RESEARCH ARTICLE

Safety and Adverse Effects of Inactive SARS-Cov-2 Vaccine (CoronaVac) in Health Care Professionals

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Abstract

Objective: To assess adverse effects post-vaccination in healthcare professionals in the first vaccinated group against coronavirus disease-2019.

Method: The prospective study was conducted at the vaccination unit of a university hospital in Tekirdag, Turkey, from January to February 2021, and comprised healthcare professionals who came for receiving the second dose of the coronavirus disease-2019 inactivated severe acute respiratory syndrome coronavirus 2 vaccine 28 days after the first dose. Data was analysed using SPSS 18.

Results: Of the 1088 subjects, 714(65.6%) were female with mean age 29.85±9.2 years and 374(34.4%) were male with mean age 29.57±9.85 years. Overall, local pain in the vaccinated area 495(45.5%), fatigue 266(24.4%), headache 261(23.9%) and muscle pain 197(18.1%) were very common adverse effects.

Conclusion: Inactivated severe acute respiratory syndrome coronavirus 2 vaccine was found to be safe.

Keywords: CoronaVac, Post-vaccination adverse effects, Healthcare professionals.

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Introduction

Coronavirus disease-2019 (COVID-19) is a contagious disease that originates from the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which is a ribonucleic acid (RNA) virus. The ongoing COVID-19 pandemic has led to high morbidity and mortality worldwide.[1]

The World Health Organisation (WHO) reported 117,799,584 coronavirus cases and 2,615,018 deaths caused by COVID-19 as of March 2021. The lack of efficient treatment to prevent COVID-19 has led to a quick action plan to develop potential vaccines against the disease.[2,3]

There are different vaccines for COVID-19 and studies on new vaccines are ongoing. One of these vaccines contains the inactivated virus that does not cause illness but creates an immune response. However, the most widely used vaccine in Turkey is CoronaVac-SinoVac (Sinovac Life Sciences, Beijing, China), which is an inactive vaccine against COVID-19 containing inactivated SARS-CoV-2. Phase III studies of the CoronaVac have earlier been conducted in Brazil, Turkey, Indonesia, China and Chile.[4-6]

Severe allergic reactions to vaccines are rare and prediction of adverse effects is difficult. The most common adverse effects post-vaccination are local reactions that may occur in the first few hours of the vaccination, including swelling, pain and redness around the vaccinated area. These are mild and have limited effects in general. However, systematic adverse effects post-vaccination are more common effects, such as fever, fatigue, hypotension, hypotonia, rash, myalgia, headache and loss of appetite. These effects are non-specific symptoms of some disease that may develop due to vaccination or other reasons.[7,8]

The most expected adverse effects of the CoronaVac is pain in the application area. In 33% of volunteers in Phase II studies of the vaccine, non-serious and simple adverse effects were observed, like pain in the injection area, fatigue, fever and headache. Other adverse effects were stated to be uncommon effects.[7,8] The incidence of mucocutaneous rashes and hypoaesthesia in the vaccinated groups was slightly higher than in the placebo group, and there was no significant difference in the incidence of other injection areas or systemic events.[9]

One of the risk groups having vaccination suggestions comprises healthcare professionals regarding the COVID-19 pandemic in Turkey. Although data from clinical studies is encouraging, evidence related to the adverse effects of COVID-19 vaccines is still limited. The current study was planned to fill the gap by providing early results on the adverse effects of the vaccine that occurred post-vaccination in healthcare professionals who were in the first vaccinated group.

Subjects and Methods

The prospective descriptive study was conducted at the vaccination unit of a university hospital in Tekirdag, Turkey,

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from January to February 2021. After approval from the ethic review committee of Tekirdag Namık Kemal University, Turkey, a simple random sampling method was used, the sample size was calculated as described in literature[10] with 95% confidence interval (CI) and ±5% sampling error for a non-homogeneous population. Those included were healthcare professionals regardless of age and gender who came for receiving the second dose of CoronaVac 28 days after the first dose. Those who had a high-risk epidemiological history, like travel history, history of exposure to SARS-CoV-2 or contact with someone infected, history of fever in the preceding 15 days, or known allergy to any vaccine component, were excluded.

