Are we adequately prepared to handle the anticipated 3rd peak of COVID-19: A KAP survey among HCWs

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Abstract

Experts in the field are predicting a third COVID-19 peak very soon in coming times, it is important to assess recent knowledge, attitude in view of prolonged exhaustion and adherence to preventive practices of HCWs. This cross-sectional study involved 168 HCWs (42 doctors, 42 nurses, 42 paramedical staff and 42 ANMs). Data was collected through online survey tool Google forms in July and August 2021. First section included sociodemographic information and infection with SARS-CoV-2, section 2 assessed recent knowledge, section 3 practices of COVID-19 appropriate behavior and section 4 assessed attitude of HCWs. Shapiro Wilk test was used to determine normality of distribution of variables. Kruskal-Wallis and Mann-Whitney U tests were used to determine the association between two variables. Pairwise comparison was done following a significant Kruskal-Wallis test using Bonferroni's correction. 42.9% of the HCWs and family members of 44.6% HCWs were infected with SARS-CoV-2. 54.1% of infected HCWs were infected during the March-May 2021 peak. 85.1% HCWs had taken COVID-19 vaccine. Mean knowledge, attitude, practice scores were 7.88±3.03(maximum score: 12), 20.35±3.2 (maximum score: 25), 69.89±9.39 (maximum score: 85) respectively. Only 48.8% HCWs had good knowledge about more recent COVID-19 information. A significant association was observed between profession and knowledge scores (p<0.001). Over 85% HCWs had good scores for attitude towards COVID-19 and 88.7% HCWs scored good in COVID-19 appropriate behavior practices. Our HCWs need to be better equipped with the more recently available knowledge about COVID-19 to improve our preparedness for the next anticipated peak.

Introduction

COVID-19 originated from Wuhan, China in the end of 2019 and has now rapidly spread over the world, reaching even the faraway places.[1] World Health Organization (WHO) declared this novel coronavirus outbreak as a public health emergency of international concern on January 30, 2020.[2] SARS-CoV-2 being an RNA virus, is more susceptible to genetic variation than the DNA viruses.[3,4] The genome of SARS-CoV-2 is constantly evolving & mutating, the resultant variants have become a regular occurrence. The genomic sequencing of SARS-CoV-2 shows a nucleotide substitution rate of roughly 1×10^{-3} substitutions per annum.[5] WHO has classified these variants under two categories, variant of concern (VOC) and variant of interest (VOI).[6] There are four variants (Alpha, Beta, Gamma, Delta) under the category of VOC and another four (eta, Iota, Kappa, Lambda) under the category of VOI.[7] Certain variants appear to have an enhanced capability to spread, contributing to a rapid increase in number of COVID-19 cases.[7,8] The Delta variant for which the earliest samples were documented from India in October 2020, has spread to over 60 countries.[7,9] Delta variant reportedly has a higher secondary attack rate[10] and growth rate[11] than the Alpha variant for which the earliest samples were documented from United Kingdom (UK) in September 2020.[7] This explains the rapid rise and displacement of Alpha variant in the UK.

In India, COVID-19 cases dramatically started increasing in late March 2021. Due to the higher transmissibility as well as immune evasive nature of the Delta variant, 17 million cases of COVID-19 were reported between March – May 2021 that was about twice the number reported during the previous 14 months.[12] India, particularly the National Capital, has witnessed the unprecedented extent of morbidity and mortality during this surge of COVID-19 cases. This new variant spared very few, even the HCWs were affected in the most extensive and distressing manner. The healthcare infrastructure was stretched beyond its limits and HCWs lived the worst nightmare of modern times.

The decline of second wave was largely credited to non-pharmaceutical interventions, COVID-19 appropriate behavior and less favorable weather conditions during March–May, rather than to high population immunity despite the large previous COVID-19 peaks and mass-vaccination rollout. Despite the rollout of mass-vaccination in India, only approximately 13% of the population had received at least a single dose of COVID-19 vaccine by the end of May 2021.[12]

Vaccination is often conferred as the only hope for back to 'normal life'. COVID-19 vaccines have a protective role against severe disease.[13,14] The preliminary data also suggests that vaccination reduces the transmission of SARS-CoV-2.[15] If vaccination is done slowly, virus gets more time to mutate and find ways to evade or deceive antibodies.[16] This further emphasizes the importance of sensitization to the need of COVID-19 vaccination at a faster pace.

