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Assessment of Symptoms Succeeding COVID-19 Vaccination in Health Care Workers of Rawalpindi Medical University, Pakistan

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Abstract

Background: We aimed to evaluate the duration and severity of symptoms experienced by Health care workers (HCWs) after receiving first dose of COVID-19 vaccine and to compare these symptoms with respect to age, gender, previous infection with COVID-19 and history of allergies.

Methods: Data for this cross-sectional analytical study was collected using simple random sampling by filling a proforma after detailed in person interview of the selected HCWs of Rawalpindi Medical University between May 2021 to September 2021. However, those HCWs who had co-morbidities were excluded from the study.

Results: A total of 350 participants were interviewed and data was analyzed by SPSS 25. Out of 350 participants 205 (58.6%) experienced symptom after receiving the first dose of COVID-19 vaccine. Most common symptom was local pain at injection site (58%). Other symptoms include fatigue(41.5%) ,myalgia(33.2%) ,low grade fever (28.8%), headache(26.8%) ,high grade fever(6.3%),joint pain(7.8%), Giddiness(5.4%), sore throat(5.9%),nausea (4.9%), diarrhea(2%) ,constipation(1.5%), insomnia(1%), allergic rash(1.5%).Women were likely to experience more symptoms as well as earlier onset of symptoms. Older age was related to late appearance and longer duration of symptoms. People who have earlier been infected with COVID-19 were likely to experience more severe symptoms. Those having previous history of any allergies were more likely to experience post-vaccination symptoms. All these results were statistically significant with p value less than 0.05.

Conclusion: Two-thirds of healthcare professionals who completed the survey reported mild and short- lived symptoms. These symptoms are the local and systemic manifestations of immunogenicity and reactogenicity of vaccines. No serious adverse event was reported hence further supporting the evidence for safety of these vaccines.

Keywords: COVID19 vaccine; safety; reactogenicity; adverse events

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Introduction

Corona virus was existent globally long before the sudden outbreak of COVID pneumonia in Wuhan(1). COVID-19 has come forth as a highly contagious pandemic that has affected over one hundred and fifty million people and claimed over three million lives worldwide in a short duration of time. The disease has resulted in a rapid increment in morbidity, mortality, global economic loss and urge for medical supplies across the world (2,3). In spite of carrying out various clinical trials, researchers have not been able to come up with any specific antiviral medication suitable for all group of patients (4). Preventive measures, however, are effective in reducing potential hazard (5). Over the past 100 years vaccines have played a crucial role in reducing death toll and improving the economy (6). Therefore manufacture and availability of safe and efficacious vaccines in the required time frame will likely be the most desirable approach to combat this pandemic (7). A number of researchers and companies worldwide have invested their expertise to develop and dispatch vaccines against COVID-19 after significantly testing their safety and efficacy (8). Wuhan Institute of Biological products and Sinopharm has also been successful in formulating an inactivated virus based SARS-COV2 vaccine(9). In Pakistan a total of 56,229,457 people have received the first dose of COVID-19 vaccine so far. Health care workers (HCWS) were the first group to receive vaccination by registering through an online portal created by National Command and Operation Centre ,Pakistan (10-12). Vaccination may be followed by physical manifestations of inflammation in the form of various local or systemic reactions because vaccines are "reactogenic". Understanding the range of post vaccination symptoms is important not only for people receiving the vaccine but also for those recommending the vaccine (13-14).

In phase 1 and 2 trial of an inactivated SARS COV 2 vaccine, fever was the most common systemic adverse reaction to be stated (15). Interim analysis of

ChAdOx1 nCoV-19 vaccine reported local and systemic reactogenicity and showed that it is tolerated and that the side-effects are less both in intensity and number in older adults, with lower doses, and after the second dose (16).

