https://doi.org/10.48047/AFJBS.7.5.2025.587-594

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

The prevalence of upper and lower respiratory tract side effects of Sinopharm COVID-19 vaccines

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Abstract

One of the main strategies to stop the COVID-19 epidemic is vaccination. Numerous vaccines are used all over the world, but there is limited information on the Sinopharm vaccine's effectiveness and negative effects on the respiratory system. Hence, this study investigated the reported upper and lower respiratory side effects of the Sinopharm vaccine among participants.

Methodology: This cross-sectional, multi-centre study was conducted using a non-probability sampling technique. The ethical approval was obtained prior to performing this study. The study was conducted over a four-month period, from 1st Jan , 2025 till 30st April, 2025. It included 550 participants aged above 18 who provided informed consent and had received both the first and second doses of the Sinopharm vaccine. Information on age, weight, height, and the duration of diabetes and hypertension were documented as means with standard deviations, while demographic characteristics were recorded as frequencies and percentages.

Results: The study results showed that out of 550 participants, 345(62.7%) were males and 205(37.3%) were females; with mean age of 42.37±14.33 years. Among them, 250(45.5%) had hypertension, and only 180(32.7%) had diabetes. After injecting the first dose of Sinopharm vaccine, the most frequently observed side effect was fever in 270(49.1%) participants, followed by burning at the injection site 221(40.2%) and injection site pain 202(36.7%). Concerning respiratory tract side effects, sore throats were observed in 170(30.9%) participants, and headaches were perceived by 132(24.0%) participants. Additionally, shortness of breath was observed in 118(21.5%) participants, followed by coughing in 101(18.4%) participants.

Conclusion: This study concluded that the most common side effects related to the respiratory tract of the Sinopharm vaccine were chest pain, shortness of breath, and sore throat after getting both doses. Moreover, the most common general and local side effects of the Sinopharm vaccine after receiving both doses were fever, pain, and burning at the injection site. Keywords: Sinopharm vaccine, fever, chest pain, shortness of breath.

Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes coronavirus disease 2019 (COVID-19), has affected tens of millions of people across the globe, bringing an imminent risk to the well-being of society and the economy, along with public health [1]. Similar to most places in the world, constraints were set into effect to stop the propagation of the COVID-19 infection. These restrictions involved restricting automobile usage based on place and time dependent on the risk level implemented by the Ministry of Health, implementing working from home, closing jobs depending on the degree of risk, mandating the use of face masks at gathering places, and educating the community by means of the media as well as healthcare workers [2]. Implementation of restrictions reduces the mortality rate; conversely, paying no attention to constraints and avoiding the COVID-19 prevention triangle (use of a mask, avoidance of huge gatherings, and use of hand sanitizer) causes a different wave [3]. Even though several pharmaceutical treatments have been advised for COVID-19, further research is still mandatory to find out their potency and effectiveness [4]; consequently, the development and administration of vaccines might be the best approach to controlling the infection [5].

Consequently, vaccination is one of the paramount approaches to stopping the propagation of COVID-19 across the globe and can save lots of lives every year [6]. Presently, an efficient and safe vaccine is the best route to fight against the transmission ofCOVID-19 [7]. Globally, numerous companies have produced COVID-19 vaccines. For instance, clinical trial at a third phase performed in Russia proved that the Sputnik V vaccine is an adenovirus vaccine that has 91.6% effectiveness [6]; at present,

it is recommended in 68 nations, whereas the frequently reported adverse effects of this vaccine involved fatigue, arthritis, headaches, myalgia, chills, pyrexia, vomiting, and nausea [7].

Main international biopharmaceutical companies have produced a number of COVID-19 vaccine candidates. One of the two inactivated viral COVID-19 vaccines is termed Sinopharm, also identified as the BBIBP-CorV vaccine. In July 2021, Sinopharm received an emergency usage authorization (EUA). Initially, the use of Sinopharm was limited to Asia, Africa, and the Middle East [8]. The inactivated BBIBP-CorV vaccine (Sinopharm), made in China, has a 79.34% effectiveness rate. In this vaccination, inactivated viruses nevertheless have the capacity to proliferate in living organisms with only minimal or nonexistent symptoms. Injection site pain, weariness, fever, headaches, and lethargy are a few of the side effects that have been reported [9]. Sinopharm has 79% effectiveness after two dosages [10]. It can have negative effects, just like any medicine or vaccination that claims to treat or prevent disease.

