers (HCWs) about COVID-19 influence the behavioral dynamics during the pandemic. HCWs are at increased risk of developing stress-related problems during outbreaks. **Objectives:** To explore the knowledge, perceptions and practices of HCWs and determine the degree of stress during COVID-19 pandemic. **Method:** A cross-sectional study was carried out on 455 HCWs at Sohag University Hospital from April to September, 2021. A structured questionnaire about personal characteristics, knowledge, perception, and practices regarding COVID-19 and its related stress was completed by a convenient sample of HCWs. **Results:** All HCWs attended tutorial sessions about COVID-19 and the official governmental website was the source of information among more than half of them. Almost all (98%) HCWs had a good knowledge level whereas only 44.2% had a good perception. There was a significant moderate positive correlation between knowledge and perception level regarding COVID-19 among HCWs. Knowledge was significantly higher among males whereas perception was significantly higher among females. More than half of HCWs were confident about the effectiveness of PPEs in protecting them from infection and they received formal training about the proper use of PPEs at the beginning of the COVID-19 pandemic. Most HCWs (78%) had mild/moderate stress level whereas the remaining 22% had moderate/high stress. Stress level was significantly higher among physicians. **Conclusion:** Despite good knowledge, pitfalls like poor training about use of PPEs, knowledge uncertainties and fear of disease acquisition among HCWs need to be addressed. Psychological support programs for HCWs are required.

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INTRODUCTION

In the first week of March 2020 the outpouring of the novel coronavirus disease (COVID-19) cases reached more than 100 countries, with cases exceeding 100,000. Health authorities have already launched awareness and preparedness activities across borders. Inadequate understanding of the disease by health

care workers (HCWs) can delay treatment and spread the disease rapidly.¹

The knowledge, attitude and practices (KAP) of HCWs about COVID-19 are influencing the behavioral dynamics during the pandemic.² Little is known about the knowledge and concerns of HCWs, and about their

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organizational readiness to deal with the sudden gush of cases that had great burden on health care systems in even the most advanced countries of Europe, America and Asia.³ Understanding knowledge of HCWs is crucial for establishing and understanding perceptions and preventive behaviors affecting coping interventions.^{4,5} COVID-19 knowledge, perceptions, and practice among HCWs and their fears and concerns about disease impact on them is actually correlated to their levels of stress and mental health status.⁵ Despite good knowledge, medical professionals especially doctors and nurses, still fear contracting the disease. They are in dangerous situations during their daily life. If they are not careful enough, they will get infected.⁶

HCWs develop stress-related problems during outbreaks due to overwhelming clinical workload, overcrowded work schedules, fear of contagion, and inadequate/inefficient protective equipment.^{7,8,9} Moreover, concerns about the possibility of passing the virus to family members are also a major factor in their anxiety.¹⁰ Workplace related stress and burnout are more common among HCWs during infectious disease pandemics.¹¹ The prevalence of infection and death among HCWs, previously reported in SARS and MERS, is now reporting social and psychological distress in COVID-19.¹² All of these problems increase social isolation, loneliness, fear of illness or death, fear of separation from family, anxiety, depression, insomnia, sleep disturbances and emotional distress.⁹ Chronic or accumulated stress can easily lead to dysfunction, inefficient work, absenteeism and/or turnover.⁵

It is necessary to assess the KAP to identify key knowledge gaps and assess the psychological impact on HCWs.¹³ The objectives of the current Study were to explore the knowledge, perception and practices of HCWs regarding COVID-19 and to determine the degree of COVID-19 related stress and the stress management procedures among HCWs.

METHOD

A cross-sectional study was carried out from April-September 2021 at Sohag university hospital, Sohag Governorate.

HCWs (physicians & nurses) belonging to Sohag University hospital and not recruited in any administrative positions at the survey time.

Sample size was calculated using open-source EPI info version 3.01, using the expected frequency of good knowledge and positive perception about COVID-19 among HCW is 72.3% and 52.9% respectively according to Giri et al.¹⁵, 95% confidence interval, design effect =1, the calculated sample size was 299 and 369 respectively. In the present study, 455 HCW completed the questionnaire. Regarding stress questionnaire, it was completed by 414 HCWs out of the 455.