The objective of this study was to evaluate the severity and duration of symptoms experienced by health care workers following the first dose of COVID-19 vaccine. To analyze the difference in spectrum of symptoms after COVID-19 vaccination with respect to age, gender and allergy history. To compare the symptoms succeeding COVID-19 vaccination in HCW having previous history of covid infection with those having no previous covid history. We believe that the study will provide an evidence-based data on symptoms following COVID-19 vaccination in order to overcome the vaccine hesitancy which still remains a major obstacle in the attainment of required goals.

Methodology

This cross-sectional analytical study was conducted between May 2021 to September 2021.Sample size calculated by WHO calculator was 350 (CI=95%, e=5%). Health care workers and faculty of Rawalpindi Medical University and its Allied tertiary care hospitals i.e., Holy Family Hospital, Benazir Bhutto Hospital and District Headquarter Hospital who received the first dose of COVID-19 vaccine within the last one month of our study were included regardless of age, gender and department. However, those HCWs who had co-morbidities i.e., Diabetes Mellitus, Hypertension, Heart disease, lung disease, obesity, dyslipidemia, and malignancy were excluded from the study.

Demographic details of vaccinated health care workers were taken from hospital records after permission from Department of infectious diseases, RMU. A total of 1038 health care workers received vaccination during this time and individuals were selected through simple random sampling using table of random numbers applied on data in vaccination record register. Selected Health care workers were traced back to their departments and after confirming their identity informed consent was taken by providing detailed information about the nature of study and assuring that their anonymity will remain secured. Participants were asked questions regarding detail of symptoms they experienced after receiving first dose of COVID-19 vaccination, previous COVID-19 infection status and history of allergies. All the answers were recorded on a self-structured proforma.

Data was entered and analyzed in IBM SPSS Statistics Version 25. The continuous variables i.e., age group, time of onset of symptoms and duration of symptoms were collected in data as a categorical ordinal variable. Presence or absence of symptoms was considered as categorical nominal variable. Status of previous COVID-19 infection (mild, moderate, severe and No infection) was also treated as categorical ordinal variable. To analyze nominal dependent variable Chi square test was used. For the relation between ordinal dependent and ordinal independent variable JANCKHEERE TREPsta test was used and strength of association was found by Kendaul's Tau test. To compare ordinal dependent variable for nominal independent variable Man Whitney U test was applied.

Results

A total of 350 healthcare workers were interviewed. Out of them 61.4% were university students, 24.9% doctors ,7.4% were technicians and 6.3% nurses.62% were females and 38% males. Out of 350 participants 205 (58.6%) experienced some symptom after receiving the first dose of COVID vaccine. Various symptoms experienced by HCWs are illustrated in Figure 1.

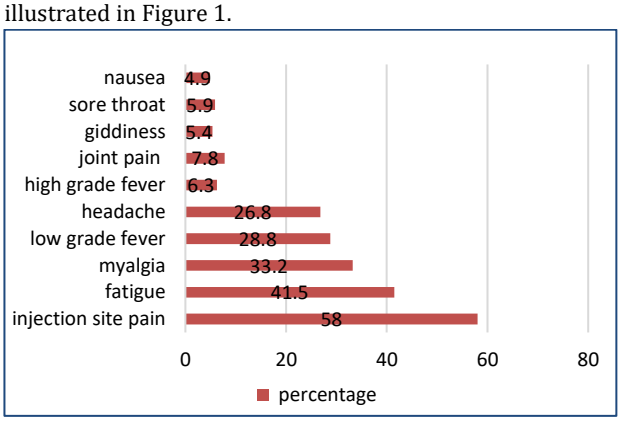

Figure 1: Percentage of various post-vaccination symptoms

Most people experienced mild symptoms (71.6%) relieved without medication while 28.4% experienced moderate symptoms relieved by self-medication. No respondent reported severe symptoms. Among those who experienced symptoms 44.1% experienced within first 10 hrs and 31.9% experienced immediately. Symptoms persisted for less than one day in 47.1% and for one to three days in 42.6% people.

Significant impact of gender was noted on spectrum of symptoms after vaccination, as shown in detail in Table 1.

