DOI: https://doi.org/10.53350/pjmhs2115123202

ORIGINAL ARTICLE

Symptoms and Side Effects of the ChAdOx1 nCoV-19 vaccine (AZD1222) among healthcare workers: A Single Center Experience

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ABSTRACT

Aim: Severe acute respiratory syndrome coronavirus (SARS-CoV-2) is a novel coronavirus which has infected millions of people across the globe in the form of a deadly pandemic. Safe and efficacious vaccines are needed urgently to prevent disease in the healthy population or at least decrease the intensity of illness post vaccination.
Aim: To assess the post vaccination side effects among groups of individuals so that an effective vaccine can be proposed according to the individuals and thus avoiding reactogenicity, both systemic and local.
Methods: A prospective study was conducted with the help of a web-based questionnaire (among health care workers) which used snowball sampling strategy and assigned persons aged ≥25-65 years, who received an intramuscular injection of the vaccine manufactured by Oxford-AstraZeneca. Safety and side effects were observed over a period of 15-20 days post vaccination to obtain results.
Results: A total of 564 participants took part in the survey who received the vaccine via intramuscular route. Both systemic and local reactogenicity were recorded. Of the respondents, 280 (49.6%) people reported fever, 322 (57.18%) had pain, 89 (15.77%) had swelling and 53 (9.3%) had redness at the injection site. Total of 368 (65.2%) individuals suffered from body aches of whom 324 (57.4%) also reported headaches.
Conclusion: Assessing the post vaccination symptoms, side effects and complications of AstraZeneca among different individuals helped in providing crucial and important information regarding the efficacy, safety and nature of the vaccine.
Keywords: Covid-19, pandemic, vaccines, reactogenicity

INTRODUCTION

Coronaviruses belong to a family of viruses known as **Coronaviridae**, which causes disease ranging from mild cold to severe respiratory distress. It is a single stranded **RNA virus** that can infect many avian and mammalian species. **SARS-CoV-2,** which is the cause of disease known as **COVID-19** is related to the coronaviruses that has affected tens of millions of people globally is responsible for causing worldwide deaths due to its life-threatening symptoms.[1] It was first reported during December 2019 in Wuhan, China in people with pneumonia of unknown origin.[2] It began as an epidemic, thought to be of a zoonotic origin.[3] It soon spread throughout the globe and was declared a pandemic by the **WHO** on March 11, 2020.[4] As of 10th May 2021, online databases show that 192 countries around the world have been affected and total global cases reaching up to 157,923,673 causing 3,287,558 fatalities. Saudi Arabia also confirmed 425,442 cases and 7,059 deaths[5].

Due to medical, economic and social instability in many parts of the world as well as the harsh nature of the virus, it became necessary to control and eradicate the disease. During early phases of the pandemic, various measures for prevention were taken (social distancing, frequent hand washing, sanitizing and disinfection i.e., non-pharmaceutical interventions) and treatment was symptomatic due to limited data and resources on the disease.[6] Recent study indicated that these measures do not help in preventing infections but are effective in reducing them.[7] Soon the health authorities began to tackle this situation through the production of safe and effective vaccines. In December 2020, **WHO** issued its first emergency use validation for COVID-19 vaccine and highlighted the need for vaccine access throughout the globe especially in the elderly and health care workers.[8] Old aged people with underlying health conditions (comorbidities) and front-line health care workers are at highest risk for Covid-19 and its complications.[9,10] Recent data show increasing rates of Covid-19 in other populations, including younger adults which is alarming. Various vaccines were produced by companies (Pfizer, AstraZeneca, Sinopharm, Moderna etc.) throughout the world which underwent many trials and phases and were approved by the **FDA** to be used in many countries under the guidance of health authorities and approval of their governments. These vaccines have various types including viral vector (AstraZeneca), mRNA vaccines (Pfizer, Moderna), DNA-based vaccines, protein vaccines, etc.

With the emerging use of the vaccines against the virus, many started experiencing different signs and symptoms. In order to better understand the effects produced by the vaccines, a study was carried out among a group of health care individuals working in Maternity and Children Hospital Buraidah, Saudi Arabia about the immediate and intermediate signs and symptoms after vaccination and further study is being done for the long-term effects of the vaccine.

The purpose of this study was to assess the post vaccination side effects among groups of individuals so that an effective vaccine can be proposed according to the individuals and thus avoiding reactogenicity, both systemic and local.

