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COVID-19 vaccine side effects and its associated factors among healthcare workers

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***Abstract*---**Background: Since the COVID-19 epidemic of Severe Acute Respiratory Syndrome (SARS COV-2) in 2019, with over 376 and 5.7 million people have contracted the disease and died as a result. Objective: This research evaluated the adverse effects of the COVID-19 immunization and its risks factors among healthcare professionals working in Pakistan. Methods: Healthcare professionals who received the Covid-19 vaccine at Mufti Mehmood Memorial Teaching Hospital Dera Ismail Khan, Pakistan, between June 2021 and May 2022 were the subject of the research. It was determined whether there was a significant connection between the distinct factors and the result variables using bivariable and multivariable binary logistic regression

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(MBLR) models. Results: One or more adverse effects were experienced by 198 (55.73%) of the healthcare employees who received the Covid-19 immunization. Fever, Headache, Myalgia, Tiredness, Injected site pain and dizziness (n=158; 44.63%, n=135; 38.13%, n=109; 30.79%, n=98; 27.68%, n=92; 25.98%, n=86; 24.29%; respectively) made up the bulk of the adverse effects. Healthcare professionals with less than eight years of employment (AOR: 3.47, 95% CI, 1.23-9.69), hesitancy to receive the Covid-19 vaccine's 1st dose (AOR: 3.11, 95% CI, 1.71-4.88), taking antihypertensive drugs (AOR: 2.51; 95% CI, 0.12-0.39), and immunization safety is viewed as being insecurely. (AOR: 3.40; 95% CI, 1.34-7) were separate variables that influenced the emergence of Covid immunization adverse effects. Conclusion: Healthcare professionals who received the Covid vaccine were found to have a variety of typical vaccine adverse effects. Employees in healthcare with up to eight years' worth of expertise, the likelihood of vaccine adverse effects was predicted by reluctance in order to have 1st dosage, erroneous perceptions of immunization safety, and highlighted chronic diseases. In order to eliminate doubt and concerns about vaccine safety, it is essential to educate the community about vaccines.

***Keywords*---**healthcare workers, associated factors, COVID-19, vaccine side effects.

Introduction

The coronavirus disease 2019 (COVID-19) epidemic, which has over 250 million new cases, has all but stopped global travel and triggered a significant global health crisis. A glimmer of hope for a return to normality has been offered by the global immunization campaign against the lethal viral illness, and ever since slightly earlier 2021, and over 7.5 billion vaccine injections have been given globally [1]. Adenovirus vector-based vaccines like Sputnik V and AstraZeneca, inactivated vaccines like Sinovac and Sinopharm, and messenger RNA (mRNA) vaccines like PfizerBioNTech and Moderna are among those that the WHO has finalized and are easily accessible throughout the globe via the COVAX vaccine subsidy scheme [2-4]. In Pakistan, people over the age of 12 have access to CanSinoBIO (PakVac), in addition to the immunizations already listed. According to the National Command and Control Center, Pakistan has given more than 120 million doses of immunization [5].

Concerns about vaccine safety persist despite permits from worried officials and the evident security given by immunizations. Despite being readily available, vaccine reluctance has grown in many areas of the globe due to the immediate and long-term adverse effects of vaccination. Because of challenging problems, the safety and probable adverse effects of a COVID-19 vaccine, large-scale polls and meta-analyses had forecast pervasive vaccine reluctance [6-8]. According to a research conducted in seven European nations, roughly 54% of subjects who expressed immunization reluctance mentioned concern over adverse effects as their primary motivation. Due to concerns about the potential adverse effects of