The inactivated Sinopharm vaccine is administered via two injections with an interval of 14 or 21 days, allowing the body to absorb SARS-CoV-2 antigens. The intramuscular administration of an inactivated COVID-19 vaccine causes the body to develop antibodies against the virus' deceased antigens, enhancing defense system against COVID-19 viral infections [11]. Symptomatic conditions are not a side effect of conventional whole-virus inactivated vaccinations. This technique allows the inactivated viruses to remain capable of reproducing in living organisms while causing little to no symptoms [12].

Vaccine uptake is still hesitant in a variety of cultural scenarios, despite the data supporting their safety and efficacy. The disregard for and refusal to get the COVID-19 vaccine placed a significant strain on medical services and economies and posed a threat to world health [13]. In spite of the Sinopharm vaccine being extensively administered in various countries, there is scarce literature on it and its negative effects. Consequently, this study was aimed at investigating the respiratory adverse effects of the Sinopharm vaccine participants.

Methodology

This cross-sectional, multi-center study was conducted using a non-probability sampling technique. The ethical approval was obtained prior to performing this study. The study duration was about four months, from 1st Jan , 2025 till 30st April, 2025, and included 550 participants aged above 18 who gave informed consent and had completed both doses of the Sinopharm vaccine. Conversely, individuals who had not completed the two-dose regimen, had received a vaccine other than Sinopharm, had never been vaccinated against COVID-19, or had submitted incomplete information were excluded from the study.

Each individual was provided with a brief overview of the study's purpose prior to obtaining their informed consent. Data from the participants was gathered using a pre-designed questionnaire. Age, gender, coexisting illnesses, Sinopharm vaccination with both doses, previously infected with COVID-19 infection, and the incidence of any local and general side effects involving the respiratory tract after receiving both dosages of the vaccine were among the demographic data on the participants. Chills, headache, dyspnea, chest pain, coughing, and sore throat are all reflected to be respiratory side effects. Local side effects of the injection are pain, burning, redness, and swelling. Additionally, the degree of participant satisfaction was also observed.

The data was entered and analyzed using IBM SPSS Statistics for Windows, Version 23.0. Age, weight, height, diabetes duration and hypertension were presented as means and standard deviations. Demographic variables such as gender, upper and lower respiratory side effects were reported as frequencies and percentages.

Results

A total of 550 participants who received Sinopharm vaccines were involved in the study. Out of them, 345(62.7%) were males and 205(37.3%) were females, with the mean age of 42.37±14.33 years.

The mean weight of participants was 67.19±14.55 kg. The mean height of participants was 5.51±0.83 feet. The mean hypertension duration was 5.35±2.80 years and the mean duration of diabetes was 4.91±6.32 years. Out of 550 participants, 250(45.5%) had hypertension, and only 180(32.7%) had diabetes. Furthermore, only 37(6.7%) participants had previously exposed with the COVID-19 Infection, as presented in Table I.

After receiving the first dose of the Sinopharm vaccine, the most commonly observed side effect was fever, which was reported in 270 (49.1%) participants, after that a burning sensation at the injection site in 221 (40.2%) and injection site pain in 202 (36.7%) participants. Likewise, swelling at the injection site was reported by 206(37.5%), participants. Concerning respiratory tract side effects, sore throats were observed in 170(30.9%) participants and headaches were perceived by 132(24.0%) participants. Additionally, shortness of breath was observed in 118(21.5%) participants, followed by coughing in 101(18.4%) participants. Moreover, chest pain and flu were the least reported side effects by 45(8.2%) and 34(6.2%) participants, respectively, as presented in Table II.

After the second dose of the Sinopharm vaccine, fever remained the most frequently reported side effect, noted in 224 (40.7%) participants, followed by pain at the injection site in 209 (38.0%) participants. Likewise, burning at the injection site was reported by 186(33.8%), participants.Concerning respiratory tract side effects, chest pain was noticed in 148(26.9%) participants. Shortness of breath was observed in 142(25.8%) participants, followed by headache and flu in118(21.5%) and 121(22.0%) participants, respectively. Moreover, sore throat and cough were the least reported side effects by 87(15.8%) and 60(10.9%) participants, respectively, as presented in Table III.