Table 1: Difference in spectrum of symptoms after COVID-19 vaccination in males and females

Variable	Males	Females	p value
Presence of any symptom in all age groups	50.4%	64.5%	<0.05
Presence of any symptom in 18-29 years old	48.9%	64.5%	<0.05
Low grade fever	40.3%	24.3%	NS
Injection site pain	19.5%	42.9%	<0.05
Myalgia	18.8%	20.7%	NS
Fatigue	16.5%	29.5%	<0.05
Headache	15%	16.6%	NS

There was no significant impact of gender on duration and severity of symptoms. However, females tend to experience these symptoms earlier than that of males (p=0.01).

There was an increase in the time of onset (p=0.03) and the duration of symptoms (p<0.05) with increasing age group statistically proven by Janckheere Trepsta and Kendal's Tau test. Local pain at injection site was more reported by 18-29 years old (p<0.05).No influence of age group was observed on presence or absence and severity of symptoms.

Among the respondents 24.3% had a history of infection with COVID 19 during the pandemic. A positive association was found between the severity of infection with COVID 19 and severity of symptoms after first dose of COVID vaccination (p=0.013), as shown in Figure 2. Presence or absence and duration of persistence of symptoms was not influenced by COVID infection status.

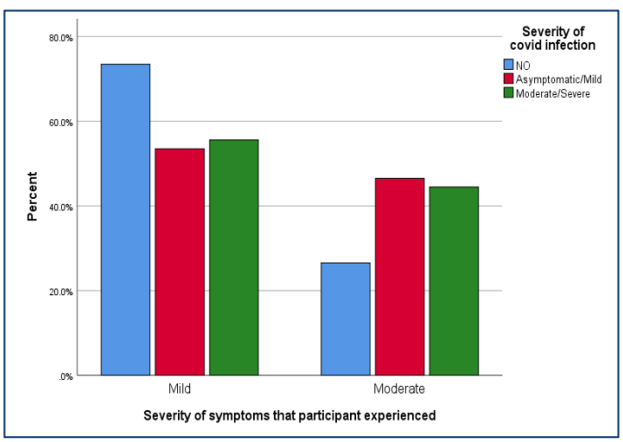

Figure 2: A clustered bar graph showing increased severity of vaccination symptoms in people previously infected with COVID 19

Overall, 20.9% respondents had previous history of allergies and they showed an increase in the likelihood of experiencing symptoms after first dose of COVID 19 vaccination (75.3% vs 54.9%, p<0.05), as shown in Figure 3. Among them 2% had Drug allergy,2%Food allergy,2%dust allergy and 13.2% had Pollen allergy. Although not associated with increased risk of severity of symptoms but these people had an increased risk of developing myalgia(30.1% vs 17.3%,p<0.05),fatigue(41.1% vs 20.6%,p<0.05) and headache(34.2% vs 11.2%) than those who did not have allergies. Only three people reported allergic rash after vaccination and all of them had a history of allergy. The spectrum of symptoms was not different for different types of allergies.

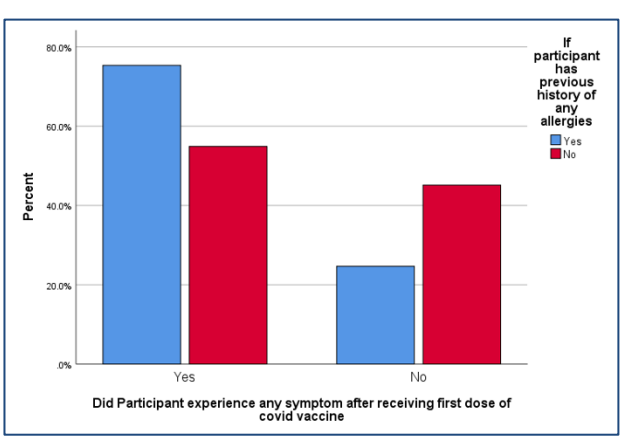

Figure 3. A simple bar graph showing an increased risk of symptoms after vaccination in people having a history of allergies