A convenience sample was used to recruit the study participants. Participants were recruited from the following departments: medical departments (internal medicine, tropical medicine, and chest), surgical departments (neurosurgery, plastic surgery, cardiothoracic surgery), and pediatric, dermatology and radiology departments. Participants completed the questionnaire in their convenient time, according to the workload in this critical time. Their responses were strictly anonymous to avoid cognitive bias.

Data collection tool: A structured questionnaire was used as the research instrument. Questions included participant characteristics, Knowledge, sources of information and perception about COVID-19. Knowledge and perception assessment tools were specifically adopted from Bhagavathula et al.¹ Knowledge was assessed by questions focused on COVID-19 etiology, signs and symptoms, transmission and risk prevention. Each response was rated as '1' (correct) or '0' (incorrect). Knowledge and perception questions was labeled as good (scored as "1") or poor perception (scored as "0"). There were two statements which were to be responded negative. *Scoring:* Knowledge and perception scores ranged from 0 to 7. A cutoff level of ≤ 5 ($\leq 60\%$) was considered poor knowledge, whereas a score >5 ($>60\%$) was considered adequate knowledge. The participants' perceptions are classified as good (score >5) or poor (score ≤ 5) according to Upadhyaya et al.¹⁴ Stress and stress management questionnaire were adopted from Raghavan et al., 2020.⁵ The questionnaire consists of 25 questions. Each question should be answered by one of a 5-point Likert scale ranges from 0-4 (Never=0, seldom=1, sometimes=2, often=3 and always=4). The total score ranges from 0-100. A higher score indicates a greater degree of stress. A score of 0-25 denotes no or mild stress, 26-50 denotes a low to moderate degree of stress, 51-75 denotes a

moderate to high degree of stress, and 76–100 denotes a very high degree of stress.

Validation: Data collection tools were tested for validity by a panel of 3 experts of faculty members to determine whether the included items are comprehensive, understandable, applicable, clear, and suitable to achieve the aim of the study before pretesting among 20 randomly selected HCWs (not included in the final sample). No refinement was required. The stress questionnaire was tested for reliability. The analysis revealed an overall Cronbach's alpha score of 0.87, indicating higher internal consistency.

Statistical analysis: Descriptive statistics included frequencies and proportions for qualitative data and mean \pm SD for quantitative data. Inferential statistics included independent sample t-test to compare means, Chi-square test to investigate the association between qualitative variables, and Pearson's correlation to detect association between quantitative variables. All tests were considered significant if p-value \leq 0.05. Data were entered, coded, recoded (if necessary), and analyzed using SPSS for Windows version 20 (SPSS Inc., Chicago, IL, USA).

RESULTS

About two thirds of respondents were physicians and one third were nurses. More than three quarters of participants were less than 25 years. Males represented 61.5% of respondents (Table 1). All HCWs heard about COVID-19 and had attended tutorial sessions about it. More than half of them were using the official governmental website as a source of information. The vast majority of HCWs think about the multiple modes of transmission of COVID-19, know the symptoms, incubation period, and methods of prevention. Most participants think that COVID-19 can be complicated by respiratory failure and death. About 80% of participants think that COVID-19 originates from bats and supportive treatment is the current available (Table 2).

Table (3) shows that 72.3% of HCWs perceived COVID-19 as fatal. Just 82.6% consider the role of hand washing in preventing COVID-19 and 5.9% consider the role of influenza vaccine in preventing it. The majority are convinced about the preventive role of equipment disinfection and the safety of using well cooked meat. All HCW reported availability of the required infrastructure and personal protective

Table 1: Sociodemographic characteristics of health care workers.

	No. (455)	%
Profession:		
Physician	296	65.1
Nurse	159	34.9
Age:		
\leq 25 years	352	77.4
$>$ 25 years	103	22.6
Gender:		
Male	280	61.5
Female	175	38.5

equipment (PPEs) to avoid infection except the screening tents/facilities as no one reported their availability. Only 54.7% of HCWs were confident about the effectiveness of PPEs in protecting them. More than half of HCWs just received formal training about the proper use of PPEs after the beginning of the COVID-19 pandemic (Table 4). All HCWs practiced risk reduction measures to avoid infection while screening/assessing patients (Table 5). Only 13.8% of HCWs reported direct care to a confirmed COVID-19 case and none of them attended aerosol generating procedure. All HCWs reported that ambulance was the only mode of transportation of COVID-19 cases to the isolation hospital. About one fifth of HCWs considered negative patients on screening as normal persons and can move freely (Table 6).