HCWs have not yet recovered fully from the physical and mental impact of last surge of COVID-19 cases and Experts in the field are predicting a third COVID-19 peak very soon in coming times.[16] COVID-19 appropriate behavior and vaccination are the only means we have to contain or delay this anticipated next COVID-19 peak. It is of paramount importance to assess knowledge about the recent information about the COVID-19, attitude in view of prolonged exhaustion and level of adherence to preventive practices by HCWs in the current scenario as it would play a crucial role in the adequate handling of next COVID-19

Materials and Methods

The present cross-sectional study was conducted by the Department of Microbiology of a tertiary care hospital in National Capital of India. This study included HCWs as the study subjects and data was collected through the online survey tool Google forms in the months of July and August 2021. The questionnaire link was shared through extensively used social media platform of WhatsApp account. The information was anonymous and no personal identifier was used in the questionnaire. Considering the variability of 1.32, 0.93, 0.79 in knowledge, attitude, practices with reference[17] to estimate the relative difference of 10% on either side of mean score at alpha=5%, a sample of 30 subjects was required. But due to availability of time and resources, we included 168 HCWs in the present study. In order to better understand the distribution of knowledge, practices and attitudes within HCWs, 42 each of doctors, nurses, technical staff and Auxiliary Nursing Midwifery (ANM) were included.

The Google form questionnaire had four sections. First section included questions about the socio-demographic profile, past infection of SARS-CoV-2 in self or family members, probable source of infection in positive cases, number of family members infected with SARS-CoV-2 till date, severity of disease in self and family members, COVID-19 vaccination history. Section 2 assessed the knowledge of HCWs about the recent available information about COVID-19 that may affect the adequate handing of the anticipated next peak of COVID-19 cases. This section had 12 questions. One mark was given for each correct answer in this knowledge assessment section. Section 3 assessed the practices of COVID-19 appropriate behavior among HCWs. This section had 3 questions out of 8 questions that assessed the variation in practicing COVID-19 appropriate behavior over a period of 4 months from April to July 2021. In this section, HCWs had to score themselves in each question ranging from 1 to 5, with score 5 implying the best COVID-19 appropriate practices. Section 3 carried the maximum score of 85. Section 4 consisted of 5 questions that assessed the attitude of HCWs. A five-point Likert-type scale was used to ascertain the level of agreement or disagreement. This section carried the maximum score of 25.

Statistical Analysis

Data was entered in MS Excel and was analyzed using SPSS version 20.0 (Statistical package for the social sciences). Descriptive statistics included mean ± Standard Deviation (SD) for the scores of knowledge, attitude and practices. Frequencies and proportions were calculated for the qualitative variables. HCWs with scores ≥70% for knowledge, practices or attitude were regarded as having good knowledge, practices or attitude and those with scores below 70% were considered to have poor knowledge, practices or attitude. The Shapiro Wilk test was used to determine the normality of distribution of the variables. For variables which were not normally distributed like the scores of knowledge, practices and attitude, non-parametric tests were used. Kruskal-Wallis Test and Mann-Whitney U test were used to determine the association between two variables, KAP scores and other variables. Pairwise comparison was done following a significant Kruskal-Wallis test using Bonferroni's correction. Associations with p-value <0.05 at 95% confidence level were taken as statistically significant.

