

# **Post vaccination side Effects of Different available vaccines among People of Karachi, Pakistan: A cross sectional Study**

## **Abstract**

**Background:** For the suppression of covid-19 virus development of vaccines are one of the foremost step but this rapid development enlarge the probability of side effects. In this study a questionnaire based survey conducted to evaluate post covid vaccination short term side effects. **Objectives:** The aim of the study was to highlight the side effects of different available vaccines such as Pfizer, AstraZeneca, Sputnik, Sino-Pharm, Sinovac and Cansino-Bio in people of Karachi, Pakistan. **Methodology:** A questionnaire based cross sectional study was conducted between May - October 2021. Questionnaire were prepared in Google form link of the form were distributed randomly through Whatsapp language of questionnaire was English. This survey had four sections which included socio demographic data of all Participants, health status, type of vaccine participants were vaccinated and post vaccination short term side effects among individuals were collected data were evaluated by using SPSS version 20.0. **Results:** A total of (n=120) participants were taken part which included n= 42 (35.8%) males, n= 75 (62.5%) females and n= 3 (2.5%) transgenders. Participants which were diabetics and hypertensive included n=1(2.38%), n= 2 (4.76%) males, n=3 (4%), n=3 (4%) females and n= 1 (33.3%) transgender however n=2 (2.66%) females were suffered from heart disease. Participants with liver disease and renal insufficiency included n=2 (47.6%), n=1 (2.38%) males, n=2 (2.66%), n=3 (4%) females and n=1(33.3%) transgender. Participants received Pfizer vaccine included n=3 (7.1%) males, n=11 (14.6%) female and n=1(33.3%) transgender whereas n=2 (2.66%) females and n=1 (33.3%) transgender were vaccinated by AstraZeneca. n=2 (2.66%) female participants immunize by Sputnik. n=13 (30.9%) males, n=29 (38.6%) females and n=1 (33.3%) transgender were vaccinated by Sino-Pharm. n=17 (40.4%), n=28 (37.3%) and n=1 (33.3%) were immunized by Sinovac vaccine and n=9(21.4%)males, n=3 (4%) females and n=1 (33.3%) transgender were vaccinated by Cansino-Bio whereas post vaccination Side effects such as pain at the site of injection were found n=27 (64.2%) in males, n=41(54.6%)in females and n= 2 (66.6%) in transgenders, participants faced fever after covid vaccination included n=14 (33.3%) males, n=23(30.6%) females another side effect like fatigue were reported by n=14 (33.3%) males, n= 21 (28%) females whereas side effect such as nausea and vomiting were reported by n=12 (28.5%) males , n= 13 (17.3%) females and n= 1 (33.3%) transgender, Abdominal Pain after covid vaccination were reported in n= 5 (11.9%) males, n= 6 (8%) females whereas diarrhea were reported in n=7 (35.7%) males n= 12 (16%) females which subsided after few days or hours and no hospitalization were reported n=15(35.7%) males, n=28(37.3%) females reported that they didn't experienced these side effects. **Conclusion:** side effects after Covid vaccination were predictable and mild such as pain at the site of injection, fever, fatigue, Nausea, vomiting, abdominal pain and diarrhea these were common short term side effects which were subsided in few days or hours This questionnaire based survey is a preliminary study to evaluate short time side effects which help in reducing vaccine hesitancy to some extent and clear conspiracies such as insertion of microchip and infertility associated with Covid vaccines. However further surveillance program needed to evaluate long term safety profile of covid vaccine with large sample size.

