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Original Article

Safety of COVID-19 Vaccines; Frequency of Side Effects and Association with Sociodemographic Characteristics Among Medical Students

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ABSTRACT

Objective: To find out the side effects of vaccines of COVID-19 and its association with sociodemographic factors among students of medical colleges of Rawalpindi.

Study Design: Cross sectional analytic study.

Place and Duration of Study: A cross-sectional analytical study was carried out from May to Aug 2022 among medical students of three Medical Colleges (AMC, FUMC, RMC) in Rawalpindi Pakistan.

Methodology: There were 200 participants that were conveniently selected with the Rao soft sample size calculator. A validated questionnaire was used to collect data. SPSS (v:26) was used to analyze the data. Chi square analysis was used to assess the relationship between side effects and demographic characteristics and a *p*-value of 0.05 was taken as significant.

Results: Majority of the participants were male 126(63%) and unmarried 182(94%). The mean age of the participants was 20 years (SD=1.4). Almost all were vaccinated 197(98.5%) with two doses 195(97.5%). The side effects after the first dose were more profound as compared to the second dose, like normal pain 133(66.5%), tenderness at injection site 69(34.5%), fever 65(32.5%) and fatigue 80(40%). Muscular pains were also documented to be pronounced after the administration of first dose 58(29%). Association analysis showed significant association between first dose side effects, normal pain(p=0.001), tenderness (p=0.004), redness (p=0.02) and fatigue (p=0.02) with gender variable. Whereas age and degree socio demographic variables reported significant association with first dose side effects, normal pain (p=0.04) and muscle pain (p=0.01), respectively.

Conclusion: It was conclusive that adverse effects were more common and more severe after the first dose than after the second. The most frequent side effect was normal pain at the injection site, found more frequently in men, with muscular pain being noticeably worse after the first dosage and surprisingly minimal following the second dose of the COVID-19 vaccination.

Keywords: COVID pandemic, Normal pain, Vaccine side effects, Vaccines safety.

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INTRODUCTION

COVID-19 a global pandemic that has resulted in high morbidity, and mortality across the globe.[1] Research indicates that its effects are more pronounced in persons >70 years of age and having comorbid conditions including obesity and lung disease.[2] The timely development of SARS-CoV-2 vaccinations to combat the ill effects of the virus is a significant public health accomplishment.[1] Types of vaccines that that were found safe and efficacious in clinical trials included the inactivated virus with adjuvants (Sinovac, Sinopharm), having a protein subunit (Novavax), Live virus (Astra Zeneca) and having Nucleic Acid (Pfizer, Moderna).[3]

Evidence indicated that there were different side effects that were reported and observed as a result of these vaccinations.[4] The most common side effects being fever, general malaise, myalgia, and headache.[5] A study conducted in Jordan revealed that, in comparison to Sinopharm and Pfizer vaccines, the first dosage of AstraZeneca resulted in significant bone and muscular pain, dizziness, flu-like symptoms, psychological symptoms, gastrointestinal (GI), and cardiac symptoms.[6] Additionally, in a research it was reported that receiving a COVID-19 vaccine resulted in CNS demyelination.[7] Another study documented that; women were more vulnerable to the side effects of vaccinations than men.[8] Research indicated that Patients who had previously contracted the coronavirus after vaccination reported breathing problems more frequently than others.[9] There have been reports of ocular side effects include facial nerve palsy, uveitis, central serous retinopathy, and acute macular retinopathy following the use of vaccines.[10]

A few studies reported that age was associated with post-vaccination adverse effects.[11,12] In a study it was observed that, younger participants were more

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likely than older participants to experience gastrointestinal distress & flu-like symptoms after vaccination.[12] However, in another study the duration & seriousness of adverse effects were unaffected by age or gender.[13]

A meta-analysis regarding hesitancy to overall vaccine use in the Pakistani population exhibited a pooled estimate of 35% that was mainly attributed to anticipated adverse effects.[7] However, during the Covid pandemic a National Command and Control Centre (NCOC) was established to oversee the vaccination rollout in Pakistan which had a favourable impact. In a study it was reported that the factors responsible for acceptance of COVID-19 vaccination include its safety, approval by the government and cost-effectiveness.[14] Health care workers including medical students were prioritised to receive the vaccine in comparison to the general public. However, there is paucity of evidence in relation to COVID vaccine use and its reported side effects in Pakistan among medical students. This study was conducted to find the find out the side effects of vaccines of COVID-19 and its association with sociodemographic factors among students of medical colleges of Rawalpindi.