Results

The male to female ratio for present study was 1.07. The age wise distribution of HCWs is shown in Figure 1. The highest educational qualification for majority of HCWs was graduation (57.7%), followed by postgraduation (26.8%), 12th class (14.3%) and 10th class (1.2%). In present study, 42.9% of the HCWs were infected with SARS-CoV-2 at least once since the beginning of COVID-19 pandemic. Among HCWs who tested positive for COVID-19, 54.1% were infected during the March-May 2021 peak, 29.2% during May-August 2020 and 16.7% during the September-December 2020. Colleagues were suspected to be the source of COVID-19 in 34.7% cases, followed by friends (26.4%), relatives (11.1%). In 23.6% of the cases, the probable source of infection was not known. Frequency distribution of severity of COVID-19 disease among infected HCWs is depicted in Figure 2.

The family members of 44.6% HCWs developed COVID-19 since the beginning of this pandemic. 64% HCWs shared the same household with the COVID-19 positive family member. In 70.7% of instances, more than one family members of the respondent HCW were tested positive for COVID-19. Parents were the first to get involved in majority (37.3%), followed by siblings (22.7%) and spouse (17.3%). The source of infection was not known in 42.6% instances of positive family members. 16% suspected friends, 14.7% colleagues, 10.7% relatives, 9.3% market places, 2.7% neighbors, 1.3% suspected their domestic help and 4% others (not covered in the list) as probable source of SARS-CoV-2 infection for their family members. Majority (77.3%) of affected family members experienced only mild COVID-19 illness. 21.3% of affected family members developed moderate illness needing oxygen support, 12% of such cases were managed at home.

Majority (85.1%) of HCWs had taken COVID-19 vaccine. Among the vaccinated HCWs, 76.9% had taken both the doses of COVID-19 vaccines. Majority (93%) of HCWs had taken the Covishield vaccine, followed by Covaxin (2.8%). 14.9% HCWs had not taken even a single dose of COVID-
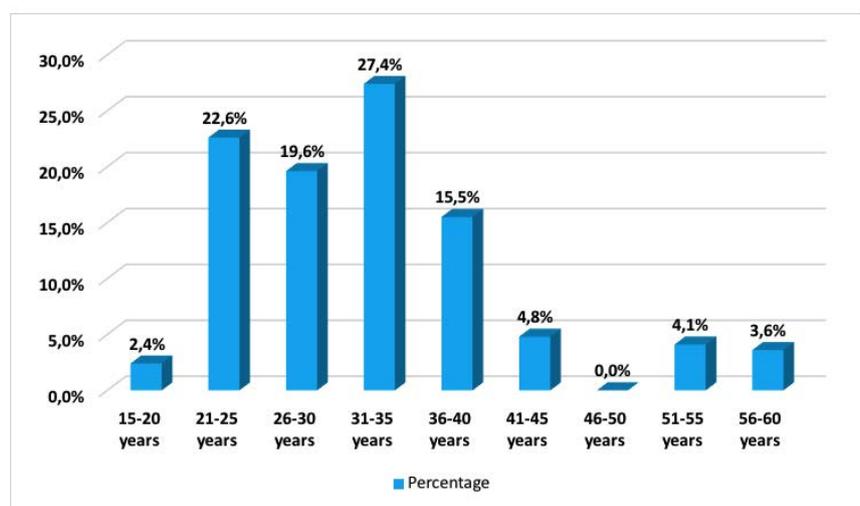

Figure 1. Age wise distribution of HCWs (n=168).

19 vaccine. 20% unvaccinated HCWs didn't think vaccine has any protective role and same percentage of HCWs had no specific reason for being unvaccinated till date, 16% could not find time for vaccination and similar percentage reported nonavailability of vaccine as their reason behind being unvaccinated and (12%) feared adverse effects.

Recent knowledge about COVID-19

Table 1 shows the distribution of means and standard deviations (SD) for knowledge among different groups of HCWs. Mean overall knowledge score in present study was 7.88±3.03 (maximum score: 12). Figure 3 depicts the distribution of good (≥70%) knowledge scores among different groups of HCWs. Only 48.8% HCWs had good knowledge about more recent COVID-19 information. Over 85% doctors included in this study had good knowledge scores. Among various groups of HCWs, doctors group also had the highest mean value for more recent COVID-19 related knowledge.