After taking informed consent from all the subjects, data was collected using a questionnaire developed in the light of literature [11] to gather sociodemographic data and post-vaccination adverse effects, including chronic diseases, like hypertension (HTN), diabetes mellitus (DM), coronary heart disease (CHD), asthma and chronic obstructive pulmonary disease (COPD).[11]

CoronaVac (strain sequence no. NC-045512.2) contained virus antigen and the vaccine dose was 600SU/0.5 mL. Post-vaccination adverse effects were classified as: Very common ≥1/10; common ≥1/100 to ≤1/10); uncommon (≥1/1,000 to ≤1/100); rare (≥1/10,000 to ≤1/1,000); very rare (≤1/10,000), not known (cannot be estimated from the current data).[12]

Data was analysed using SPSS 18. Kolmogorov-Smirnov and Shapiro Wilk's tests were used for data normality distribution. Chi-square analysis was applied to explore the inter-group relationships in terms of nominal variables. Fisher's exact test was used in cases where the expected values in the cells did not have sufficient volume in 2x2 tables, and Monte Carlo Simulation was applied in RxC tables. While interpreting the results, 0.05 was used as the significance level.

Results

Of the 1088 subjects, 714(65.6%) were female with mean age 29.85±9.2 years and mean body mass index (BMI) 23.74±6.56, and 374(34.4%) were male with mean age

Table-1: Categorical variables (n=1088).

		n (%)
Gender	Male/Female	374 (34.4) / 714 (65.6)
Mean Age. (years)	Male/Female	29.57±9.85 / 29.85±9.2
BMI (kg/m^2)	Male/Female	26.11±4.1 / 23.74±6.56
Smoker	Yes/No	408 (37.5) / 680 (62.5)
Participant groups	<30 Age	688(63.2)
	30-39 Age	328(30.1)
	40 ≥ Age	72(6.6)
History of allergy	Yes	236 (21.7)
	No	852 (78.3)
History of previous anaphylaxis	Yes	23 (2.1)
	No	1065 (97.9)
Chronic Illness	Yes	189 (17.4)
	No	899 (82.6)
COVID-19 patient contacts	Yes	380 (34.9)
	No	708 (65.1)
COVID-19 infection	Yes first visits	61 (5.6)
	Yes second visits	30 (2.8)
	No	997 (91.6)

BMI: Body mass index, COVID-19: Coronavirus disease-2019.

