ORIGINAL RESEARCH

Impact of COVID-19 Vaccination on Healthcare Workers: A Cross-Sectional Study at ESIC Medical College and Hospital, Kalaburagi

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ABSTRACT
The COVID-19 pandemic has significantly impacted healthcare workers (HCWs) worldwide. This cross-sectional study aimed to assess the impact of vaccination on the severity and outcome of COVID-19 among HCWs at ESIC Medical College and Hospital, Kalaburagi. The study included 134 vaccinated HCWs and evaluated their vaccination status, COVID-19 infection rates, and symptom severity. Results showed that 25% of vaccinated HCWs contracted COVID-19, with 52% of infections occurring after full vaccination. The majority of infected HCWs experienced mild to moderate symptoms, with no severe cases requiring long-term hospitalization. This study provides valuable insights into the effectiveness of COVID-19 vaccines in reducing disease severity among HCWs.

INTRODUCTION

The pandemic caused due to Novel Coronavirus-19 (COVID19) has given rise to health threat with no disparity all over the globe. India was the second most affected countries among all the others, and was also considered as an epidemic hub.

Almost all of the countries have gone through the two waves of the disease, with a first wave in spring and a second in late summer and autumn. In first wave the elderly population was affected whereas patients in the second wave were younger and the duration of hospitalization and case fatality rate were higher than those in the first wave. It was also noted that, there were more children, and pregnant and post-partum women in the second wave. The common signs and symptoms in both waves were fever, dyspnoea, pneumonia, and cough, and the most relevant comorbidities were cardiovascular diseases, type 2 diabetes mellitus, and chronic neurological diseases.[1]

Health-care workers (HCWs) constitute a special subgroup of the population, which is at a substantial risk of infection and are an important disease transmission source. It was also demonstrated that HCWs were significantly affected due to Covid19 infection increasing the prevalence of morbidity and mortality among them. Previous studies have reported COVID-19 seroprevalence rates of up to 17.4% among the HCWs.[2]

Despite unprecedented movement restrictions, social distancing measures, and stay-at-home orders enacted everywhere, the COVID-19 pandemic has caused devastating morbidity and mortality among all. Highlighting the need for an effective vaccine. As of December 31, 2020, safety and efficacy results for a number of vaccines have been reported, and Phase III clinical trials for several other candidates were in the pipeline. Later the vaccine efficacy of over 90% received authorization for being administered with prioritization.[3]

Ensuring protection of healthcare worker is crucial especially at these times of pandemic. Though the pace of coverage is slow but whole of the population is being covered. HCWs were among the first priority groups to receive the jabs.

According to the World Health Organization (WHO), a successful vaccine should reduce the risk of disease

by at least 50% (i.e., 50% efficacy), while the preferred efficacy is 70% with consistent results in the elderly. Moreover, the world health organization reported more than 688 million cases and over 6.8 million deaths by mid 2023, wherein many HCWs got severe infection through co-workers, their patients and extra professional social contact. [4]

Unmitigated, rising infection and mortality rates in HCWs will paralyse a country's response to COVID-19, and it will lead to long-term impact on healthcare delivery, particularly in health systems already grappling with workforce shortage due to lack of trained personnel, skilled labour migration and geographical maldistribution, even prior to pandemic times.[5]

The introduction of COVID-19 vaccines brought hope for reducing the threat of infection among all populations, including HCWs. However, information regarding the impact of vaccination on HCWs remains limited. This study aims to address this knowledge gap by assessing the impact of vaccination on the severity and outcome of COVID-19 among HCWs at ESIC Medical College and Hospital, Kalaburagi.

OBJECTIVES

1. To estimate the prevalence of COVID19 infection among vaccinated health care workers
2. To know the presentation of COVID19 infection among vaccinated health care workers
3. To assess the impact of vaccination on severity and outcome of covid19 among healthcare workers.

Methodology

This is cross sectional study conducted among health care workers of ESIC medical college and hospital, Sedam road, Kalaburagi. The duration of the study was 6 months.

Inclusion criteria: Health care workers include hospital staff who haveworked in the institute for more than 6 months and under various designations like; Doctors, Nursing staffs, Technicians, Housekeeping staffs and security guards.

1. Healthcare workers currently working in ESIC medical college and hospital.
2. Healthcare workers vaccinated with at least one dose of COVID19 vaccine (any).
3. Proforma of Healthcare workers able to answer all the designed questions shall be included in the study.