Age group of the study participants and gender had no significant association with their knowledge scores. The participants with highest education and those who had infection with COVID-19 were more likely to have higher knowledge scores and the association was statistically significant (p=0.008 & p=0.001, respectively). On applying pairwise comparison, those who have postgraduation were more likely to have higher knowledge scores as compared to those who were graduates (p=0.027). A significant association was also observed between the profession of study participants and the knowledge scores (p<0.001). Doctors were more likely to have higher knowledge scores as compared to nurses (p<0.001), technical staff (p<0.001) and ANMs (p<0.001). Over 94.6% of HCWs were aware about the variants of SARS-CoV-2 virus. 49.4% HCWs knew that alpha variant was first detected in United Kingdom. Majority (80.4%) rightly identified delta variant as the most transmissible variant till date. Nearly 64% HCWs had knowledge that the delta variant was

responsible for the devastating 2nd peak (May-June 2021) in Delhi. Two-third (75%) HCWs correctly identified the delta plus variant as the emerging variant in India with reportedly high transmissibility and potency to reduce monoclonal antibody response. Nearly 60% HCWs possessed knowledge that being a RNA virus, SARS-CoV-2 virus is more susceptible to mutations. 51.2% respondents had knowledge that gene sequencing technique is used to identify the newer emerging variants of SARS-CoV-2. However, over a quarter (30.9%) believed that RT-PCR was used for the same. The majority (66.7%) was aware that symptomatic relief is the main stay of management in mild COVID-19 cases. A large proportion (85.7%) of respondent HCWs rightly answered that to stop/delay the 3rd wave of COVID-19, we need the collaboration of all three factors of COVID-19 appropriate behavior, vaccination and enhanced surveillance for newer emerging variants. 61.3% HCWS had knowledge that children are at higher risk in coming times as they are still not vaccinated. 18.4% HCWs incorrectly answered about the eligibility of pregnant or lactating mothers for COVID-19 vaccine. Only 17.8% had knowledge that the available vaccines in India are about 60-65% efficient against newer emerging variants of concern.

COVID-19 appropriate behavior including vaccination practices

Distribution of means and SD for COVID-19 appropriate behavior practices among different groups of HCWs is shown in Table 1. Mean score for practice in present study was 69.89±9.39 (maximum score: 85). Figure 3 illustrates the distribution of Good (above mean) COVID-19 appropriate practices scores among various groups of HCWs. Overall, 88.7% HCWs had good scores for COVID-19 appropriate behavior practices. Over 80% HCWs in each of four groups included in this study had good practice scores. Among various groups of HCWs, doctors' group had the highest mean value for COVID-19 appropriate behavior practices. There was no statistically significant association between

practice scores and age group, sex or highest education of the study participants. A significant difference was seen in the practice scores among HCWs infected with COVID-19 as compared to those who were not infected (p=0.011).

Distribution of COVID-19 appropriate behavior practices among HCWs on the basis of self-assessment score ranging from 1 to 5 during the months of April to July, 2021 is depicted in Figure 4. Highest frequency of best (score 5) preventive practices including avoidance of visits to markets or malls, avoidance of gatherings for tea or lunch with colleagues/friends, use of facemask was observed during the month of April and a consistent decline in score 5 was observed in the following months. Nearly 90% HCWs had not taken any unnecessary trip in last four months. Majority (67.3%) HCWs had attended or were planning to attend a session for COVID-19 preparedness.

Figure 5 shows the distribution of COVID-19 vaccination practices among HCWs. Over 85% HCWs had taken at least single dose of COVID-19 vaccine and all the eligible family members of HCWs were vaccinated in 44% instances. Spouse and parents had received at least a single jab of COVID-19 vaccine in 60.7% cases.
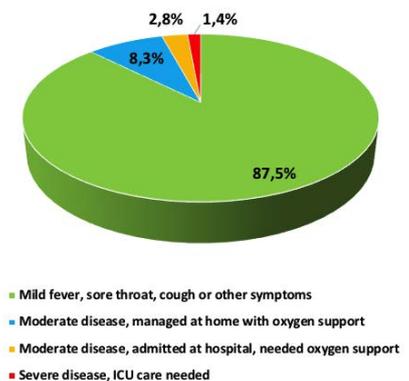

Figure 2. Frequency distribution of severity of COVID-19 Disease among infected HCWs (n=72).