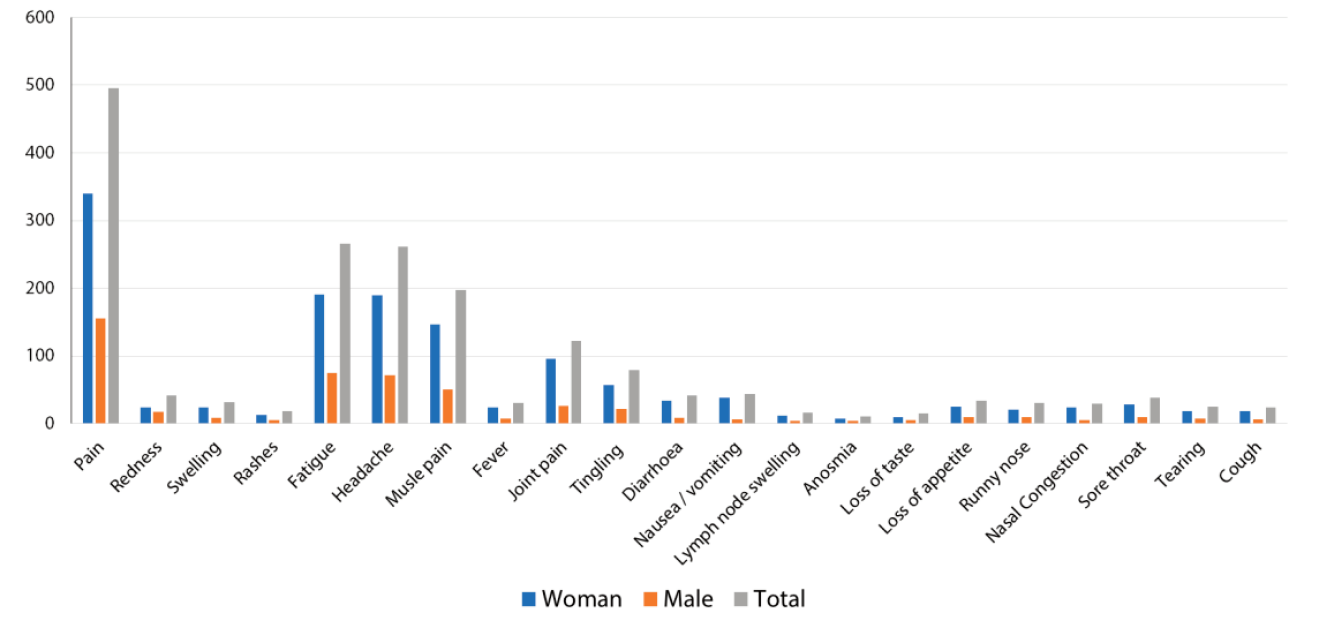

Figure-1: Association between side effects and gender.

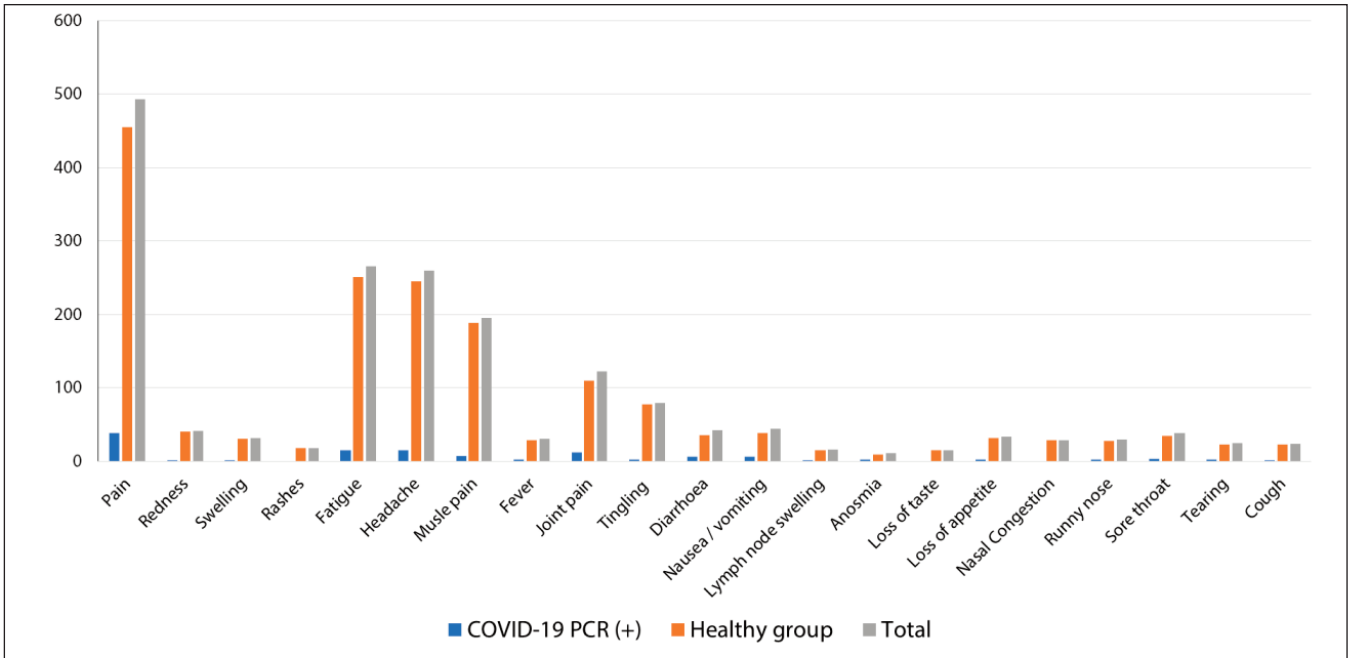

Figure-2: Comprison of side effects between coronavirus disease-2019 (COVID-19) polymerase chan reaction (PCR) positive and healthy individuals.

