Emergence of COVID-19 infection and Healthcare Workers in Karachi, Pakistan

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Abstract

Objective: The objective of the study was to investigate the knowledge, attitude and practice (KAP) regarding novel coronavirus disease 2019 (COVID-19) among healthcare workers in Karachi Pakistan.

Methods: This was a cross-sectional study conducted at medical unit 3, Jinnah Postgraduate Medical Centre, Karachi by using a self-reported questionnaire-based survey from March 2020 to May 2020. A convenience sampling technique was used to recruit the consenting HCWs of all categories (doctors, nurses, pharmacists and technicians) who were currently providing services at different hospitals of Karachi. The non-consenting and unavailable doctors were excluded from this study. The questionnaire was developed by using the frequently asked questions from the WHO and Centre for Disease Control (CDC). The healthcare workers knowledge, attitude and practices related to COVID-19 were used as outcomes. Healthcare workers were approached by investigators and survey instrument was made accessible through a link on social media (WhatsApp, Facebook, and emails). Binary logistic regression analysis was performed to estimate the odds ratio with 95% confidence interval for KAP of HCWs regarding COVID-19. P-values less than 0.05 were considered statistically significant.

Results: A total of 553 subjects completed the study questionnaire. However, data of 547 (98.9%) participants was selected for inclusion in final analysis after excluding 6 respondents. HCWs gross category and clinical setting were found to be statistically associated with overall KAP (P<0.001 and P=0.048, respectively). Upon logistic regression analysis, KAP scores statistically differed across genders (β coefficient=2.115, SE =0.179 and P<0.001), age groups (β coefficient=2.098, SE =0.138 and P<0.001) and HCWs gross category (β coefficient=2.053, SE=0.135 and P<0.001). The nurses and technicians were found less likely for good KAP with reference to COVID-19 as compared to doctors and pharmacists. These results were found to be statistically significant with P-value less than 0.05; the odds for nurses and technicians were 0.35 and 0.10, respectively.

Conclusion: The study demonstrated that HCWs had good knowledge, optimistic attitude and decent practice towards recent COVID-19 pandemic. However, their source of information regarding COVID-19 is not reliable and can adversely influence the KAP.

Keywords: KAP, COVID-19, Outbreak, Pandemic, Healthcare Workers

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Introduction

In late December 2019, China witnessed a cluster of typical pneumonia cases of unknown etiology, which was later established as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). The resultant pulmonary pathology is then officially named as Coronavirus Disease 2019 (COVID-19)[1]. The COVID-19 had reached pandemic magnitude and therefore World Health Organization (WHO) had categorically acknowledged COVID-19 as a Public Health Emergency of International Concern (PHEIC)[2,3]. The unprecedented speed, with which SARS-CoV-2 disseminated, had forced the nations across the globe to enforce compete lockdown, so as ensure social distancing and break the chain of

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infection. Pakistan has also been challenged with soaring COVID-19 cases. By the end of January, 2021, Pakistan's total number of confirmed COVID-19 cases reached 544,813 and confirmed deaths 11,657, with Punjab and Sindh provinces being the hotspot of cases and fatalities, respectively[4].

Healthcare workers (HCWs) are consistently in contact with COVID-19 patients and are prone to catching COVID-19 infection in this pandemic. It is essential to ensure their safety not only to maintain incessant patient care but also to make sure they do not transmit the infection. Therefore, appropriate measures must be deliberated to contain the dissemination of the infection, especially among HCWs. It should be performed by recognizing the possible risk factors for infection and then by pondering suitable actions to minimize these risks. It is noteworthy to mention that the well-established risk factors for transmission of infection among HCWs are overcrowding, absence of isolation facilities and environmental adulteration. As a matter of fact, it should also be understood that the risk of infection can be further enhanced by inadequate knowledge and awareness of infection control practices[5,6]. Healthcare workers' knowledge of disease, attitudes and practices towards it can significantly predict the direction of infection[7].