immunization, parents were reluctant to consent to their children who received the COVID-19 vaccine. According to other research, if the concern over adverse effects is handled, the general public will be more ready to receive vaccinations. A research conducted in China also confirmed that the general public continues to be seriously concerned about the adverse effects, particularly those related to attenuated immunizations [9-12]. Recent polls aimed at different sociodemographic groups have revealed enduring immunisation reluctance. Approximately 13% of the populace in Thailand was reluctant to get the immunisation or did not get it, despite the percentage being on the decline. A cross-sectional research conducted in Saudi Arabia found that immunization reluctance was primarily motivated by concern about adverse effects [13-14]. On the contrary hand, in Italy, 20% of young people and 31% of parents showed reluctance to vaccinate their offspring against the COVID-19 virus. The quick clearance procedure made it possible to raise questions regarding if these vaccines received enough time for safety testing and evaluation before going on the market. The public's decreased readiness to freely receive the COVID-19 vaccine was linked to the impact of political objectives on such studies [15-17].
Immunization reluctance was one of the Top 10 risks to public health in 2019 before the COVID-19 outbreak, according to WHO. There is a history of broad resistance to polio immunizations in Pakistan [18-19]. Because of this, the acceptance of COVID-19 immunizations in Pakistan is crucial and may be connected to their possible adverse effects. So, this research evaluated the adverse effects of the COVID-19 immunization and its risks factors among healthcare professionals working in Pakistan

Material and Methods

Healthcare professionals who received the Covid-19 vaccine at Mufti Mehmood Memorial Teaching Hospital Dera Ismail Khan, Pakistan, between June 2021 and May 2022 were the subject of the research. This research included every healthcare professional who utilized and got the mRNA-based COVID-19 immunization. Participants who failed to get the mRNA-based COVID-19 immunization or who did not complete the entire assessment were not included in the research.

A survey questionnaire served as the foundation for this cross-sectional analysis. The surveys were created after reading various literatures and standards used to evaluate the unfavorable effects of vaccinations, vaccination intentions, and vaccinations that have already been used and verified for research. The evaluation was written in English and given to healthcare experts in its original form, while non-professional health employees received a translation into their native tongue. Data collectors and managers were taught for one day on the goal of the research, the substance of the questionnaire, the data gathering process, how to contact study subjects, and various ethical problems. The primary analyst and managers constantly reviewed the gathered data each day during the data gathering time to ensure its uniformity and thoroughness. Epi-data edition 3.1 was used for data input, and STATA version 15.2 was used for research. Participants completed an informed permission document and agreed that all information was private and would only be used for scholarly study. Before beginning the research, the Ethical Council of PIMS hospital granted the study's ethical clearance.

The information was gathered, amended, categorised, and then entered into the statistical programme SPSS version 26. The dependability or uniformity of the surveys used to gauge the COVAX vaccine's adverse effects was evaluated using Cronbach's alpha. It was determined whether there was a significant relationship between the independent factors and the result variables using bivariable and MBLR models. The MBLR model included all independent factors with a p-value less than 0.2. To investigate the relationship between classified factors, the chi-square test was applied.

Results

The assessment was finished by 354 out of the 387 research subjects, for a response ratio of 91.47%. 198 (55.73%) of the healthcare employees who received the Covid-19 immunization experienced adverse effects. Fever, Headache, Myalgia, Tiredness, Injected site pain and dizziness (n=158; 44.63%, n=135; 38.13%, n=109; 30.79%, n=98; 27.68%, n=92; 25.98%, n=86; 24.29%; respectively) made up the bulk of the adverse effects (Table 1). Of the 86 research subjects, 24.29 percent (24.29%) reported having at least one medical issue. Of these, hypertension, allergies, asthma, diabetes mellitus, and heart issues accounted for the bulk of 27 (7.62%), 23 (6.49%), 18 (5.08%), 11 (3.10%), and 8 (2.25%) of the problems, accordingly. For their underlying illness, 72 (20.33%) healthcare professionals reported using at least one drug. Of these, 13 (3.67%), 18 (5.08%), and 21 (59.3%) were taking antiepileptic, anti-asthmatic, and hypertension medicines, respectively (Table 2).