**Key words:** Post-Vaccination, COVID-19, Vaccines, Pandemic, Side effects

## 1. Introduction

Severe Acute Respiratory Syndrome Corona virus-2 (SARS-COV 2) was emerged from city Wuhan Hubei province China. The beginning of SARS COV 2 appearance was linked to animal market in Wuhan where it is possibly come to the fore from bat(Ahmed et al., 2020). The Virus is acknowledged as novel because the evolution characters are completely different from the previous known viruses strain(Gorbalenya et al., 2020). on 3<sup>rd</sup> January, 2020 the virus first named as 2019-ncov (2019 Novel corona virus) and the disease called as (NCIP) Novel coronavirus infected Pneumonia(Tan et al., 2020) after the disclosure and scanning of complete viral genome of the virus by National Health commission and China CDC. On 31st January, 2019 WHO revealed (SARS-COV 2) as pandemic (WHO d), as the virus spread globally(Hatmal et al., 2021). It is transmitted from person to person at a very fastest rate through wheeze, saliva, urine, fecal matter and contact with infected person(Tahir et al., 2021). The main combat area for this virus are lungs as the lungs alveoli are rich in ACE 2 Receptors(Wadman et al., 2020). Virus strike the epithelial cells of the lungs and resulting in diffuse alveolar damage (DAD) resulting in Respiratory failure in patients(Gu et al., 2020). After virus attack WBC, dead cells, mucus and pus or fluid all together in the alveoli causes Acute Respiratory Distress syndrome with side by side symptoms of Pneumonia like fever, cough and difficulty in breathing resulting in Hypoxia(Xu et al., 2020). People having older age, lung disease, CVD, diabetics and hypertension are at greater danger for severe covid-19. To fight against covid 19 many supportive options has been suggested(Hatmal et al., 2021) which included NSAIDS, Antipyretic for fever and pain reduction(Wu et al., 2020), oxygen therapy to maintain oxygen saturation(Røsjø et al., 2011). As an Empiric therapy Antibiotics Azithromycin, Teicoplanin were suggested(Rhodes et al., 2017). For acute resuscitation of patients with covid 19 and shock a buffer crystalloids, the use of albumin or vasopressin play an important role in maintaining osmotic, cardiovascular and stress hormone balance during disease (Schultz et al., 2019). For the management of cardiac shock or failure beta agonist dobutamine and systemic steroid against COPD exacerbation are suggested as supportive therapy(Alhazzani et al., 2021) and for immunity booster some vitamins and Chinese medicine also reported to manage covid 19 disease. This widespread disease has imposed a heavy impact on health and posed socio economic burden all over the world(Tuite et al., 2020). In Karachi the first case of covid 19 was reached through Iran on 26<sup>th</sup> February, 2020(Ahmed et al., 2020). The non-Pharmaceutical intervention between the covid pandemic like cover face and nose by mask, use of antibacterial cleanser, wipe out hands regularly with maintenance of social spacing was less perceive this behavior from the public was thought to associated with different religious beliefs that covid not exist (Mal et al., 2020). According to the government website of Pakistan in October 2020 confirmed covid cases in Pakistan were 462,859 whereas deaths were reported to be 28,134 in Karachi. Corona virus also created other health issues such as anxiety and depression (inyat, 2020) (Meo et al., 2020). The process by which immune system after administrating a vaccine fights against an infection is called immunization.It prevents illness by the stimulation of body adaptive immunity process(Swetha et al., 2020). In reducing the disability, death as well as the burden of disease vaccination can play an important role(Andre et al., 2008). The National command and control center (NCOC) in Pakistan manages the covid 19 vaccination where front line health care workers involving inpatient care with suspected and confirmed cases of covid 19 was on top priority for vaccination followed by other Health workers ,teachers and general public(Naeem et al., 2020). The important thing for the complete success of immunization program is adaptation of vaccine by the general public (DeRoo et al., 2020). Although many Narrative conspiracies in Pakistan against covid 19 such as the installation of 5G chips in Human and associated infertility affects the people decision in taking covid 19 vaccine after its availability(Uscinski et al., 2020). In 2019 WHO Considered vaccine adaptation doubt in the top ten warning to the world. It has been previously observed the main source of spreading such conspiracies is

social media (Suarez-Lledo and Alvarez-Galvez, 2021). Currently available vaccine in Pakistan against SAR COV-2 are prepared by the following methods: a) mRNA based vaccine Pfizer Biontech and Moderna b) viral vector based Sino pharm and sinovac c) Protein subunit vaccine Vaxzevria d) whole virus sputnik(Klugar et al., 2021). Pfizer Vaccine Biontech and Moderna vaccine use Lipid nanoparticle delivery system or modified RNA System (Dolgin, 2020), the vaxzevria replicated deficient chimpanzee Adenovirus inoculating the SARS-COV-2 protein in the body to initiate immune response(Voysey et al., 2021). Sputnik V uses the two adenovirus vector Ad5 and Ad26 which helps in the spike protein gene expression(Logunov et al., 2020). Sino pharm is the inactivated whole virus made from vero cell. Multiple copies of SARS-COV-2 Virus which are treated with Beta propionalactone deactivating the virus by binding to the gene(Siddique et al., 2021). Cansino Bio contain modified common cold virus and as vector for inoculation of corona virus genetic material in the Human Body It helps in the boost of T cells Response which Helps in the combaction of disease(Ramasamy et al., 2020). According to NCOC latest update till 13<sup>th</sup> October 2021 64,947,702 of people got their first vaccine while 34,809,848 peoples are fully vaccinated while the total Dose of the covid vaccine administered are 93,551,193. On the report of CDC ( Center of Disease control and prevention ) the common ADR after Post vaccine included pain in arm specially at the site of injection , pyrexia, chills, tiredness, muscular pain ,headache and Vomiting(Abu-Hammad et al., 2021). The primary objectives of this study is to evaluate the short time side effects of available covid vaccines which included Pfizer, AstraZeneca, Sputnik, Sino-Pharm, Sinovac and Cansino-Bio in people of Karachi, Pakistan in limited number of participants however an extended monitoring program is needed to evaluate side effect potency and prevalence .