The World Health Organization (WHO) has published recommendations for the prevention and control of COVID-19 infection in health care settings[8]. This includes hand hygiene, wearing personal protective equipment and patient placement. Therefore, use of personal protective equipment is crucial to reduce transmission. Gowns and gloves are recommended as a contact precaution and surgical masks are recommended as a droplet precaution. However, these effective infection prevention and control practices depend on awareness and compliance among healthcare workers at all levels. A poor level of knowledge has been implicated in the rapid spread of the infection in hospitals and public[9]. Lately, a study by Zhou et al. (2020) documented sufficient knowledge of COVID-19 among healthcare workers[10].

Healthcare workers are at the forefront of caregiving and hence understanding of the knowledge, attitudes and practices among healthcare workers and potential risk factors assist to foretell the likely consequences of strategic behaviors. The aim of the study was to investigate the knowledge, attitude and practice regarding novel coronavirus disease 2019 (COVID-19) among healthcare workers in Karachi, Pakistan during this global health crisis. This study delivers the one of the initial assessments of knowledge, attitudes and practices of healthcare worker in Karachi during the COVID-19 pandemic. The findings might be useful in recommending any remedial measures and additional interventions in the study area to improve awareness and attitudes and preventive practices among healthcare workers during pandemic in Pakistan.

Subjects and Methods

This was a cross-sectional study using an online self-reported questionnaire-based survey conducted at medical unit 3 Jinnah Postgraduate Medical Centre Karachi which enrolled the healthcare workers of all categories (doctors, nurses, pharmacists and technicians) delivering services at different hospitals of Karachi. A convenient sampling technique was used to recruit the participants from March 2020 to May 2020. Healthcare workers were approached by investigators and survey instrument was made accessible through a link on social media (WhatsApp, Facebook, and emails). The objective of study was briefed to healthcare workers and informed consent was acquired from the willing participants. They were categorically assured for anonymity. Moreover, during data collection all COVID-19 preventive measures were used.

A standardized self administered questionnaire in English language was developed using the frequently asked questions from the WHO and Centre for Disease Control (CDC) to evaluate healthcare workers knowledge, attitude and practices related to COVID-19 as outcomes[11,12]. The questionnaire was pilot tested on 15 healthcare workers (5 doctors, 5 nurses and 5 technicians) who were not in-

cluded among the study participants to determine the acceptability and clarity of the questions, and to confirm its face validity; it was then modified accordingly. The questionnaire comprised of 4 parts. The first part covered demographic data such as age, gender, current position, education and participants' source of knowledge on COVID-19 (7 items). The second part assessed the knowledge of healthcare workers by asking questions about the etiology, incubation period, symptoms, risk group, consequences, source of transmission, prevention and treatment of COVID-19 (9 items). A scoring system was applied to assess the level of knowledge of each subject: 2 points for each correct answer, 1 point for an incorrect answer. A total of $\geq$10 points ($\geq$ 60% of total marks) were considered to represent sufficient knowledge. Participants were grouped into 2 categories according to their level of knowledge: insufficient (< 10 points) and sufficient ($\geq$ 10 points). The third part of the questionnaire evaluated the attitude of healthcare workers regarding COVID-19 using a set of 7 questions and assessment was done on a 5-point scale from strongly agree to strongly disagree. The fourth part of the questionnaire assessed the practice of healthcare workers on prevention of COVID-19 infection. It included 7 questions and assessment was performed the same way as done for second part. It was calculated as adequate and inadequate based on 60 percent cut-off.

Before commencing the study, ethical approval was obtained from Institutional Review Board of Jinnah Post Graduate Medical Centre, Karachi, Pakistan. Research was conducted in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments.

The research data was coded, validated and analyzed using SPSS version 25. Counts with percentages were provided for baseline characteristics. Mean scores were given for KAP of healthcare workers. Pearson Chi-square test was used to check for the association of KAP of COVID-19 with age group, gender, healthcare working category, experience and type of hospitals. Independent sample t-test was performed to compare the mean KAP scores with respect to gender. Binary logistic regression analysis was done to estimate the odds ratio with 95% confidence interval for KAP of healthcare workers regarding COVID-19. P-value less than 0.05 were considered statistically significant.