Table 1: Covid-19 Vaccination Adverse Reactions in Healthcare Staff

Side Effects	Categories	Incidence	Percentage
Headaches	Yes	135	38.13
	No	219	61.87
Myalgia	Yes	109	30.79
	No	245	69.21
Fever	Yes	158	44.63
	No	196	55.37
Injected site pain	Yes	92	25.98
	No	262	74.02
Nausea	Yes	86	24.29
	No	268	75.71
Fatigue	Yes	98	27.68
	No	256	72.32
Chills	Yes	64	18.08
	No	290	81.92
Leg swelling	Yes	31	8.75
	No	323	91.25
Vomiting	Yes	61	17.23
	No	293	82.77
Insomnia	Yes	51	14.40
	No	303	85.60
Breathing difficulty	Yes	52	14.68

	No	302	85.32
Altogether, at least one adverse impact appeared.	Yes	198	55.93
	No	156	44.07

Table 2: Health Service Employees' Medical and Drug Condition

Variables	Medical Diseases			Participants Condition with Regard to Consuming Medicine			
	Categories	Incidence	Percentage	Medications Type	Status	Incidence	Percentage
Diabetes mellitus	Yes	11	3.10	Antiepileptic	Yes	13	3.63
	No	343	96.90		No	341	96.32
Cardiac disease	Yes	8	2.26	Anti-asthmatic	Yes	18	5.09
	No	346	97.74		No	336	94.91
Hypertension	Yes	27	7.63	Cardiac medication	Yes	9	2.55
	No	327	92.37		No	345	97.45
Hematologic disease	Yes	4	1.13	Thyroid disease medication	Yes	2	0.56
	No	350	98.87		No	352	99.44
Asthma	Yes	18	5.09	Anti-hypertension	Yes	21	5.94
	No	336	94.91		No	333	94.06
Allergy	Yes	23	6.50	Analgesics	Yes	7	1.98
	No	331	93.50		No	347	98.02
Pulmonary disease	Yes	7	1.98	Steroid drug	Yes	3	0.85
	No	347	98.02		No	351	99.15
One or more physical conditions	Yes	86	24.30	Using at least one drug	Yes	72	20.34
	No	268	75.70		No	282	79.66

The members' average age was 33.16 5.98 years, and 214 (%) of them were men. The majority of the study's 298 health workers (84.18%) had less than 8 years of job employment. Physicians and nurses made up about 121 (34.18%) and 113 (31.92%) members, correspondingly. 189 (53.38%) of the health professionals were revealed to individuals with the known disease Covid-19 and Before receiving the immunization, 34 (9.60%) subjects had Covid-19 illness. More than half of 224 (63.27%) medical workers expressed reluctance to receive the vaccine, citing adverse effects (n = 228; 64.40%), doubts about the vaccine's efficacy (n = 117; 33.05%), and worsening of preexisting chronic illnesses (n = 9; 2.54%) (Table 3). In those who experienced adverse effects, the research subjects' mean age was considerably greater (independent t-test, p-value = 0.02). Between workers with relevant work experience of greater than and less than 8 years, there was a significant difference in the frequency of Covid vaccine adverse effects. Parallel to this, the adverse effect profile of medical workers who had at least one medical condition and were reluctant to receive the Covid-19 vaccine's first dosage varied considerably (Table 4).

The development of a Covid-19 vaccine adverse reactions was significantly predicted by MBLR to be associated with relatively long job experience, reluctance

to have the 1st dose of the vaccine, the existence of one or more health issues, anti-hypertensive therapy, and healthcare employees doubts about the vaccine's safety. Taking other variables into account, the chances of a Covid-19 vaccine adverse effect rose by 3.47 (1.23-9.69) among healthcare professionals with more than 8 years of job experience. Healthcare employees who delayed to receive the first dosage of the covid-19 vaccine had a ratio of 3.11(1.71-4.88) higher risk of experiencing an adverse effect from the vaccine than those who did not wait. On the contrary hand, healthcare employees who were suffering from at least one medical problem as opposed to those who did not had their chances of experiencing an adverse effect from the covid-19 immunization rose by a ratio of 13.19 (4.06-41.29). Relative with those who weren't taking hypertension medicines, health professionals on antihypertensive medication had a 2.51 (0.12-0.39) lower risk of adverse reactions from the Covid-19 immunization. The chances of experiencing the adverse effect were 3.40 (1.34-7.76) higher among medical professionals who did not think the Covid-19 immunization is a safe strategy than they were compared with those who did (Table 5).