METHODOLOGY

A cross-sectional analytical study was carried out from May to August 2022 among medical students of three Medical Colleges (AMC, FUMC, RMC) in Rawalpindi Pakistan. The Rao soft calculator's sample size calculator was used, with 5% margin of error and a 95% confidence interval, and anticipated population proportion of 16.3%,[11] a sample size of 208±10 was collected using the convenience sampling strategy.

Inclusion Criteria: Undergrad students, age <25 years, currently studying in medical colleges of Rawalpindi, Pakistan were included in sample population.

Exclusion Criteria: Postgraduate students, age more >26 years, students of medical colleges of other cities were excluded from the study. Written informed consent was taken before disseminating the questionnaire.

A validated questionnaire,[11] was used to collect data (Cronbach's alpha=0.81) and disseminated online. There were three sections of the questionnaire the first section covered the demographic information such as age, gender, marital status, education and the type of degree program (MBBS, BDS). The second section included documenting the co-morbidities, such as diabetes, hypertension, cancer, autoimmune disorders and obesity. The third section had a list of side effects; pain, tenderness, redness, induration, fever, headache, nausea, diahorrea, cough, lethargy experienced after receiving the first and second doses of the vaccination. The data was analyzed using SPSS-26. Data that was continuous was converted to categorical data. To calculate the means and standard deviation of continuous variables as well as the frequencies and percentages of categorical variables, descriptive analysis was used. The chi-square test was used to analyze the relationship between side effects and demographic characteristics. *p*-value of <0.05 was taken as significant.

RESULTS

The majority of the participants in our study were male 126(63%), unmarried 182(94%) and resident of Rawalpindi 103(51.5%). Mean age of the participants was 20±1.4 years. There were 193(96.5%) MBBS students and majority 54(27%) were studying in 2nd year MBBS. Regarding vaccination status of the participants, almost all were vaccinated 197(98.5%) with two doses 195(97.5%). There were 64(32%) participants previously infected with COVID-19 infection, but majority 124 (62%) were not previously infected (Table-I)

Table-I: Frequency Distribution Table of Demographic Variables (n=200)

Variables	Frequency(%)
Age	
≤ 20 years	111(55.5%)
> 21 years	89(44.5%)
Gender	
Male	126(63%)
Female	74(37%)
Marital status	
Married	12(6%)
Un-married	182(94%)
Educational year	
First year	40(20%)
Second year	54(27%)
Third year	35(17.5%)
Fourth year	49(24.5%)
Final year	22(11%)
Degree	
BDS	7(3.5%)
MBBS	193(96.5%)
Address	
Rawalpindi	103(51.5%)
Islamabad	97(48.5%)
Vaccination Status	
Not Vaccinated	3(1.5%)
Vaccinated	197(98.5%)
No of Doses Recieved	
None	3(1.5)
1 Dose	2(1)
2 Doses	195(97.5)
Previously Infected with COVID-19	
No	124(62)
Yes	64(32)
Not Sure	12(6)

The majority of the participants 177(88.5%) were not suffering from any comorbidity, but only 23 (11.5%) had reported any comorbidity as shown in Figure-1.