## METHODOLOGY

A cross sectional preliminary study was conducted for the period of 6 months starting from May - October 2021. An online survey questionnaire created on Google form link of which had been delivered using Whatsapp. Authors declared no conflict of interest, informed consent were given to all participants, No incentives or compensation were given to participants. Individuals  $\geq 18$  years were included however participants less than 18 years of age were not allowed to participate in this survey. Multiple choice and closed ended questions were included in questionnaire. Language of questions were in English. This survey based on four sections first section was socio demographic factors of participants, second section was chronic diseases that participants suffered and third section composed of non- vaccinated, vaccinated participants with brand of vaccine they received and fourth section of survey based questionnaire collected information of short term post vaccination side effects of various vaccines Pfizer, AstraZeneca, Sputnik, Sino-Pharm, Sinovac and Cansino-Bio available in Karachi, Pakistan. Participants data were analyzed by using SPSS Version 20.0

## 2. RESULTS

The basic aim of this questionnaire based survey is to identify the short term side effects of covid 19 vaccines such as Pfizer, AstraZeneca, Sputnik, Sino-Pharm, Sinovac and Cansino-Bio in people of Karachi, Pakistan that were vaccinated by these vaccines. A limited number of participants takes part in this survey. side effects associated with vaccines were subsided after few days however a surveillance program still needed to evaluate a large population sample size with long term side effects of these available vaccines. Four sections were discussed here as firstly socio demographic data of participants, secondly health status of participants, thirdly non – vaccinated and vaccinated participants with brand of vaccine they are vaccinated and finally the fourth section comprised of short term post covid vaccination side effects reported by the people of Karachi, Pakistan in this survey.

**Table 1:** represent the socio demographic data of participant's which included gender, age, marital status and education level of participants. In this study n= (42) (35.8%) were males, n= (75) (62.5%) were females and n= (3) (2.5%) were transgenders. age of participants between 18-30 years included n= (37) (88%) males, n= (59) (78.6%) females and n= (2) (66.6%) transgenders whereas participants age between 31-40 years included n= (4) (9.52%) males, n= (11) (14.6%) females and n= (1) (33.1%) transgenders. participants age between 41-50 included n= (1) (2.38%) males, n= (05) (6.66%) females and no transgenders were found to be in this age limit. The marital status of all participants were found to be that n=(9)(21.4%) males and n=(10)(13.3%) females were married however n=(33)(78.5%) males, n=(63)(84%) females and n=(3)(100%) transgenders were unmarried. In our findings only n= (2) (2.66%) females were widow. The education level of all participants included n=(2)(4.76%) males, n=(2)(2.66%) females, n=1(33.3%) transgender were matric whereas n=(8)(19%) males, n=(24)(32%) females, n=(1)(33.3%) transgender were intermediate however n= (32) (76.1%) males, n= (49) (65.3%) females and n=1(33.3%) transgender were graduated.