Discussion

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), discovered originally in Wuhan, Hubei province, China lead to a global pandemic causing an infection that ranges from asymptomatic to mild to severe resulting in an unrivalled increment in economic loss, retrogression of health system and imposition of prolonged lockdowns (17), (18). Since the pandemic emerged, researchers have been trying to develop a vaccine that is safe and effective for all population considering it a sole preventive measure to combat this threat (19). Healthcare workers were the first group to be vaccinated because of the exposure risk. Pakistan received the inactivated virus-based vaccine Sino pharm from China in bulk so that masses could be vaccinated against the disease (20). As the vaccination started so did the development of resistance for receiving vaccine fearing the adverse effects and myths associated with it (4). The efficacy of vaccines has been widely proved in experimental trials. However, data pertaining to symptoms after receiving COVID-19 vaccination in real world in specific groups is still lacking (17).

This study is among the first few studies in our region that has analyzed the difference in spectrum of these symptoms on the basis of age group, gender, previous COVID-19 infection and allergy history. About two-third of the health care workers who responded experienced at least one symptom after vaccination. This is in compliance with a similar study conducted in India. However, most common symptom they reported was fatigue in contrast to our study where fatigue was second to local pain at injection site. Frequency of other symptoms was coherent to our study and this includes myalgias, fever, headache, joint pain and nausea. Compared to their study, the frequency of Giddiness and sore throat was relatively more in our respondents (21). All these symptoms reported are the physical manifestations of inflammatory response to vaccine as indicated by Caroline in his review article(14).

The analysis of data indicated a higher incidence and earlier onset of symptoms in women than in men as also reported by Rajeev in his study (21). Similar trend was identified internationally by other researches as well (22-23). This could possibly be due to behavioral as well as biological factors as estrogen increases the production of antibodies. Women have a more “robust immune system” hence they also experience more autoimmune diseases. The higher onset of symptoms was more remarkable in women of 18-29 years age which further justifies the role of estrogen in driving increased vaccine related symptoms. However unlike the above mentioned study no effect of gender on the severity and duration of symptoms was observed in our respondents.

The results of our study suggested that age group did not significantly affect the incidence of symptoms which

contrasts with another study conducted in UK that has shown a decrease in the appearance of systemic side effects with COVID-19 vaccination after the age of 55 years (17). Our study statistically signify the delayed onset and longer duration of symptoms with advancing age as also concluded by a recent study (21). The delay in onset of symptoms could be possibly due to declining immunity with age. No significant difference in the severity of symptoms was observed between younger and older people contrary to what ROY L. SOIZA presented in his commentary article (24).

The efficacy of vaccine was not fully established for people who had been infected with COVID-19 as they were largely excluded from vaccine trials. This study has statistically shown a previous infection with COVID-19 as being linked to increased severity of side effects reported. This result is consistent with research conducted in UK (17). However other studies have not shown this positive correlation (21,25). For people who had been infected with COVID-19 immune system is already primed and hence mounts an increased immune response leading to increased severity of side effects. This study like a similar study in UK deduced that people having history of drug, food, pollen or dust allergies have an increased incidence of symptoms after vaccination. Moreover, unlike this study we also showed an increase occurrence of myalgia, fatigue and headache in people having allergy history (17).

This study provides an evidence-based knowledge of what healthy people can expect after receiving first dose of COVID-19 vaccine which will help to reduce hesitancy for the vaccine.

The potential recall bias of respondents and small study population are the main limitations. Moreover, the difference in symptoms between first and second dose as well as different types of vaccines is also not discussed. Hence more work needs to be done in this regard to fully establish the protective efficacy of COVID-19 vaccines.

Conclusion

Two-thirds of the healthcare workers of Rawalpindi Medical University who completed the survey reported mild and short- lived symptoms after receiving the first dose of COVID-19 vaccination. Local pain at injection site, fatigue, myalgia and fever were most commonly reported. These symptoms are the local and systemic manifestations of immunogenicity and reactogenicity of vaccines. No serious adverse event was reported hence further supporting the evidence for safety of these vaccines.

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