Fig. (1) shows that the vast majority of HCWs had good knowledge whereas only less than half of them had positive perception. Fig. (2) shows that there is a significant moderate positive correlation between knowledge and perception score regarding COVID-19 among HCWs. Gender affected both knowledge and perception level about COVID-19. Knowledge level was significantly higher among males whereas positive perception was significantly higher among females. Neither job nor age affected knowledge or perception level (table 7). Fig. (3) shows that most of HCWs (78%) had mild/moderate stress level whereas the remaining one fifth had moderate/high stress. Stress level was significantly higher among physicians than nurses. Neither age nor gender affected stress level (Table 8). Only two thirds of HCWs were relying on verified information sources in COVID-19 updates. More than 60% experienced less sleep than usual and would consider receiving psychological support if available. More than half of

Table 2: Knowledge about COVID-19 among health care workers

	No. (455)	%
Knowledge:		
- Previous hearing about novel corona virus (COVID-19)	455	100
- Ever attended any tutorial sessions/discussions about COVID-19	455	100
Source of information about COVID-19:		
- Official government website	260	57.1
- Training by the hospital management/MOH	195	42.9
Knowledge about COVID-19:		
- COVID-19 originates from bats	361	79.3
- COVID-19 has many transmission routes; airborne, feco-oral and contact	426	93.6
- COVID-19 has many symptoms; headache, fever, cough, sore throat, and flu	438	96.3
- The incubation period of COVID-19 is 2-14 days	425	93.4
- Pneumonia, respiratory failure, and death are complications of COVID-19	438	96.3
- Supportive care is the current treatment for COVID-19	365	80.2
- Hand washing, and cough etiquette help in the prevention of COVID-19 transmission.	438	96.3

Table 3: Perception about COVID-19 among health care workers

	No. (455)	%
Symptoms appear in 2-14 days	377	82.9
The disease is fatal	329	72.3
Influenza vaccine can prevent infection by COVID-19	27	5.9
Eating well-cooked and safely handled meat don't transmit the disease	419	92.1
HCWs should know about patient travel history	371	81.5
Equipment and wet markets should be disinfected at least once daily	410	90.1
Hand washing help in prevention of COVID-19 transmission	376	82.6

them had excessive fear and worry about their health. More than 70% are engaged in their spiritual and religious activities as usual (table 9).

DISCUSSION

The present study showed that -as expected- all HCWs already heard about COVID-19. This is conforming to Raghavan et al.⁵ while the present study reported that all HCWs received official tutorial sessions/discussions about COVID-19 which is higher than their findings. Source of information about COVID-19 was either the official governmental website or through training by the hospital management/MOH or WHO. This good finding is higher than the reports of many other studies.^{1,5,16,17} Because the other studies were conducted earlier than the present study, news media including

Table 4: Availability of infra structures to avoid COVID-19 infection as reported by health care workers

	No. (455)	%
HCW reporting about availability of infra structures to avoid COVID-19 infection:		
- Hand washing facilities	455	100
- Soap/solution for hand wash	455	100
- Sanitizer	455	100
- Toilet	455	100
- Masks	455	100
- Thermometer	455	100
- Screening Tents/Facilities	0	0
Confidence of HCW about effectiveness of PPEs:		
- Confident	249	54.7
- Somewhat confident	206	45.3
Receiving formal training on the proper use of PPEs:		
- Pre-employment training	192	42.2
- Within the last 2 months due to current pandemic	263	57.8

Table 5: Risk reduction measures against exposure to COVID-19 among HCWs while screening or assessing patients.

	No. (455)	%
- Gloves	455	100
- Surgical masks	455	100
- Disposable, fluid resistant gown	455	100
- Goggles	455	100
- Regular hand hygiene	455	100
- Face Shield	455	100

Table 6: Practice of HCWs with COVID-19 patients

	No. (455)	%
Practice of HCW with COVID-19 patient		
- Provided direct medical care to a confirmed case	63	13.8
- Had direct contact (within one meter) with a confirmed case	35	7.7
- Had direct contact with the environment where confirmed cases were managed	17	3.7
- Provided health care in another health facility during the pandemic period	38	8.4
- Attended aerosol generating procedure done to COVID-19 patient	0	0
- Transportation of all confirmed or suspected cases was done by ambulance to isolation hospital	455	100
Advice if a patient's COVID-19 test result is negative:		
- No measures are needed, and they are managed as normal person (free to move)	95	20.9
- If they had travel history and/or had close contact with COVID-19 case, so they need to complete the full 14-day quarantine period	216	47.5
- If they are still sick with the same illness at the end of the 14-day isolation period, they will need to stay in isolation until they have been symptom-free for 48 hours	144	31.6