**Table 2:** represent the health status and chronic diseases n=(1)(2.38%) male, n=(3)(4%)females and n=(1)(33.3%) transgenders were diabetic, n=(39)(92.8%) males, n=(70)(93.3%) females and n=(2)(66.6%) transgenders were not diabetic. however participants n= (2) (4.76%) males, n= (2)(2.66%) females were not sure about their diabetes. n=(2)(4.76%) males, n=(3)(4%) females were hypertensive whereas n=(36)(85.7%) males, n=(68)(90.6%) females and n=(3)(100%) transgenders were not hypertensive however n=(4)(9.52%) males, n=(4)(5.33%) females were not sure that they are hypertensive. n= (2) (2.66%) females were found to have heart disease whereas n= (41) (97.6%) males, n= (68) (90.6%) females and n= (3) (100%) transgenders had no complain of heart disease however n= (1) (2.38%) males, n= (5) (6.66%) females were not sure. n= (2) (4.76%) males, n= (2) (2.66%) females and n= (1) (33.3%) transgender had liver disease however n= (40) (95.2%) males, n= (70) (93.3%) females and n= (2) (66.6%) transgenders had no liver disease and n= (2) (4%) females were not sure. participants of this study suffered from renal insufficiency included n= (1) (2.58%) male, n= (3) (4%) females however participants n= (41) (97.6%) males, n= (72) (96%) females and n= (3) (100%) transgenders had no renal insufficiency

**Table 3:** Compares participants that are non-vaccinated and vaccinated by which available brand in Karachi, Pakistan. In our study n= (41) (97.6%) males, n= (72) (96%) females and n= (3) (100%) transgenders were vaccinated however n= (1) (2.38%) males, n= (3) (4%) females were not vaccinated. participants that were vaccinated with Pfizer vaccine included n= (3) (7.14%) males, n= (11) (14.6%) females, n= (1) (33.3%) transgender whereas n= (39) (92.8%) males, n= (64) (85.3%) females and n= (2) (66.6%) transgenders were not vaccinated by Pfizer vaccine. n= (2) (2.66%) females and n= (1) (33.3%) transgenders were vaccinated by AstraZeneca vaccine while n= (42) (100%) males, n= (73) (97.3%) females and n= (2) (66.6%) transgenders were not vaccinated by AstraZeneca vaccine. Vaccination of participants by sputnik vaccine included n= (2) (2.66%) females only however n= (42) (100%) males, n= (73) (97.3%) females and n= (3) (100%) transgenders were not vaccinated by sputnik vaccine. Vaccination of participants by Sino pharm vaccine included n= (13) (30.95%) males, n= (29) (38.6%) females and n= (1) (33.3%) transgender however n= (29) (69%) males, n= (46) (61.3%) females and n= (2) (66.6%) transgenders were not vaccinated by Sino pharm vaccine. In this study n= (17) (40.4%) males, n= (28) (37.3%) females and n= (1) (33.3%) transgender were vaccinated by sinovac vaccine however, n= (42) (100%) males, n= (47) (62.6%) females and n= (2) (66.6%) transgenders were not vaccinated by sinovac vaccine. Another vaccine of severe acute respiratory syndrome (SARS) Covid 19 vaccine is Cansino bio, participants vaccinated by this vaccine included n= (9) (21.4%) males, n= (3) (4%) females and n=1(33.3%) transgender however n= (36) (85.7%) males, n= (72) (96%) females and n= (2) (66.6%) transgenders were not vaccinated by Cansino bio vaccine.

**Table 4** Present the prevalence of general or short time side effects among males and females n= (27) (64.2%) males, n= (41) (54.6%) females and n= (2) (66.6%) transgenders had pain at the site of injection however n= (15) (35.7%) males, n= (34) (45.3%) females and n= 1 (33.3%) transgender had no complain of pain at the site of injection after covid vaccination. Participants with pain at the site of injection last at one day included n= (26) (61.9%) males, n= (60) (80%) females and n= (1) (33.3%) transgender however participants whose pain last in one week included n= (12) (28.5%) males, n= (11) (14.6%) females and n= (2) (66.6%) transgenders. Participants suffered from fever after covid vaccination included n= (14) (33.3%) males, n= (23) (30.6%) females however n= (28) (66.6%) males, n= (52) (69.3%) females and n= (3) (100%) transgenders had no fever after covid vaccination. Participants that suffered from fatigue included n= (14) (33.3%) males, n= (21) (28%) females whereas participants n= (28) (66.6%) males, n= (54) (72%) females and n= (3) (100%) transgenders were not complain about fatigue after covid vaccination. Participants that faced Nausea and vomiting condition after covid vaccination included n= (12) (28.5%) males, n= (13) (17.3%) females and n= (1) (33.3%) transgenders However n= (30) (71.4%) males, n= 62 (82.6%) females and n= (2) (66.6%) transgenders had no complain of nausea and vomiting. Participants that were suffered with abdominal pain after immunization by covid vaccine included n= (5) (11.9%) males, n= (6) (8%) females however n= (37) (88%) males, n= (69) (92%) females and n= (3) (100%) transgenders had no abdominal pain after vaccination. n= (7) (16.6%) males, n= (12) (16%) females suffered diarrhea however n= (35) (83.3%) males, n= (63) (84%) females and n= (3) (100%) transgenders had no compliant of diarrhea after covid vaccine. In our study n= (15) (35.7%) males, n= (28) (37.7%) females had no side effects such as pain at the site of injection, fever, fatigue, diarrhea and abdominal pain.