Table 1. Distribution of knowledge, Practice & Attitude scores among various groups of HCWs (n=168).

S.no	Category	Knowledge (mean±SD)	Practices (mean±SD)	Attitude (mean±SD)
1	Overall	7.88±3.03	69.89±9.39	20.35±3.15
2	Doctors	10.19±1.73	71.98±5.51	21.61±2.81
3	Nurses	7.64±1.96	69.69±8.95	20.26±3.80
4	Technical staff	6.33±3.30	68.81±12.37	19.60±3.02
5	ANMs	7.36±3.38	69.10±9.43	19.93±2.58

Attitude of HCWs regarding COVID-19

Table 1 shows the distribution of means and SD for attitude scores among different groups of HCWs regarding COVID-19. This study observed a mean attitude score of 20.35±3.2 (maximum score: 25). Over 85% HCWs had good scores for attitude towards COVID-19. Table 2 depicts the attitude of HCWs regarding COVID-19. A positive attitude was observed among majority of HCWs towards COVID-19. Only 64.9% HCWs had a positive attitude that we will be able to manage the next wave of COVID-19 if it comes. However, nearly 90% HCWs agreed that they have to stay ready to play a bigger role in this ongoing COVID-19 pandemic if situation arises.

There was no statistically significant association between attitude scores and age group, sex, or highest education of the study participants. A statistically significant association was observed between profession and attitudes score (p=0.001). On pairwise comparison, attitude scores were more likely to be seen among doctors as compared to technical staff and ANMs, and the difference was also found to be statistically significant (p=0.002 & p=0.003, respectively).

Discussion

In present study, 31-40 years constituted the most predominant (42.9%) age group, marginally falling behind (42.2%) was 21-30 years age group. However, in another study involving the HCWs 20-30 years was the most predominant (60.9%) age group, followed by 31-40 years (18.9%) age group.[18] In our study, 51.8% participants were males. Similarly, in a study by Verma *et al.*, 53.0% of study participants were males.[18]

This ongoing pandemic of COVID-19 has affected the HCWs at the personal front, besides enhancing the professional stress to humongous levels. The present study shows that over 40% HCWs were infected with SARS-CoV-2 during this pandemic and over half of them were infected during the devastating COVID-19 peak that hit the National Capital during March-May 2021. Nearly 45% HCWs reported that their family members tested positive for COVID-19 and in the majority of instances, more than one family member got infected with SARS-CoV-2. The scale and impact of SARS-CoV-2 particularly the delta variant was unprecedented. Our HCWs have fought this battle against COVID-19 at multiple
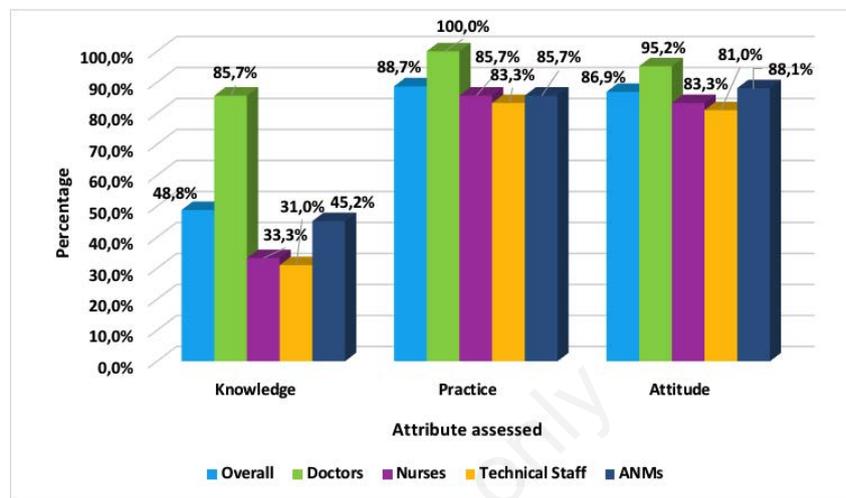