METHODOLOGY

Vaccination for the prophylaxis against the new novel coronavirus produced by Oxford/AstraZeneca, the **ChAdOx1(AZD1222**) vaccine, was carried out among 564(n=564) health care workers working in Maternity and Children Hospital Buraidah, Saudi Arabia between March 30 and April 30, 2021. This prospective cohort study was approved by the ethical committee of the hospital and consent was obtained from the recipients. Adults aged ≥25-65 years including doctors, nurses, paramedics and health-care staff who were healthy or had stable chronic medical conditions were enrolled and allocated to the above vaccine while individuals who were unwell and unfit were excluded from the study. They received an intramuscular injection delivered on the deltoid muscle and one medical specialist remained available throughout the clock to keep a check on any acute reaction in those who were vaccinated. Their responses were collected via a systematic questionnaire designed using **Google forms** platform. The data was collected and no personal information was collected or stored. The questionnaire was in English language format and consisted of 37 questions

Received on 25-06-2021
Accepted on 15-11-2021

highlighting sections on general health, pre-vaccination conditions and post vaccination signs and symptoms. The questionnaire was kept short and simple so that it can be quickly and easily completed. Initially a link was sent via social media (WhatsApp Messenger) and emails to primary contacts and they were requested to spread it further (Snowball sampling strategy). Safety and side effects were assessed for 15-20 days post-vaccination. Two major components of post covid vaccination taken into consideration were probability of minor side effects (discomfort at injection site, headache, body aches, chills, minor fever, etc.) and the likelihood of a serious adverse reaction (prolonged fever, anaphylaxis etc.). Specific **local** (pain at injection site, redness, swelling) and **systemic** (fever, fatigue, headache, body aches, chills, vomiting, diarrhea) adverse events for every individual were recorded. The data was analyzed and the results were produced in the form of tables and graphs.

RESULTS

A total of **564** health care workers took part in the survey. The data was gathered from both males and females. Table 1 shows the summary statistics of the demographic profile of the study participants and the infection status of the individuals prior to vaccination. Most of the respondents 288 (51.1%) were aged between 26 and 35 years followed by 110 (19.5) aged 36-45 years, 104 (18.4%) aged below 25 years, and 62 (11%) were aged 45 years and above (Table 1).

Local effects of the vaccine were pain, swelling and redness at the injection site. Of 564 respondents, 464 (82.3%) reported local reaction. Among these, 322 (57.2%) had pain at the site, 89 (15.8%) experienced swelling while 53 (9.3%) reported redness at the jab site. Apart from these 100 (17.7%) respondents had no local reaction towards the vaccine. Local reactions were mild to moderate and generally resolved within 1-3 days. Younger group (between age 25-35) experienced relatively more effects than the older group (above 45 years) (Table 2).

Systemic events reported by younger respondents (between 25 –35 years of age) and by older vaccine recipients (above 45 years of age) were almost similar. Moreover, these effects were more predominant in women than in men. The most commonly reported systemic effects were body ache, headache and fatigue (65.2%, 57.3% and 55% respectively). Fever and chills were reported in 280(49.6%) and 236(41.8%) respondents respectively. Diarrhea (14.9%) and vomiting (8.5%) were also reported by some individuals. Research also shows that people who contracted the virus prior to vaccination were more likely to have systemic effects due to vaccines (nearly 20% of people affected). People with comorbidities (hypertension, diabetes mellitus, etc.) also showed more reactogenicity towards vaccines than normal healthy individuals. There was no case of any severe systemic event. Regularly exercising individuals also reported less symptoms than those with a sedentary lifestyle. Table 2 shows local and systemic side effects due to AstraZeneca along with affected individuals

Table 1: Demographic characteristics and clinical status of healthcare workers (n=564)

Demographic Characteristic		**n**
Age	25 and below	104 (18.4)
	26-35	288 (51.1)
	36-45	110 (19.5)
	45 above	62 (11)
Gender	Male	210 (37.2)
	Female	354 (62.8)
SARS-CoV-2 infection	Infected	96 (13.8)
	Non-infected	468 (86.2)
Comorbidities	Diabetes	41 (7.3)
	Hypertension	55 (9.7)
	Asthma	37 (6.6)
	Multiple Sclerosis	12 (2.1)
	Hyperthyroidism	18 (3.2)

SARS-CoV-2: severe acute respiratory syndrome coronavirus 2

Table 2: Side effects of AstraZeneca

Type		**n (%)**
Local Reactogenicity	Pain	322 (57.2)
	Swelling	89 (15.8)
	Redness	53 (9.3)
Systemic Reactogenicity	Fever	280 (49.6)
	Chills	236 (41.8)
	Body aches	368 (65.2)
	Headache	324 (57.4)
	Vomiting	48 (8.5)
	Diarrhea	84 (14.9)

Figure 1: Local effects due to vaccination (Percentage%)