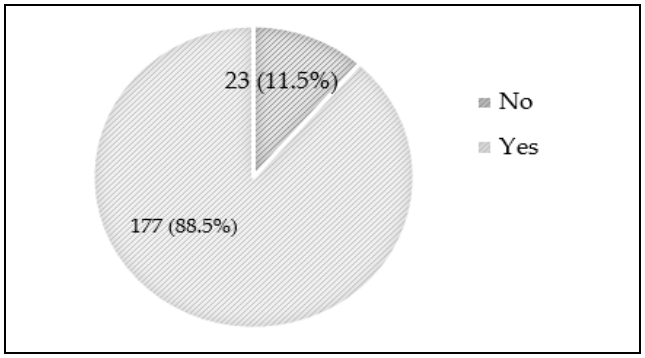

Figure-1: Frequency of Participants Suffering from Chronic Condition

The frequency of side effects revealed they were more profound after first dose in comparison to the second dose as shown in Figure-2. The more frequently reported side effects were normal pain 133(66.5%), tenderness at injection site 69(34.5%), fever 65(32.5%), fatigue 80(40%) and lethar gy 46(23%). In contrast 2nd dose showed normal pain 111(55.5%), 59(29.5%) tenderness and fatigue, whereas fever 48(24%) and lethargy (17%). Muscular pains were more observed after administering first dose 58(29%). Headache was reported important side effect for both first 58(29%) and second 47(23.5%) dose.

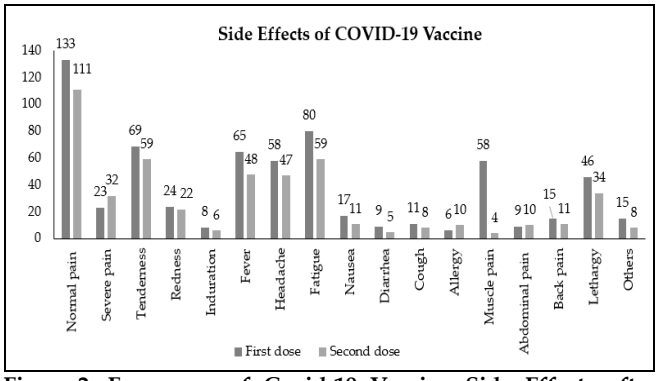

Figure-2: Frequency of Covid-19 Vaccine Side Effects after First and Second Dose

Table-II, depicts statistically significant association between first dose side effects, normal pain (p=0.001), tenderness (p=0.004), redness (p=0.02) and fatigue (p=0.02) with gender variable. Whereas age and degree socio demographic variables reported significant association with first dose side effects, normal pain (p=0.04) and muscle pain (p=0.01), respectively.

Table-II: Association Between Side Effects of First Dose with Socio Democratic Variables

Sides Effects		Socio Demographic Variables											
		Gender		*p*-value	Age (years)		*p*-value	Marital Status		*p*-value	Degree		*p*- value
		M	F		≤20	>21		UM	M		BDS	MBBS	
Normal pain	No	53	14	0.001*	44	23	0.04*	62	5	0.53	2	65	0.77
	Yes	73	60		67	66		126	7		5	128	
Severe pain	No	11	63	0.25	100	77	0.43	165	12	0.19	5	172	0.15
	Yes	12	11		11	12		18	5		2	21	
Tenderness	No	92	39	0.004*	73	58	0.93	122	9	0.47	4	127	0.63
	Yes	34	35		38	31		66	3		3	66	
Redness	No	116	60	0.02*	98	78	0.88	165	11	0.68	7	169	0.32
	Yes	10	14		13	11		23	1		5	19	
Fever	No	82	53	0.34	70	65	0.13	125	10	0.22	5	130	0.82
	Yes	44	21		41	24		63	2		2	63	
Headache	No	86	56	0.26	78	64	0.80	133	9	0.75	5	137	0.98
	Yes	40	18		33	25		55	3		2	56	
Fatigue	No	83	37	0.02*	68	52	0.68	111	9	0.27	4	116	0.87
	Yes	43	37		43	37		77	3		3	77	
Nausea	No	114	69	0.49	103	80	0.46	171	12	0.27	7	176	0.41
	Yes	12	5		8	9		12	5		6	11	
Diarrhoea	No	120	71	0.81	106	85	0.99	180	11	0.51	7	184	0.55
	Yes	6	3		5	4		8	1		4	5	
Muscle pain	No	95	47	0.07	80	62	0.70	131	11	0.11	2	140	0.01*
	Yes	31	27		31	27		57	1		5	53	
Lethargic	No	100	54	0.30	83	71	0.40	143	11	0.21	6	148	0.57
	Yes	26	20		28	18		45	1		7	39	