Figure 3. Distribution of good knowledge, practice and attitude scores among different groups of HCWs (n=168).
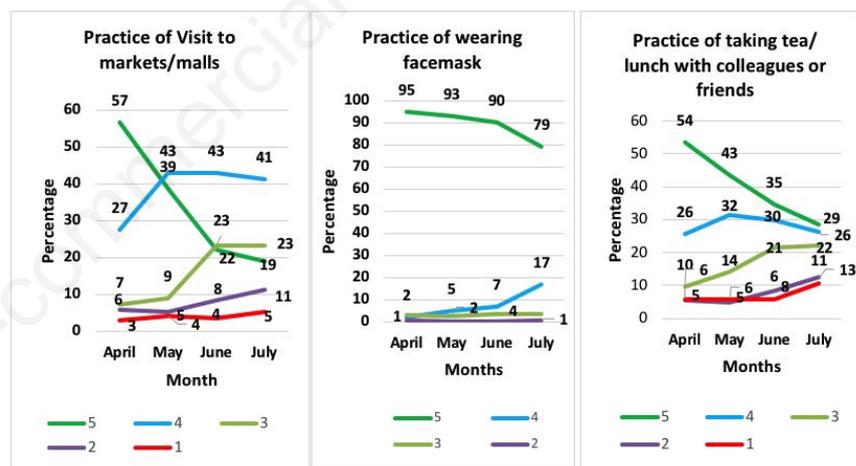

Figure 4. Distribution of COVID-19 appropriate behavior practices among HCWs on the basis of self-assessment score (1-5) during the months of April to July, 2021 (n=168).

Table 2. Attitude of HCWs regarding COVID-19 (n=168).

	Strongly disagree n(%)	Disagree n(%)	Neutral n(%)	Agree n(%)	Strongly Agree n(%)
1. Do you think we will be able to manage the 3rd wave of COVID-19 if it comes?	5(3)	5(3)	49(29.2)	92(54.8)	17(10.1)
2. Do you think COVID appropriate behavior is important in prevention/ delay of 3rd COVID-19 wave?	5(3)	3(1.8)	28(16.7)	73(43.5)	59(35.1)
3. Maximum coverage of vaccination against COVID-19 is key to limit the spread of COVID-19.	5(3)	1(0.6)	21(12.5)	91(54.2)	50(29.8)
4. One should avoid all unnecessary travel of any kind during these times.	3(1.8)	0	20(11.9)	81(48.2)	64(38.1)
5. Being the Healthcare Professionals, we have to stay ready to play a bigger role if situation arises.	2(1.2)	1(0.6)	14(8.3)	70(41.7)	81(48.2)

fronts at the same time. In present study, over two thirds of the HCWs developed a mild COVID-19 disease. Our findings are in line with another study that assessed the characteristics of HCWs infected with COVID-19.[19]

COVID-19 vaccine plays a critical role in the mitigation and control of current pandemic. The Government of India had prioritized HCWs along with other frontline workers for COVID-19 vaccination at the availability of COVID-19 vaccines. Over 85% HCWs were vaccinated and over two third of HCWS had taken both the jabs of COVID-19 vaccine. Our findings are in agreement with another study that reported 84.1% acceptance of COVID-19 vaccines among respondent HCWs.[20]