Table 7: knowledge and perception among HCWs according to their sociodemographic characteristics

	Knowledge		P-value	Perception		P-value
	Good	Poor		Positive	Negative	
Job:						
Physician	290 (98.0%)	6 (2.0%)	1.0	123 (41.6%)	173 (58.4%)	0.1
Nurse	156 (98.1%)	3 (1.9%)		78 (49.1%)	81 (50.9%)	
Gender:						
Male	279 (99.6%)	1 (0.4%)	0.003	93 (33.2%)	187 (66.8%)	<0.001
Female	167 (95.4%)	8 (4.6%)		108 (61.7%)	67 (38.3%)	
Age:						
≤25 years	345 (98.0%)	7 (2.0%)	1.0	156 (44.3%)	196 (55.7%)	0.9
>25 years	101 (98.1%)	2 (1.9%)		45 (43.7%)	58 (56.3%)	

radio, television and print media were the major source of information related to COVID-19. However, HCWs and scientists have warned that misinformation about COVID-19 is widespread and constitute a serious problem that is fueling xenophobia around the world. In this regard, healthcare professionals should carefully evaluate information related to COVID-19 and use scientific and reliable contents as sources.¹ The vast majority of HCWs think about the multiple modes of transmission of COVID-19, know the symptoms, incubation period, and methods of prevention. Also, most participants think that the disease leads to respiratory failure and death and think that supportive treatment is the only available. All these findings are in concordance with Raghavan et al.⁵ Most participants think that COVID-19 originates from bats which is higher than the percent reported by Bhagavathula et al.¹ and Raghavan et al.⁵ This can be due to getting the same information from the

verified sources of knowledge and/or during the formal tutorial sessions attended by participants. Regarding perceptions about COVID-19, about three quarters of HCWs perceived COVID-19 as fatal, although the international knowledge realize that the disease is curable and the case fatality rate is about 2%.¹ On the contrary, Bhagavathula et al.¹ and Raghavan et al.⁵ reported much lower percent. Although it is well known that hand hygiene is the single most important infection prevention and control measure, unfortunately just 82.6% consider its role in preventing COVID-19. The remaining percent may think about other modes of virus transmission (arthropods) or they may be not sure about the mode of transmission. In addition, they may observe that highly cautious and clean individuals are also susceptible to infection, so they are still in doubt about the preventive role of hand hygiene. This is conformed to the finding of Bhagavathula et al.¹ whereas Raghavan et al.⁵ reported higher percent.

Table 8: Stress level among HCWs according to sociodemographic characteristics

Personal data	Stress score (Mean ± SD)	T-test	P-value
Age:			
< 25 years	44.2 ± 8.8	t=0.87	0.4
>25 years	43.4 ± 8.7		
Job:			
Physician	47.2 ± 8.5	t=11.6	<0.0001
Nurse	38.1 ± 5.4		
Gender:			
Male	43.99 ± 8.7	t=0.02	0.9
Female	44.0 ± 8.7		

Only few percent of participants considered the role of influenza vaccine in preventing COVID-19. This finding is conformed to Bhagavathula et al.¹ This finding could be because the new pandemic with high morbidity and mortality is caused by novel corona virus and may be one of the bioterrorism agents or originated due to genetic shift of the virus, so they are not realizing that it can be prevented by the influenza vaccine. The majority are convinced about the preventive role of equipment disinfection and the safety of using well cooked meat. This is conformed to the reports of Raghavan et al.⁵ While higher than that of Bhagavathula et al.¹

As regards availability of the required infrastructure and PPEs to avoid COVID-19 infection, all HCW reported their availability (except for the screening tents/facilities). Moreover, all HCWs practiced risk reduction measures to avoid infection while they are screening/assessing patients. This is higher than the reports of Raghavan et al.⁵ and Galal et al.¹⁷ More than half of HCWs were confident about the effectiveness of PPEs in protecting them from infection and they just received formal training about the proper use of PPEs after the beginning of the COVID-19 pandemic. This is higher than the reports of Raghavan et al.⁵ In Canada, only half of participants reported proper donning on PPEs and just one third reported proper donning off.¹⁸ Still the reported percent is unsatisfactory as all HCWs should receive technical training on proper PPEs donning on and off. This is very important in increasing their confidence about the protective role of PPEs. Tutorial videos and illustrations are available at CDC and WHO websites. Hand hygiene and PPEs are main components of standard precautions that should be applied to all patient as indicated regardless of the specific pandemic situation. They constitute a cornerstone in protecting HCWs.