Exclusion criteria

1. Those who are not consenting for participation.
2. Health care workers who remain unavailable for 3 times or more.

In a study titled infection and mortality of healthcare workers worldwide from COVID-19: a systematic review by Bandyopadhyay et al, it is noted that 34.9% of the health care workers were infected with COVID19 infection.[6] Considering this proportion for estimating sample size by Cochran's formula the sample size estimated is 152 with 99% confidence interval and 10% margin of error. By simple random sampling method, 152 subjects will be enrolled for the study.

The data was collected by face to face interview after obtaining consent from the participants and explaining them the purpose of the study. A semi open validated questionnaire wasutilised to collect the information regarding: sociodemographic details, health details, vaccination status and details, details of signs and symptoms following vaccination if any.

Ethical Considerations

Ethical approvals were obtained, and informed consent was taken from all participants.

RESULTS

Among a total of 152 health care workers enrolled for the study by simple random sampling, only 134 participants could completely answer the questionnaire, thus details of 134 participants were considered for analysis.

Table 1: Sociodemographic Characteristics

		N=134	%
Age in years	Less than 25	65	49%
	25 to 29	12	9%
	30 to 34	38	28%
	More than and Equal to 35	19	14%
Gender	Male	74	55%
	Female	60	45%
Religion	Hindu	115	86%
	Islam	13	10%
	Christian	4	3%
	Others	2	1%
Marital Status	Married	35	26%
	Unmarried	99	74%
Completed Educational level	Intermediate/ 12th	11	8%
	Graduate	95	71%

	Post graduate	28	21%
Designation	Doctors	38	28%
	Nursing staffs	20	15%
	Paramedical staffs	39	29%
	Supporting staffs	37	28%
Habits	Alcohol	13	10%
(More than 2 habits)	Tobacco chewing	6	4%
	Tobacco smoking	4	3%
	None	120	90%
Co-morbidities	Asthma/ Respiratory illness	2	1%
	Hypertension	3	2%
	Diabetic	3	2%
	Chronic Renal or Liver disease	4	3%

The study included 134 healthcare workers, with 55% male and 45% female participants. The majority (49%) were under 25 years old, followed by 28% in the 30-34 age groups. Most participants were Hindu (86%) and unmarried (74%). The sample included doctors (28%), nursing staff (15%), paramedical staff (29%), and supporting staff (28%).

Table 2: Vaccination Status

		N=134	**%**
Covishield	2 doses	118	88%
	1 dose	11	8%
Covaxin	2 doses	4	3%
	1 dose	1	1%
Duration between 2 doses	Less than 4 weeks	84	63%
	1 to 2 months	16	12%
	2 to 3 months	18	13%
	More than 3 months	16	12%
Adverse effect following vaccination	Yes	30	22%
	No	104	78%

Majority participants (88%) received two doses of the Covishield vaccine, while 8% received one dose. Only 4% received Covaxin (3% with two doses, 1% with one dose). Most participants (63%) received their second dose within 4 weeks of the first dose. AEFI was reported by 22% of the participants.

Table 3: Adverse Events Following Immunization (AEFI):

	Yes, after 1st dose	**Yes, after 2nd dose**
a. Pain at the site of injection	73%	23%
b. Pain in injected arm	53%	10%
c. Generalized Body-ache	80%	23%
d. Fever	67%	10%
e. Cold	13%	0%
f. Rashes	3%	0%
g. Headache	33%	0%
h. Dizziness	17%	3%
i. Flu like symptoms	23%	3%

Table 3 depicts the adverse effects following immunization (AEFI) among healthcare workers, comparing the effects after the first and second doses of the COVID-19 vaccine. It shows that side effects were more prevalent after the first dose compared to the second dose. This pattern was consistent across all reported symptoms.

Most Common Side Effects after the first dose were Generalized Body-ache (80%), Pain at the site of injection (73%), Fever (67%) and Pain in the injected arm (53%). After the second dose, the prevalence of these symptoms decreased significantly: Generalized Body-ache (23%), Pain at the site of injection (23%), Fever (10%) and Pain in the injected arm (10%)

Both systemic (e.g., body-ache, fever) and local (e.g., pain at injection site) reactions were more common after the first dose. This may be because of the initial immune response to the vaccine which is more robust.Some symptoms, such as cold, rashes, and headache, were reported after the first dose but were not observed after the second dose.