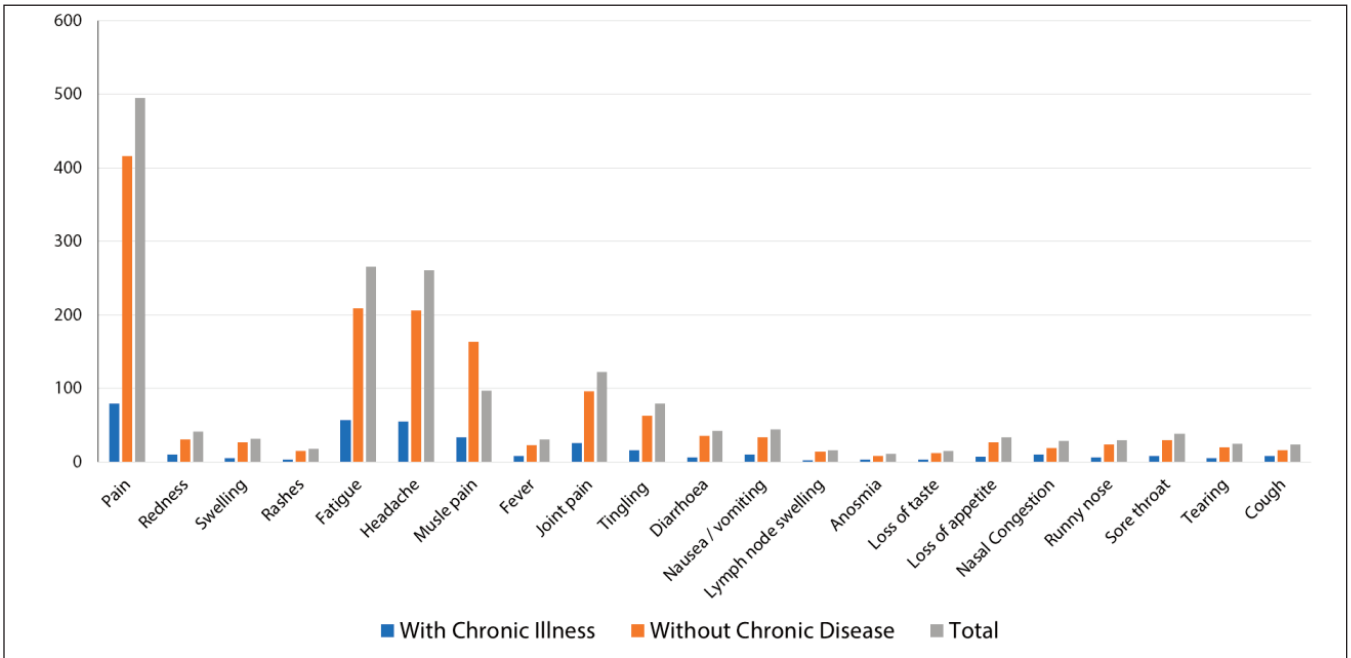

Figure-3: Side effects rates among those with and without a chronic disease.

29.57±9.85 years and mean BMI 26.11±4.1 (Table 1).

The prevalence of adverse effects post-vaccination was compared along gender lines (Figure 1).

Likewise, comparison of side effects' prevalence was done between those found COVID-19-positive on polymerase chain reaction (PCR) and healthy individuals (Figure 2), and between those with and without a chronic disease (Figure 3).

Overall, local pain in the vaccinated area 495(45.5%), fatigue 266(24.4%), headache 261(23.9%) and muscle pain 197(18.1%) were very common adverse effects (Table 2).