In present study, less than 50% HCWs had good knowledge scores. However, Almohammed OA, et al., in their study have reported an adequate knowledge in 67.8% HCW participants about COVID-19.[21] In a study by Kamacooko et al., 84.5% of the participants scored ≥80% on knowledge assessment parameters.[22] This could be due to the fact that present study has assessed more recent information about COVID-19 like variant of SARS-CoV-2 responsible for recent peak, technique to detect emerging variants, efficiency of available vaccines in India against newer emerging variants of concern, eligibility of pregnant mothers for COVID-19 vaccine, reason for children being proposed at higher risk of COVID-19 infection in coming times. For the first time, knowledge of HCWs was assessed on the basis of information that became available very shortly and extended beyond the basic information about COVID-19 that became available in early six months of year 2020. Furthermore, in present study, four different

groups of HCWs were included in equal numbers. Highest proportion of participants from doctors' group had good knowledge scores in present study, followed by nurses' group. Similarly, other study has also reported highest percentage of doctors to have good knowledge regarding COVID-19, followed by nurse participants.[18]

Though nearly 90% participant HCWs had good scores for practices involving COVID-19 appropriate behavior, we observed a consistent decline in best practices against COVID-19 from April to July 2021. Another study has also reported a decline in preventive practices over months. However, this previous study assessed the preventive practices from the beginning of lockdown in India (25th March, 2020) till October 2020.[23] The initial months involved in present study coincided with the catastrophic peak of COVID-19 cases in the region that also warranted the observation of extreme preventive measures by HCWs to ensure the safety of self and family members.

In present study, over 85% HCWs had good attitude scores. However, another Indian study has reported 95.7% of participant HCWs having good attitude.[18] This could be explained on the basis that in present study, obtaining ≥70% was considered as good score, whereas another study has considered scores above mean value as good scores. Only 65% HCWs were confident that we will be able to manage the next peak of COVID-19 in present study. Another study from National Capital has reported a positive attitude regarding the same in 89% HCWs.[23] This was probably because the present study was carried out after the ravaging second peak of COVID-19. The magnitude and impact of last peak

was unforeseen and HCWs being at the forefront have witnessed the worst. Though more HCWs had reservations about being too optimistic about the next wave, nearly 90% agreed that being Healthcare Professionals, they had to stay ready to play a bigger role if situation arises.

The present study had a limitation that it might lack the accurate representativeness due to its online mode. However, there is no reason to believe that the included groups of HCWs would have been significantly different if this study would have been conducted in offline face-to-face mode. Our study suffered the limitation that for collection of data, standardized tools were not used. The findings of our study should be validated with more extensive multicentric studies involving larger sample sizes.

Conclusions

SARS-CoV-2 is constantly evolving and mutating. The dynamics of COVID-19 is continuously changing and it is more important than ever that we don't lag behind in our knowledge about this invisible enemy. This study has helped us in knowing our weaker areas better. Now we know that our HCWs need to be better equipped with the more recently available knowledge about COVID-19 to improve our preparedness for the next anticipated peak. This study has shown that our HCWs are observing good practices against COVID-19 and despite the hardships of last peak, the attitude is positive among HCWs.

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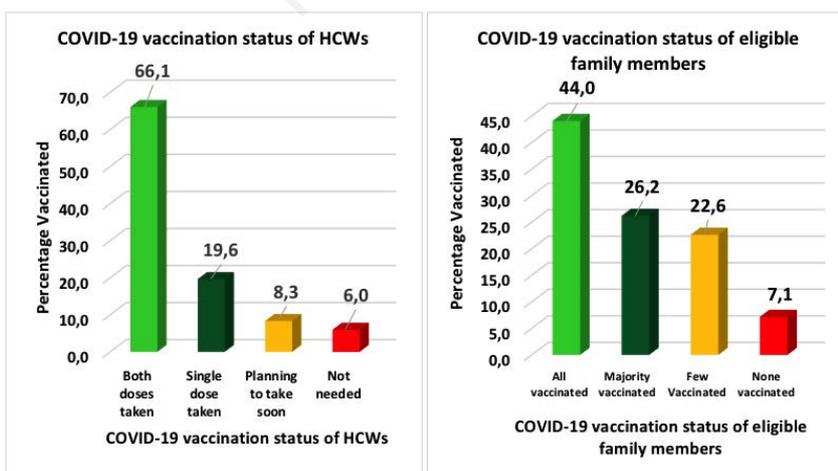
Figure 5. Distribution of COVID-19 vaccination practices among HCWs (n=168).

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