Table 4: COVID-19 Infection among Vaccinated HCWs

Ever infected with COVID-19?	Yes	33	25%
	No	101	75%
		N=33	
COVID-19 infection following vaccination	No	16	48%
	Yes, after 2nd dose of vaccination	17	52%
After how many days of vaccination were you infected with COVID-19?	Less than a week	5	15%
	Within a month	1	3%
	More than a month	3	9%
Probable source of infection	Don't Know	7	21%
	History of Travel	3	9%
	Primary contact of Covid case	19	58%
	Secondary Contact	4	12%

Table 4 shows that one quarter of the vaccinated health care workers i.e., 25% (33 out of 134) contracted COVID-19. Among these, 52% (17 out of 33) were infected after receiving the second dose of the vaccine. In about half of the cases (58%) the probable source of infection was a known case of COVID-19. It was noted that all those who were infected with COVID-19 were vaccinated with doses of Covishield vaccine

Table 5: Recovery and Follow-up

COVID-19 status at time of discharge?	Negative	24	73%
	Test was not done	9	27%
Were able to continue your routine work during the period of COVID-19 infection?	No	13	39%
	Yes	20	61%
After how many days of home isolation/ discharge from hospital were you able to do your routine tasks	Within 3 days	13	39%
	3 to 7 days	9	27%
	7 to 14 days	7	21%
	More than 15 days	4	12%
How would you grade your recovery at time of discharge from the day of admission/ isolation?	Not recovered	1	3%
	25%	0	0%
	50%	3	9%
	75%	6	18%
	100%	23	70%

Majority i.e., 70% of infected HCWs reported 100% recovery at the time of discharge. 61% were able to continue their routine work during the infection period. 39% resumed routine tasks within 3 days of home isolation or hospital discharge.

DISCUSSION

A systematic review reports that, around the world, COVID-19 infections and deaths among HCWs follow pattern similar to that among the general population.Physicians working in certain specialties may be considered high risk due to exposure to oronasal secretions, but the risk to other specialties is equally high[4].

The launch of vaccine was highly awaited and it brought a hope to win the battle of COVID pandemic condition. As of December 31, 2020, safety and efficacy results for a number of vaccines were reported, and Phase III clinical trials for several other candidates were in the pipeline. Later the vaccine efficacy of over 90% received authorization for being administered with prioritization.[3]

This study provides valuable insights into the impact of COVID-19 vaccination on healthcare workers at ESIC Medical College and Hospital, Kalaburagi. The findings suggest that while vaccination does not completely prevent COVID-19 infection, it may help in reducing the severity of symptoms and improving outcomes.

The infection rate of 25% among vaccinated HCWs is notable, with over half of these infections occurring after full vaccination. This highlights the importance of continued preventive measures even after vaccination. However, the low rate of severe cases and hospitalizations among infected HCWs suggests that vaccination may have played a role in mitigating the severity of the disease.

Whereas in a study conducted by Jayadevan R and others depicted that Two-thirds of healthcare professionals reported mild and short- lived post-vaccination symptoms. Tiredness, myalgia and fever were most commonly reported. These symptoms were consistent with an immune response commonly associated with vaccines, no serious events were reported. Symptoms were found to be more common among younger individuals. There was no difference in symptoms among those who had a past history of COVID-19.[5,7]

The predominance of high recovery rates among infected HCWs further supports the potential benefits of vaccination. The ability of most infected HCWs to continue or quickly resume their routine work is

particularly important in maintaining healthcare workforce capacity during the pandemic.The study also provides useful data on the side effects of COVID-19 vaccines, which were generally mild and more common after the first dose. This information can be valuable in preparing HCWs for potential side effects and addressing vaccine hesitancy.

Strengths of the study: This study is one of its kind to estimate the burden and morbidity caused due to COVID-19 infection among healthcare workers who are vaccinated.
ESIC Medical College and Hospital, Kalaburagi is a designated COVID care institute, with dedicated health care workers. This study will estimate the prevalence and pattern of Covid-19 infection among health care staffs.
This study will also add on to health care seeking behaviour of healthcare workers.

Limitations of the study: The smaller sample size than initially planned and the focus on a single healthcare institution, which may limit the generalizability of the findings. Additionally, the lack of a control group of unvaccinated HCWs makes it difficult to directly compare the impact of vaccination. Recall bias is expected. Thus data is collected regarding recent history post vaccination which had initiated in month of February, 2021 (not more than 6 months).

CONCLUSION

This cross-sectional study provides evidence that COVID-19 vaccination may help in reducing the severity of symptoms and improving outcomes among healthcare workers, even if it does not completely prevent infection. The findings underscore the importance of vaccination for HCWs, while also highlighting the need for continued preventive measures. Future research with larger sample sizes and control groups could further elucidate the long-term impact of vaccination on HCWs and inform ongoing vaccination strategies in healthcare settings.

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