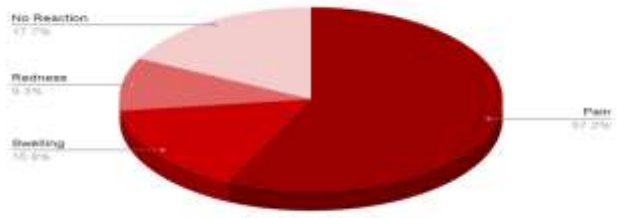
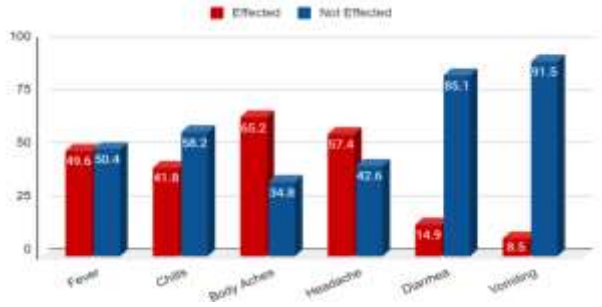


Figure 2: Various systemic events due to AstraZeneca vaccine (Percentage%)



DISCUSSION

Vaccines were developed in the twentieth century to address the needs of a society where mortality rate caused by infectious diseases during the early years of life was a major concern and challenge. Owing to the success of vaccines, in the twenty-first century people have longer life expectancy, and thus we should consider how the principles of vaccine technology can be redesigned to meet the needs of healthcare systems that are struggling to deal with the new obstacles[11].

The use of vaccines in prevention of viral infections has been stressed throughout the globe for many years with an ample amount of research still going on for the development of different types of vaccines.[12] Healthcare workers who deal directly with patients suffering from COVID-19 are at a higher risk of being exposed to the virus, making them a number one priority once a potent and safe vaccine becomes available.[13] Vaccines against the coronavirus have been developed by many companies with varying efficacies. However, people experienced post vaccination side effects which varied according to the types of vaccines. Our study used the vaccine produced by Oxford/AstraZeneca, the **ChAdOx1(AZD1222**) vaccine as it was supplied to the majority of the population in Saudi Arabia during this period. Our research concluded that local reactions due to vaccines experienced by the participants were mostly pain (57.18%), while swelling and redness were less common (15.77% and 9.30% respectively). This pattern was almost similar to the research done on the Pfizer**(BNT163B2)** vaccine.[14] The Pfizer vaccine reported more systemic events than AstraZeneca in the younger population than in older adults particularly after the first dose although it has been proved to be higher in efficacy than the latter.[15] It also reported serious adverse

events such as shoulder injury related to vaccine administration, lymphadenopathy, ventricular arrhythmia and leg paresthesia although no such event was seen with AstraZeneca. Pfizer and Moderna (**mRNA-1273 vaccine)** also reported events of anaphylaxis in people who had allergies to some vaccine products (chiefly polyethylene glycol) although no such case was seen with AstraZeneca[16,17,18]. Research on the vaccine also pointed out that the side effects were more predominant in females than in males. Similarly, during the influenza pandemic (2009), the cases of anaphylaxis reported in women compared with men were nearly four times[19]. Another study (1990-2016) highlighted the fact that women were responsible for 80% of the anaphylactic reactions due to vaccines[20].

Studies show that side effects from the flu vaccine are almost similar to AstraZeneca, but the intensity of the side effects (mainly local reactogenicity) was more common in the covid-19 vaccine which is probably due to reactivity and increased immune response of the body.[21] Regarding the rare side effects, during the H1N1 swine flu pandemic in 2009, healthcare departments in various regions of the world raised the alarm about occurrence of narcolepsy in children who had received a dose of Pandemrix, a flu vaccine[22]. Certain types of rare events also occurred with AstraZeneca vaccine (formation of blood clots). For shingles vaccine, local systemic effects are more intense (local pain 88.4%, redness 38.7%, swelling 30.5% chance) as compared to vaccine.

Two studies on AstraZeneca which contradicts with the research, showed that it caused rare development of blood clots in some vaccine recipients due to antibodies produced against platelet factor 4, showing similar effect as autoimmune heparin-induced thrombocytopenia and was also concluded by the European Medicines Agency (EMA) that these rare side effects should be listed[23,24,25].

Our study had some limitations. Firstly, the responses for the study were collected using a web-based questionnaire, instead of being in person. Secondly, a snowball sampling strategy was used, which may not depict the actual picture of participants. Thirdly, the number of participants in the study were not sufficient to fully comprehend the side effects of the vaccine making this a small-scale study.

CONCLUSION

Through thorough collection of data and assessing the results, it can be concluded that AstraZeneca vaccine showed minor to intermediate side effects (both local and systemic) among the participants with no case of adverse reaction making it fairly safe as well as effective. Keeping in view of the rare systemic events such as blood clots which may occur in the person being vaccinated (four people in a million), the vaccine is relatively safe. As the benefits overcome the side effects of the vaccine it is important that the vaccines be implemented properly into the system to prevent and protect people from this virus and to overcome this deadly pandemic.

Authors Contribution: DJ produced, designed and edited the manuscript, **YHA** and **AJ** did data collection and helped in manuscript writing, **JI** reviewed and approved the manuscript
Disclaimer: None
Conflict of interest: None to declare
Grant Support & Financial Disclosures: None

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