**Table 1: Socio Demographic Factors of Participants (n=120)**

Details of Participants		Frequency (n)	Percentage (%)
Gender of Participants	Male	42	35.8%
	Females	75	62.5%
	Transgender	03	2.5%
Age of Participants 18-30 years	Male	37	88%
	Females	59	78.6%
	Transgender	02	66.6%
31-40 years	Male	04	9.52%
	Females	11	14.6%
	Transgender	01	33.1%
31-40 years	Male	04	9.52%
	Females	11	14.6%
	Transgender	0	0%
41-50 years	Male	01	2.38%
	Females	05	6.66%
	Transgender	0	0%
Marital status Married	Male	09	21.4%
	Females	10	13.3%
	Transgender	0	0%
Un Married	Male	33	78.5%
	Females	63	84%
	Transgender	03	100%
Widow	Male	0	100%
	Females	02	2.66%
	Transgender	0	100%
Education level Matric	Male	02	4.76%
	Females	02	2.66%
	Transgender	01	33.3%
Intermediate	Male	08	19%
	Females	24	32%
	Transgender	01	33.3%
Master/Graduate	Male	32	76.1%
	Females	49	65.3%
	Transgender	01	33.3%

**Table 2: Health status and chronic conditions of Participants (n=120)**

Conditions	Participants	Frequency (n)	Percentage (%)	No chronic illness Frequency (n)	Percentage (%)	Not sure Frequency (n)	Percentage (%)
Diabetic	Male	01	2.38%	39	92.8%	02	4.76%
	Females	03	4%	70	93.3%	02	2.66%
	Transgender	01	33.3%	02	66.6%	0	0%
Hypertensive	Male	02	4.76%	36	85.7%	04	9.52%
	Females	03	4%	68	90.6%	04	5.33%
	Transgender	0	0%	03	100%	0	0%
Heart Disease	Male	0	0%	41	97.6%	01	2.38%
	Females	02	2.66%	68	90.6%	05	6.66%
	Transgender	0	0%	03	100%	0	0%
Liver Disease	Male	02	47.6%	40	95.2%	0	0%
	Females	02	2.66%	70	93.3%	3	4%
	Transgender	01	33.3%	02	66.6%	0	0%
Renal insufficiency	Male	01	2.38%	41	97.6%	0	0%
	Females	03	4%	72	96%	0	0%
	Transgender	0	0%	03	100%	0	0%

**Table 3: Covid -19 vaccinated/non-vaccinated participants with Different vaccines Brands**

<b>Vaccinated/ Type of Vaccine</b>		<b>Frequency (n)</b>	<b>Percentage (%)</b>	<b>Non-vaccinated</b>	<b>Percentage (%)</b>
Yes	Male	41	97.6%	01	2.38%
	Females	72	96%	03	4%
	Transgender	03	100%	0	0%
Pfizer	Male	03	7.1%	39	92.8%
	Females	11	14.6%	64	85.3%
	Transgender	01	33.3%	2	66.6%
AstraZeneca	Male	0	0%	42	100%
	Females	02	2.66%	73	97.3%
	Transgender	01	33.3%	2	66.6%
Sputinik	Male	0	0%	42	100%
	Females	02	2.66%	73	97.3%
	Transgender	0	0%	3	100%
Sino pharm	Male	13	30.9%	29	69%
	Females	29	38.6%	46	61.3%
	Transgender	01	33.3%	2	66.6%
Sinovac	Male	17	40.4%	42	100%
	Females	28	37.3%	47	62.6%
	Transgender	01	33.3%	2	66.6%
Cansino bio	Male	09	21.4%	36	85.7%
	Females	03	4%	72	96%
	Transgender	01	33.3%	2	66.6%