The satisfaction levels indicated that most of the participants, 307 (55.8%), were satisfied, while 127 (23.1%) reported being very satisfied with their vaccination. In contrast, only 10 (1.8%) participants expressed dissatisfaction, as shown in Table IV.

Table I: The demographic information of Sinopharm recipients (n=550).

Variable		**Mean±SD n(%)**
Age (years)		42.37±14.33
Weight (kg)		67.19±14.55
Height (feet)		5.51±0.83
Hypertension Duration (years)		5.35±2.80
Diabetes Mellitus Duration (years)		4.91±6.32
Gender	**Male**	345(62.7%)
	Female	205(37.3%)
Hypertension	**Yes**	250(45.5%)
	No	300(54.5%)
Diabetes Mellitus	**Yes**	180(32.7%)
	No	370(67.3%)
History of Prior COVID-19 Infection	**Yes**	37(6.7%)
	No	513(93.3%)

Table II: The distribution of general and respiratory side effects after receiving the first dosage of the Sinopharm vaccine.

Variable		n	(%)
Injection site pain	**Yes**	202	36.7
	No	348	63.3
Swelling at injection site	**Yes**	206	37.5
	No	344	62.5
Redness at injection site	**Yes**	88	16.0
	No	462	84.0
Lymphadenopathy	**Yes**	134	24.4
	No	416	75.6
Fever (temperature >37.8 ˚C)	**Yes**	270	49.1
	No	280	50.9
Headache	**Yes**	132	24.0
	No	418	76.0
Burning at injection site	**Yes**	221	40.2
	No	329	59.8
Flu	**Yes**	34	6.2
	No	516	93.8
Chills	**Yes**	169	30.7
	No	381	69.3
Cough	**Yes**	101	18.4
	No	449	81.6
Sore throat	**Yes**	170	30.9
	No	380	69.1
Shortness of breath	**Yes**	118	21.5
	No	432	78.5
Chest Pain	**Yes**	45	8.2
	No	505	91.8

Table III: The distribution of general and respiratory side effects after receiving the second dosage of the Sinopharm vaccine.

Variable		n	(%)
Pain at injection site	**Yes**	209	38.0
	No	341	62.0
Swelling at injection site	**Yes**	131	23.8
	No	419	76.2
Redness at injection site	**Yes**	74	13.5
	No	476	86.5
Lymphadenopathy	**Yes**	120	21.8
	No	430	78.2
Fever (temperature >37.8 ˚C)	**Yes**	224	40.7
	No	326	59.3
Headache	**Yes**	118	21.5
	No	432	78.5
Burning at injection site	**Yes**	186	33.8
	No	364	66.2
Flu	**Yes**	121	22.0
	No	429	78.0
Chills	**Yes**	144	26.2
	No	406	73.8
Cough	**Yes**	60	10.9
	No	490	89.1
Sore throat	**Yes**	87	15.8
	No	463	84.2
Shortness of breath	**Yes**	142	25.8
	No	408	74.2
Chest Pain	**Yes**	148	26.9
	No	402	73.1

Table IV: Participant's level of satisfaction with vaccine.

Variable		n	(%)
Overall subject level of Satisfaction for vaccine	**Very Satisfied**	127	23.1
	Satisfied	307	55.8
	Ok	106	19.3
	Dissatisfied	10	1.8

Discussion

The prevention of COVID-19 cases and mortalities during the global COVID-19 epidemic was greatly assisted by vaccination [14]. Thoughts about vaccination safety are widespread around the world. Therefore, the present study demonstrated the upper and lower respiratory tract side effects reported by the Sinopharm recipients.