Results

A total of 553 subjects completed the study questionnaire. However, data of 547 (98.9%) participants was selected for inclusion in final analysis after excluding 6 respondents. Among the participants, 278 (51.5%) belonged to 21-30 years of age group, 154 (28.5%) from 31-40, 83 (15.4%) from 41-50 and 25 (4.6%) were from >50 years group. There were 325 (59.6%) female participants. In healthcare worker gross category, most of them were doctors 408 (74.9%), followed by nurses 74 (13.6%), technicians 45 (8.3%) and pharmacists 18 (3.3%). Over 85% of the subjects were from tertiary care hospital. In addition, nearly one-third of the participants had >10 years of healthcare work experience. The demographic characteristics have been shown in Table 1.

Table 1. Demographic characteristics and variables of study subjects

	Variables	Frequency n(%)
Age groups	21 - 30	278 (51.5)
	31 - 40	154 (28.5)
	41 - 50	83 (15.4)
	>50	25 (4.6)
Gender	Female	325 (59.6)
	Male	220 (40.4)
Healthcare worker category gross	Doctor	408 (74.9)
	Nurse	74 (13.6)
	Pharmacist	18 (3.3)
	Technician	45 (8.3)
Type of clinical setting	Tertiary Care Hospital	468 (86.2)
	Secondary Care Hospital	30 (5.5)
	Primary Health Care Unit/ Personal Clinic	45 (8.3)
Experience in years	<5 years	248 (45.7)
	5 - 10 years	129 (23.8)
	>10 years	166 (30.6)

Knowledge, attitude and practice of study participants regarding COVID-19 was assessed using self-reported questionnaire. Upon questions regard-

ing the knowledge of COVID-19 disease, following correct answer percentages were observed: COVID-19 etiology 540 (97.6%), contagiousness 511 (92.4%), vaccine availability 483 (87.3%), transmissibility 540 (97.6%), incubation period 445 (80.5%), symptoms 547 (98.9%), availability of treatment 414 (75.4%), reported case fatality 468 (84.6%), diagnosis 435 (78.7%) and preventive measures 216 (39.1%).

Similarly, attitude towards COVID-19 infection revealed following correct percentages for agree and disagree statements: hand hygiene as personal responsibility 540 (98.2%), prevention of transmission through precaution 540 (98.2%), getting vaccine shot once available 464 (84.4%), provision of intensive care to all COVID-19 patients 26 (4.7%), healthcare workers should ensure available information 541 (98.2%), sufficient availability of information 95 (17.4%) and ability of government to control COVID-19 epidemic 406 (73.7%).

Finally, practices of study participants towards COVID-19 indicated following correct results: minimum safe distance 288 (52.1%), seasonal flu vaccine 432 (78.1%), hand washing 328 (59.3%), when to use disinfectant 345 (62.4%), appropriate precaution to prevent COVID-19 transmission 464 (84.4%), which personal protective equipment (PPE) to use when dealing with COVID-19 patient 475 (86.2%), precautions after exiting from infected room 475 (85.9%) and measures after discharge of COVID-19 patient 456 (83.5%). The source of COVID-19 knowledge has been depicted in Figure 1.

Our findings did not suggest significant association between gender (P=0.588), age groups (P=0.395), healthcare work experience (P=0.267) and individual and overall knowledge, attitude and practice on Pearson chi-square test. However, healthcare worker gross category and clinical setting were found to be statistically associated with overall knowledge, attitude and practice (P<0.001 and P=0.048, respectively) (Table 2).