**Table 4: Short term side effects after Covid-19 Vaccination n= (120)**

Side Effects		Frequency (n) Yes	Percentage (%)	No	Percentage (%)
Pain at the site of injection	Male	27	64.2%	15	35.7%
	Females	41	54.6%	34	45.3%
	Transgender	2	66.6%	1	33.3%
Pain at the site of injection last in one Day	Male	26	61.9%	-	-
	Females	60	80%	-	-
	Transgender	1	33.3%	-	-
Pain at the site of injection last in one week	Male	12	28.5%	-	-
	Females	11	14.6%	-	-
	Transgender	2	66.6%	-	-
Fever	Male	14	33.3%	28	66.6%
	Females	23	30.6%	52	69.3%
	Transgender	0	0%	3	100%
Fatigue	Male	14	33.3%	28	66.6%
	Females	21	28%	54	72%
	Transgender	0	0%	3	100%
Nausea and vomiting	Male	12	28.5%	30	71.4%
	Females	13	17.3%	62	82.6%
	Transgender	01	33.3%	2	66.6%
Abdominal pain	Male	05	11.9%	37	88%
	Females	06	8%	69	92%
	Transgender	0	0%	3	100%
Diarrhea	Male	7	16.6 %	35	83.3%
	Female	12	16%	63	84%
	Transgender	0	0%	3	100%
No above side effects	Male	15	35.7%	27	64.2%
	Female	28	37.3 %	47	62.6%
	Transgender	0	0%	3	100%

### 3. DISCUSSION

Most of the countries have taken safety measures against COVID -19 pandemic by the use of vaccines (Alhazmi et al., 2021). All available COVID -19 vaccines have tolerable short term safety profile but still there is a need of long term public health surveillance data to evaluate its safety (Wu et al., 2021). Post vaccination mild symptoms such as pain at the muscular site of injection, fever, fatigue, nausea, abdominal pain and diarrhea. These symptoms subsided within 2-3 Days (Ullah et al., 2021) and there is no treatment requires for these side effects (Xian et al., 2020). Similar type of studies were conducted by Menni and the team the study found that tiredness and pain at the site of injection were the most common side effects that occurred on the same day after vaccination and subsided after one or few days (Menni et al., 2021). The results of our survey showed the same results that only short term side effects occurred after Covid vaccination and none of these side effects required hospitalization but one of the most common systemic reaction was pain at the site of injection and fever that were self-limiting and subsided after few days. Results from previous studies demonstrated percentage of post covid vaccination side effects such as pain at the muscular site of injection were (41.5%), fatigue were (23.6%) and Headache were (18.7%) among health care workers (Riad et al., 2021). As pain at the injection site was reported with majority of vaccines (Hatmal et al., 2021) pain can be reduced as patients were recommended to lower their arm so their muscles get relaxed to reduce pain at the site of injection. In our study minor side effects such as pain at the site of injection were (64.2%) in males, (54.6%) in females and (66.6%) in transgenders were reported however fever were reported as (33.3%) in males, (30.6%) in females other side effects such as fatigue were reported to (33.3%) in males, (28%) in females. Nausea and vomiting were reported as (28.5%) in males, (17.3%) in females and (33.3%) in transgenders. abdominal pain were reported as (11.9%) in males, (8%) in females other common side effect such as watery stool were reported to be (16.6%) in males, (16%) in females. Participants had no serious side effects only short term side effects were reported in our study but still there is a need of surveillance program to identify Covid vaccines long term safety. Several studies showed that all these vaccines produced transient type side effects which are tolerable (Alghamdi et al., 2021). As these side effects can also cause by the excipients added in the formulation of vaccine such as gelatin ,thiomersal or neomycin which stimulates IgE antibodies and triggers these reactions which subsided in few days or hours (Saeed et al., 2021). A follow up study needed to evaluate long term safety and the effect of covid-19 vaccines in the prevention and control of SARS-COV-2 infection(Alhazmi et al., 2021).

### 4. Conclusion

Currently vaccination is the only effective weapon in the fight against the covid infection. The majority side effects after covid vaccination are mild indicating body immune system are strengthening its defense. The current study concluded that all approved covid 19 vaccines in Pakistan have mild side effects which subsided after few days but still a monitoring program needed to evaluate long term safety profiles of these vaccines.

### Consent

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

### 5. COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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