Table (9): Stress management among HCWs during COVID-19,

	No. (414)	%
- Relying on substantial sources of information about COVID-19	276	66.7
- Taking a break from work to focus on your breathing and regularly taking deep breaths	234	56.5
- Sleeping less than usual	264	63.8
- Maintaining regular contact with friends and family	306	73.9
- Consider receiving psychosocial support if it was available	252	60.9
- Engaged in usual religious/spiritual practices as normal	294	71.0
- Having excessive fear and worry about your own health and the health of your loved ones	234	56.5
- Feeling sadness, anger, or frustration because friends or loved ones have fears of being infected from you because of your work	186	44.9

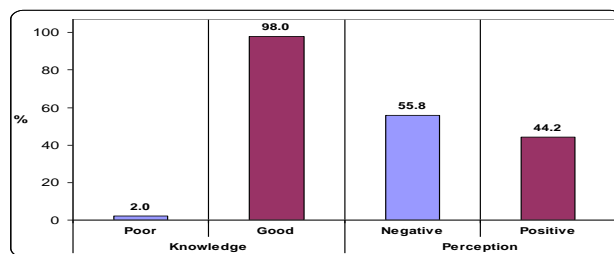


Figure 1: Knowledge and perception level regarding COVID-19 among HCWs

Ambulance was the only transportation method of COVID-19 cases. This is much better than the reports of Raghavan et al.⁵ About one fifth of HCWs considered negative patients on screening as normal persons and can move freely. This information needs to be corrected based on the fact about low sensitivity (60%) of the screening test.

The vast majority of HCWs had satisfactory knowledge about COVID-19. This is higher than the reports of many other studies.^{1, 11,13,14,16,17, 19} However, the present study was conducted after the other studies, so participants had enough time to get more information and attend more tutorial sessions. Moreover, differences among studies' results may be due to many factors including differences in methodological methods and tools, differences in knowledge sources and information retrieval, and lack of training/education programs due to overwork and

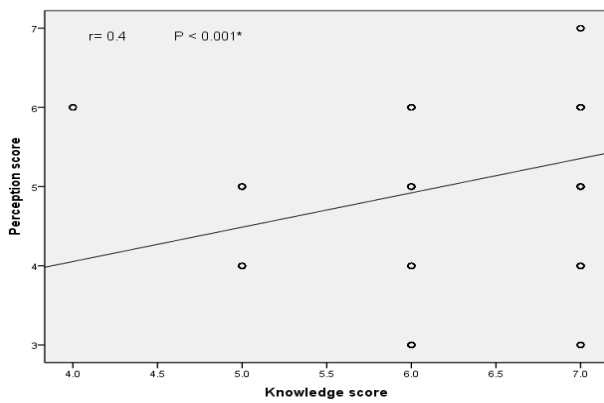


Figure 2: Correlation between knowledge and perception regarding COVID-19 among HCWs

exhaustion of HCWs specially at the beginning of the pandemic.

Unfortunately, in the present study less than half of HCWs had a positive perception regarding COVID-19. On the other hand, Gopalakrishnan et al.¹³ in India, Haghighi et al.¹⁹ in Iran and Galal et al.¹⁷ in Egypt reported much higher percents. Moreover, Elbqry et al.¹¹ reported that nearly all of the participants had positive perception. This may be due to the higher percent of mortality among HCWs observed all through the pandemic that participated in increasing the negative thoughts among HCWs about the disease. Knowledge level was significantly higher among males, whereas females had significantly better perception about COVID-19. This may be due to more searches and retrieval of news, greater interaction, and socialization among males. Whereas females are giving more care to disinfection, hand hygiene and safe food during the pandemic (because they are more anxious about kids and family care) which are included in perception evaluation. The finding is in concordance with Zhang et al.,⁶ Gopalakrishnan et al.¹³ and Upadhyaya et al.¹⁴ On the other hand, Haghighi et al.¹⁹ reported significant association between male gender and positive perception.