Table 2. Association between healthcare worker gross category and knowledge, attitude and practice

Variables		Healthcare Worker Gross Category				
		Doctors N (%)	Nurses N (%)	Pharmacists N (%)	Technicians N (%)	P-value
KAP	No	29 (7.1)	13 (17.6)	1 (5.6)	19 (42.2)	<0.001*
	Yes	379 (92.9)	61 (82.4)	17 (94.4)	26 (57.8)	
Knowledge	No	5 (1.2)	8 (10.8)	0 (0.0)	7 (15.6)	<0.001*
	Yes	403 (98.8)	66 (89.2)	18 (100.0)	38 (84.4)	
Attitude	No	292 (71.6)	48 (64.9)	15 (83.3)	27 (60.0)	0.166
	Yes	116 (28.4)	26 (35.1)	3 (16.7)	18 (40.0)	
Practice	No	167 (40.9)	17 (23.0)	2 (11.1)	24 (53.3)	<0.001*
	Yes	241 (59.1)	57 (77.0)	16 (88.9)	21 (46.7)	

Abbreviation: KAP, Knowledge, Attitude and Practice
*p<0.05 was considered significant for Pearson Chi-square Test

Upon logistic regression analysis, knowledge, attitude and practice scores statistically differed across genders (β coefficient=2.115, Standard Error=0.179 and P<0.001), age groups (β coefficient=2.098, Standard Error=0.138 and P<0.001) and healthcare worker gross category (β coefficient=2.053, Standard Error=0.135 and P<0.001). Finally, binary logistic regression analysis showed that nurses and technicians were found less likely for good KAP with reference to COVID-19 as compared to doctors and pharmacists. These results were found to be statistically significant with P-value less than 0.05; the odds for nurses and technicians were 0.35 (Confidence Interval=0.17-0.72) and 0.10 (Confidence Interval=0.05-0.21), respectively.

Discussion

The present research is among the other few studies which methodically evaluated the knowledge, attitude and practice of healthcare workers toward COVID-19 epidemic in Pakistan[13,14,15]. This study was conducted in an early phase of spread of COVID-19 infection, therefore, it provides the baseline information for knowledge, attitude and practices among health care workers. While personal protective equipment (PPE) like gloves, protective gowns, goggles and face shield is necessary to effectively combat COVID-19, good knowledge, positive attitude and ideal practice among healthcare workers cannot be underestimated. Not