*Abbreviation: M: Male, F: Female, UM: Un-married, M: Married, *p-value< 0.05 is statistically significant*

DISCUSSION

Our study's findings revealed that following the first dose of the vaccine The students most frequently reported experiencing normal pain at the injection site (66.5%), fatigue (40%), tenderness (34.5%), fever (32.5%), and headache (29%) as adverse effects. Similar side effects persisted following the second dose, but fewer students reported experiencing them. The most frequent side effects, according to a study done in the Czech Republic, were pain at the injection site (89.8%), fatigue (62.2%), and headache (45.6%).[15]

Our study also showed that the most frequent side effects following the delivery of live COVID-19 vaccines include injection site pain, fatigue, tenderness, fever, and headache. Another study done in the UAE,[11] found that the primary adverse effects following the first dose of live vaccines were headache (9.6%), weariness (12.2%), and normal pain at the vaccination site (42.2%), which is exactly the same as the outcome of our study. According to another study conducted in Egypt,[13] the most frequent adverse reactions following the administration of a live vaccine were pain, redness, or swelling at the injection site (52.5%), fatigue and tiredness (45%), and headache (15%). The adverse effects were more severe after the first dosage than after the second. In Pakistan,[12] a study found side effects following vaccination that were comparable to those in our study, with fever, headaches, and exhaustion being the most frequent ones. To increase public vaccine acceptability, it's critical to be aware of a vaccine's side effects and effectiveness. Depending on their level of education, different groups have different levels of vaccine reluctance.[16]

Current study reported that most common adverse effect was normal pain at injection site was more intensely experienced by men than women. Almost all participants were with no concomitant health conditions and fall in age bracket of 18 to 27 years. These results corroborated a study that was done in Ethiopia,[17] that found that male participants experienced more severe adverse effects after covid 19 vaccination. Those aged 50 to 60 with comorbidities reported significantly more unpleasant effects. In contrast to current study findings, one research conducted at KSA,[18] revealed that the proportion of side effects was higher in women. In our study there was significant association of normal pain, tenderness and redness at injection site and fatigue with gender variable. But there was no association evident of gender with GIT disturbances and headache side effects. It was contrary to study conducted in Pakistan.[12] which reported significant association of headache (p=0.05), GI disturbances (p=0.04),whereas insignificant association of fatigue (p=0.20)with gender variable .This same study also shows similar results as current study, that sourness/redness at injection site was reporting significant association (p=0.01) with gender.

Despite all the precautions taken to stop the sread of the disease, it is anticipated that a vaccine will be the most useful instrument for halting the progression and complications of coronavirus disease and restoring sanity. The SARS-CoV-2 vaccine has been successfully created by scientists from all around the world, however the COVID-19 vaccine confronts a number of difficulties that could hinder its effec-tiveness.

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STUDY LIMITATIONS

Instead of distributing questionnaires, inperson interviews with the participants could have resulted in a more precise and thorough study. Furthermore, as the adverse effects were self-reported, recall bias may have affected the results. Additionally, it's possible that the questionnaire's questions weren't understood correctly.

CONCLUSION

It was conclusive that adverse effects were more common and more severe after the first dose than after the second. The most frequent side effect was normal pain at the injection site, found more frequently in men, with muscular pain being noticeably worse after the first dosage and surprisingly minimal following the second dose of the COVID-19 vaccination.

Conflict of Interest: None.

Author's Contribution:

Following authors have made substantial contributions to the manuscript as under:

SM: Supervision, Conception, Study design, analysis and Interperitation of data, Critically reviewed manuscript & approval for the final version to be published.

MZ: Co-supervision, Data entry, analysis and interpretation, manuscript writing & approval for the final version to be published.

SFM: Critically reviewed, Drafted manuscript & approval for the final version to be published.

UA: Data colllection, Entry and analysis of data, preparation of rough draft & approval for the final version to be published.

UY: Data collection and entry, Preparation of rough draft & approval for the final version to be published.

NM:, AA:, AS:, AN: Data collection and entry & approval for the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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