One of the research investigated the adverse reactions that recipients of the Sinopharm vaccine had after receiving the first and second dosages. Pain at the site of injection was the most prevalent side effect following dosage one in 253 (61.3%) participants, and following dose two in 161(38.9%) participants. About, 168(40.6%) respondents reported overall tiredness, 99(23.9%) myalgia/body pain, 93(22.4%) mild fever, and 87(21%) participants reported headache. General fatigue, headaches, myalgia/body discomfort, and mild fever were among the side effects frequently described by participants after the second dosage of the vaccination following injection site pain [10]. These findings were in line with another study that similarly intended to evaluate the most frequent Sinopharm adverse effects [15]. Similarly, according to another study, the patients' most frequent adverse effects for the initial dose were headache (9.6%), tiredness (12.2%), and soreness at the injection site (42.2%). The most frequent adverse reactions for the second dose were pain (32.6%), weariness (16.3%), and tiredness (13.7%) [16]. These findings were not consistent with the present study, which identified fever as the most commonly observed side effect following both the first and second dosages. Concerning respiratory tract side effects, sore throats were observed in 170(30.9%) participants, and headaches were perceived by 132(24.0%) participants after the first dose.

Similarly, a research by Saeed BQ et al. carried out in UAE to identify the most common Sinopharm adverse effects. They found that 42.2% of individuals reported injection site pain after their first dose of vaccinations, subsequently fatigue in 12.2% and headaches in 9.6% of subjects. No adverse events were reported by 24.4% of participants. They also discovered that fatigue (16.3%), exhaustion (13.7%), and soreness at the injection site (32.6%) were the most common side effects of the second dose [15]. These studies were inconsistent with the previously published findings, revealed that after receiving both doses, participants exhibited a high body temperature burning, edema, and injection site pain [17]. The results of the present study were inconsistent with those of the aforementioned studies and demonstrated that fever, pain, and swelling at the injection site were the most frequent observed adverse reactions following receiving the both doses. Side effects of second dose were more severe than those first dose. Headaches were observed in 132(24.0%) and 118(21.5%) participants after injecting the first and second dosages of the Sinopharm vaccine, respectively.

Likewise, another study found that, with the exception of dyspnea ($p<0.05$), all self-reported adverse effects caused by the immunization were not associated with increasing severity with a previously exposure to COVID-19 illness [18]. Participants with prior infections may have experienced chronic COVID-19 or prolonged dyspnea after acute infection, which may have gotten worse following vaccination [19], despite the lack of a clear explanation. None of the participants who had previously contracted COVID-19 experienced any serious side effects or needed hospital treatment [19]. These findings were not corroborated with the present study and revealed that only 37(6.7%) had prior history of COVID-19 infection, while shortness of breath was reported by 118(21.5%) participants after getting the first dose and 142(25.8%) participants after getting the second dose, showing there was no relationship between shortness of breath and prior COVID-19 infection.

One of the prospective cohort studies conducted on HCWs in Pakistan. A total of 2500 individuals participated. The majority of them (56.5%) were males who worked directly in the medical field. 30.4% of the population was middle-aged or older while 69.6% were youngsters. 17.4% of cases exhibited no symptoms. Among symptomatic individuals, fever (84.2%), cough (68.4%), muscle

soreness (63.2%), throat pain (31.6%), and cold (5.3%) were among the symptoms that were present [20]. The present study contradicted the previously stated research and showed that 345 (62.7%) of the recipients were male. After the first dose, there were indications of fever (270; 49.1%), cough (101; 18.4%), sore throat (170; 30.9%), and flu (34; 6.2%).

The study has several limitations. The relatively small sample size is one of its primary weaknesses. Additionally, as a cross-sectional study on the basis of self-reported side effects, the findings may have been influenced by participants' prior beliefs or misconceptions about vaccination. Another methodological limitation is the unequal gender distribution within the study population. Furthermore, given the limited number of participants with a previous exposure of COVID-19 infection, future research should aim for a balanced demonstration of previously infected and non-infected individuals to allow for a more accurate assessment of the severity of vaccine-related side effects.

Conclusion

This study concluded that chest pain, shortness of breath, and sore throat were the most common respiratory side effects of the Sinopharm vaccine, while fever, pain, and burning at the injection site were the most frequent general and local reactions. These side effects were generally mild, with slightly higher frequency and severity after the first dosage. Overall, the Sinopharm vaccine was found to be safe for future use.

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