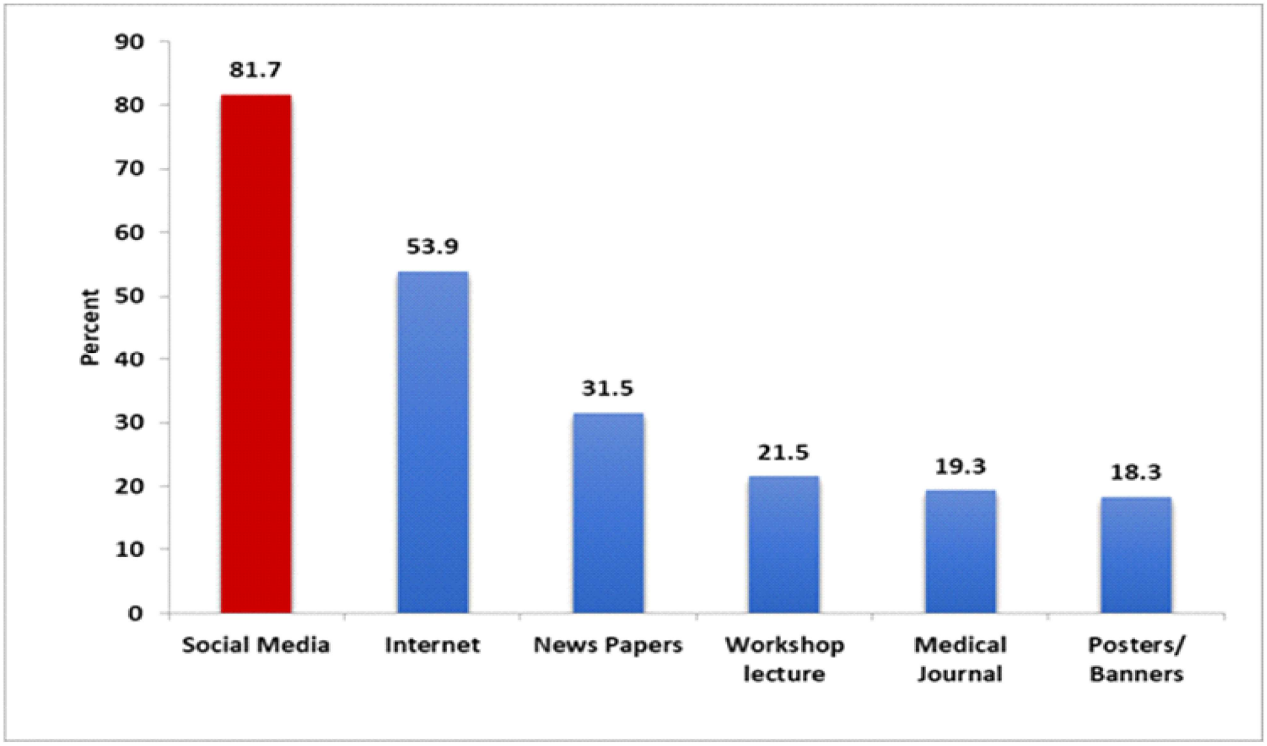

Fig 1. Source of knowledge about COVID-19 for study participants

to mention that compliance to such preventive measures convey positive vibes and can also influence people around such as patients, family members and friends[16].

Results of the current cross-sectional survey highlighted that most of the healthcare workers (88.6%) had good overall and optimum knowledge (96.2%), however poor attitude (29.7%) and modest practice (61.5%) regarding COVID-19. The overall findings of knowledge, attitude and practice of healthcare workers were in line with previous study performed in Pakistan by Saqlain et al. (2020)[13]. Interestingly, 81.7% of the healthcare workers utilized social media as a primary source of information, whereas only 21.5% and 19.3% of the participants enhanced their knowledge regarding COVID-19 from workshop, lectures and medical journals, respectively. These results are in agreement with Saqlain et al. (2020) and Giao et al. (2020). Both studies documented that 87.7% and 91.1% of the healthcare workers used social media as a key information source of COVID-19, respectively[13,17]. Likewise, another study reported over 60% of the subjects to be using social media for COVID-19 information[18]. There is plethora of information available regarding COVID-19; however, unauthentic information can mislead and create unnecessary fear among people[15,19]. Therefore, healthcare workers should be vigilant while seeking information of COVID-19[18]. In this sense, it is obligatory to provide educational and training sessions to all healthcare workers at their work places who are directly involved with COVID-19 patients. These training sessions should be regarding the preventive procedures, treatment process, and guidelines that should be followed by healthcare workers.

Our study findings of optimum knowledge among healthcare workers are consistent with Saqlain et al. (2020) who communicated 93.2%, Giao et al. (2020) (88.4%), Zhou et al. (2020) (89%) and Shi et al. (2020) (89.5%)[10,13,17,20]. High knowledge is of utmost importance to curtail spread of the SARS-CoV-2, especially in circumstances when there was no available treatment. It is noteworthy to

mention that 17.9 percent of the subjects nodded for influenza vaccine for protection against COVID-19. In this regard, one research study from Pakistan reported that over 20 percent of the healthcare workers had similar misconception[13]. Our findings are comparatively high from that of recent study by Bhagavathula et al. (2020) which cited 9.1% poor knowledge regarding no clinical benefit of flu vaccine in COVID-19 infection[18]. Despite global phenomenon, extreme knowledge gap was prevalent among healthcare workers during initial phase of pandemic. Hence, it is need of the hour to clear myths prevailing among healthcare workers and educate them regarding all aspects of infection management and prevention.