The present study showed no significant role of profession on knowledge score. This may be due to attending the same formal tutorial sessions and also searching the governmental website about the new pandemic by all HCWs regardless of their job. This is in concordance with the finding of Alreshidi et al.³ but disagree with Bhagavathula et al.¹, Galal et al.¹⁷ and Haghighi et al.¹⁹ who reported that doctors were more knowledgeable than nurses. Participants showed no

significant difference in knowledge score by age. On the other hand, Alreshidi et al.³ and Gopalakrishnan et al.¹³ reported significantly higher knowledge among older HCWs whereas, Galal et al.¹⁷ reported better knowledge among juniors. Higher knowledge among juniors may be due to higher contact with the social media and all internet sources, whereas some seniors may be more worried about disease complications and fatality. Profession showed no significant effect on HCWs' perception about COVID-19. This disagree with the finding of Galal et al.¹⁷ and Haghighi et al.¹⁹ Positive correlation was recognized between knowledge and perception. This indicates that more correct knowledge is associated with better perception toward the disease or health problem. This is conformed to the finding of many other studies^{6,19,20}. On the other hand, Galal et al.¹⁷ reported significant negative correlation between knowledge and attitude scores.

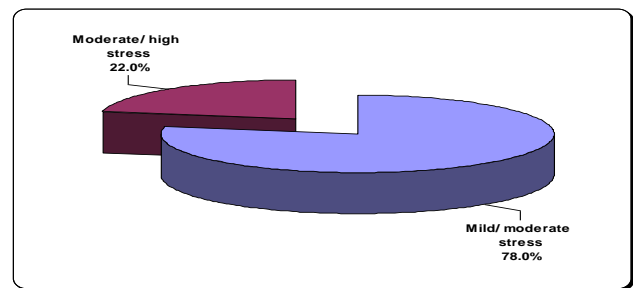


Figure 3: Stress level categories among HCWs

As regards degree of stress, most of HCWs had low/moderate stress whereas the remaining one fifth had moderate/high stress. This is much higher than the stress level reported by Raghavan et al.⁵ in Afghanistan. This may be due to the repeated conflicts and war in their community, so they used to manage highly dangerous situations all the time not only at the pandemic time. On the other hand, Elbqry et al.¹¹ and Afulani et al.²¹ reported higher stress levels. However, the different communities, spiritual backgrounds and the different tools used in different studies must be taken into consideration while interpreting and comparing the results in addition to the different personal experience of the participants; death of a close relative, friend or colleague and other bad social experiences related to the pandemic in general. A systematic review and meta-analysis study reported the overall prevalence of stress amidst the COVID-19 pandemic among one third of all HCWs.⁸ whereas,

Teshome et al.⁹ reported stress among two thirds. Stress level was significantly higher among physicians than nurses. This may be due to the decision taking responsibility and the fear of complications that can occur to their patients.

Only two thirds of HCWs were relying on verified information sources in COVID-19 updates. More than 60% experienced less sleep than usual and would consider receiving psychological support if available. More than half had excessive fear and worry about their health. More than 70% are engaged in their spiritual and religious activities as usual. However, Raghavan et al.⁵ reported a higher percent in all stress management items. Many HCWs struggle with common mental health problems; depression, anxiety, insomnia, and hopelessness. They can be supported by strengthening their team, discussing decisions, and providing regular contacts to check on their mental health and wellbeing.¹

CONCLUSION AND RECOMMENDATIONS

The vast majority of HCWs had adequate knowledge, but less than half had positive perception towards COVID-19. Knowledge was significantly higher among males whereas perception was significantly higher among females. Stress level was significantly higher among physicians. However, pitfalls like poor training about use of PPEs, knowledge uncertainties and fear of disease acquisition among HCWs need to be addressed. psychological support programs for HCWs are required. All these measures learned from the COVID-19 experience should be a cornerstone in facing any pandemic or even local epidemic or infectious disease.

Ethical Approval

The study obtained all required approvals from the Institutional Review Board (or other appropriate ethics committee) of Sohag University.

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Author contributions: Taghreed Ismail: literature search, analysis interpretation and writing. Mohammad Mostafa: literature search, discussion and

critical review. Safaa Khalaf: tool preparation and revision and data collection. Magda Ali: Idea, data collection, tool preparation.

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