Table-2: COVID-19 vaccine side effects.

	n (%)	Category
Local in vaccinated area	495 (45.5)	Very common
Redness in the vaccinated area	41 (3.8)	Common
Swelling in the vaccinated area	32 (2.9)	Common
Rashes post-vaccination	18 (1.7)	Common
Fever (38°C and above)	31 (2.8)	Common
Fatigue	266 (24.4)	Very common
Headache	261 (24.0)	Very common
Muscle pain	197 (18.1)	Very common
Joint pain	122 (11.2)	Very common
Local tingling sensation	79 (7.3)	Common
Diarrhoea	42 (3.9)	Common
Nausea/vomiting	44 (4.0)	Common
Sore throat	38 (3.5)	Common
Loss of appetite	34 (3.1)	Common
Cough	24 (2.2)	Common
Lymph node swelling	16 (1.5)	Common
Anosmia	11 (1.0)	Common
Loss of taste	15 (1.4)	Common
Nasal congestion	29 (2.7)	Common
Runny nose	30 (2.8)	Common
Tearing	25 (2.3)	Common

COVID-19: Coronavirus disease-2019.

Discussion

Vaccination is one of the most effective preventive health measures against SARS-CoV-2. Also, it is a critical and successful public health intervention as it prevents morbidity and mortality arising from common infectious diseases. In the current study, local pain in the vaccinated area, fatigue, headache and muscle pain were "very common" side effects. Other side effects post-vaccination were "common".

Mild to moderate pain in the injection area was the most commonly reported local reaction within 7 days post-vaccination); and 495(45.5%) participants of all age groups reported local pain in the injection area. Mild or moderate adverse effects were reported in 22% of 123 people in another study that applied 6µg vaccines. In the same study, the most frequently reported adverse effects were pain in the injection area (9%), muscle pain (1%), headache (4%) and fatigue (3%).[2] Comparing the information from both studies, local pain in the injection area was higher in the current study. Also, headache, muscle pain, joint pain and fatigue were higher in the current study. The incidence of fever post-vaccination was 2.8% in the current study, which was lower than that of the other study.[2] Mild adverse effects, such as pain at the injection area, headache, fever and fatigue, were detected based on the first data of the CoronaVac vaccine, whose Phase III studies were conducted in Brazil, Indonesia and Turkey.[3]

Logunov et al. conducted a study on a 21-day interval between the first dose and the second dose vaccines with 38 participants and reported that the most common adverse effects post-vaccination were pain in the injection area (58%), hyperthermia (50%), headache (42%), asthenia (28%), and muscle and joint pain (24%).[13] Another study that used the chimpanzee adenovirus-vectored vaccine (ChAdOx1 nCoV-19) vaccine reported that local and systemic reactions were common, and the most common side effect was pain in the injection area (67%). In the same study, muscle pain was 60%, fatigue 61%, trembling 56%, and feeling of fever 51% in the groups that did not take paracetamol.[14] Mild to moderate pain in the injection area within 7 days after the injection of the in another vaccine (BNT162b2) was the most commonly reported local reaction, followed by other common adverse effects that were fatigue (59%) and headache (52%).[15] The current study found post-vaccination adverse effects, such as 3.9% diarrhoea and 4% nausea/vomiting. Another study with the same dose of vaccine reported that there were no diarrhoea and nausea/vomiting.[16] The most common systemic adverse effects in the current study were fatigue, headache, and muscle and joint pain. These systemic effects of the CoronaVac vaccine were similar to other vaccines produced for COVID-19 and were detected at a higher rate than another study conducted on the same vaccine.[16]

Although not many, clinical symptoms, such as 1% anosmia and 1.4% loss of taste, which we encounter during COVID-19 infection in general, were found in the current study. To our knowledge, there is no statistical data available on clinical symptoms, such as loss of taste and anosmia in individuals during the illness and post-vaccination. Comparing the groups infected and non-infected with COVID-19, there was no statistically significant relationship between the adverse effects ($p>0.05$). Muscle pain was observed in 19.6% participants who did not have COVID-19 infection, which was higher than other similar studies.[3,16]

The curret study has limitations, like being a single-centre research. Only minor side effects were reported and the lack of sufficient scientific data to interpret vaccine adversely effects profiles is another limitation of the study.

Multicentre, large-scale studies are recommended.

Conclusion

Undesirable adverse effects profile post-vaccination of CoronaVac was not different from those reported in studies for inactivated virus vaccines.

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