We found that pharmacists had statistically higher knowledge (100%) of COVID-19 in comparison with other categories of healthcare workers. Similar findings were also observed by two earlier studies[13,17]. During MERS outbreak, two research studies by Khan et al. (2014) and Albarrak et al. (2019) also confirmed that pharmacists had comparatively higher knowledge of MERS infection[21,22]. Conversely, Bhagavathula et al. (2020) found physicians to have substantially higher COVID-19 knowledge[18]. These findings suggest significant disparities of knowledge among healthcare workers. High knowledge among pharmacists could be due to their active involvement in treatment of COVID-19 patients and research as inherent part of their job. These results can further be explained by the fact that pharmacists acquire and update knowledge by involving in dispensing, storing and supplying medicines, devices, masks as responsibility of their job.

It is vital to mention that during pandemic the attitude of healthcare workers can be affected by increased infection exposure risk and workload. The attitude of healthcare workers is key to improve patient care and in developing preventive strategies. Our study findings demonstrated positive attitude among healthcare workers towards following hand hygiene and other preventive measures. One plausible explanation could be high knowledge of COVID-19 which is directly proportional to positive attitude towards health. A study from Pakistan12 and two other studies[17,18] also conveyed same findings. Findings related to practice revealed that majority of the healthcare workers have ideal practice towards COVID-19. However, ideal hand washing practice was observed for just over 50 percent of the healthcare workers and reflects their actual hand washing practice, which is in contrast with the results reported by Khan et al. (2014) and Nour et al. (2017)[21,23].

Our findings did not suggest significant association between gender, age groups, healthcare work experience and individual and overall knowledge, attitude and practice. However, healthcare worker gross category and clinical setting were found to be statistically associated with overall knowledge, attitude and practice. Similarly, knowledge, attitude and practice scores statistically differed across genders, age groups and healthcare worker gross category. One reason of this finding could be higher overall healthcare knowledge and educational background among doctors and pharmacists and tertiary care hospitals being at the centre of education, healthcare service and research. Lastly, the nurses were found to have lesser odds of having good knowledge, attitude and practice in relation to COVID-19 in comparison with doctors and pharmacists. Possible explanation for this is that inferior educational background of nurses and technicians and healthcare work burden. Therefore, infusing knowledge will definitely improve the attitude and subsequently practice towards COVID-19[24]. This association can be described by reasoned action theory which states that intention of a person towards targeted behavior is a result of his/her attitude towards that specific behavior[25]. Therefore, it is fundamental to adequately train healthcare workers so they can cope strategically during pandemic. We highly recommend more future research work in other parts of Pakistan to get a comprehensive overview of the scenario. The study emphasizes hospitals to take responsibility to arrange blended training programs for healthcare workers to keep them up-to-date with ongoing COVID-19 data flow and enhance their knowledge

which will subsequently reflect on their attitudes and practices.

The present study probed the scientific area that is very poorly explored in Pakistan and other countries of the world. Most importantly, our study recognized baseline status of knowledge, attitude and practice of healthcare workers which is essential for successful rapid response against the pandemics like that of COVID-19. The study has few limitations. It is a descriptive cross-sectional study on a very small sample and therefore findings may not be generalizable to healthcare workers across the country. The strategy that is recommended to strengthen cross-sectional survey designs is to conduct a series of surveys that cater participants from all over Pakistan. Since the data was collected using a self-reported questionnaire, the results may somewhat be affected by recall bias. Lastly, study questionnaire had very limited internal consistency as evidenced through Cronbach's alpha measure (Overall=0.378, Knowledge=0.514, Attitude=0.252 and Practice=0.258).

Conclusion

In conclusion, present study concludes that healthcare workers had good knowledge, optimistic attitude and decent practice towards recent COVID-19 pandemic. Most worrying aspect was social media as the most common source of information of COVID-19. It can adversely influence the knowledge and can reflect on attitude and practice, if not addressed immediately and accordingly.

Conflict of Interest

Authors have no conflict of interest and no grant/funding from any organization.

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