Table 3: Characteristics of Research Subjects Who Got the First Dosage of the Covid 19 Immunization in Terms of Demographics

Variables	Categories	Incidence	Percentage
Age in years (mean ± SD)	33.16 ± 5.98		
Gender	Male	214	60.45
	female	140	39.55
Profession	Nurses	113	31.92
	Physicians	121	34.18
	Laboratory	34	9.60
	Midwives	45	12.71
	Others	41	11.59
Status of marriage	Single	119	33.61
	Married	186	52.54
	Widowed	20	5.64
	Divorced	29	8.21
Work Experience	< 8 years	298	84.19
	> 8 years	56	15.81
Patients' exposure to Covid-19	Yes	189	53.39
	No	165	46.61
Ever Covid-19 infection	Yes	34	9.61
	No	320	90.39
Taking the first dosage with hesitation	Yes	224	63.27
	No	130	36.73
Causes for hesitation	Distrust effectiveness	117	33.06
	Side Effects	228	64.40
	Occurrence of chronic disease	9	2.54
Safety of vaccines as perceived	Do not Know	116	32.76
	Safe	195	55.08
	Unsafe	43	12.16

Others: = radiologists, Pharmacy, physiotherapy and cleaner.

Table 4: Covid 19 Immunization Adverse Impact Spread by Research Parameters

Variables	Categories	Vaccine Adverse Effects		Chi-Square/t-test (p-value)
		Yes	No	
		N (%)	N (%)	
Age in years (mean ± SD)		33.58±6.2	32.34±5.84	0.02
Gender	Male	117 (54.67)	97 (45.33)	
	Female	85 (60.71)	55 (39.29)	
Profession	Nurses	69 (35.38)	44 (27.68)	0.085
	Physicians	56 (28.71)	65 (40.89)	
	Laboratory	21 (10.76)	13 (8.17)	
	Midwives	23 (11.79)	22 (13.83)	
	Others	26 (13.36)	15 (9.43)	
Work Experience	< 8 years	163 (80.69)	135 (88.81)	<0.01
	> 8 years	39 (19.31)	17 (11.19)	
Patients' exposure to Covid-19	Yes	109 (54.5)	80 (51.94)	0.027
	No	91 (45.5)	74 (48.06)	
Ever Covid-19 infection	Yes	21 (10.14)	13 (8.84)	0.038
	No	186 (89.86)	134 (91.16)	
Taking the first dosage with hesitation	Yes	139 (72.39)	85 (52.46)	<0.01
	No	53 (27.61)	77 (47.54)	
Safety of vaccines as perceived	Do not Know	69 (33.99)	47 (31.14)	<0.01
	Safe	103 (50.74)	92 (60.92)	
	Unsafe	31 (15.27)	12 (7.94)	
Medical Disease	At least one	71 (36.98)	15 (9.26)	<0.01
	No Medical Problem	121 (63.02)	147 (90.74)	
At least one negative impact of growth overall		198 (55.93)	156 (44.07)	<0.01

Table 5: Health Employees' Covid-19 Immunization Adverse Effects: A Multivariable Study

Variables	Categories	COR (95% CI)	AOR (95% CI)
Age		1.03 (1.21–1.16)	0.86 (0.39–1.41)
Sex	Men	1.13 (0.57 – 1.69)	0.32 (0.46 – 1.14)
	Women	1.91 (0.67-1.28)	0.76 (0.52-1.39)
Relationship Condition	Single	1.81 (0.59–1.95)	1.13 (0.37–2.84)
	Married	1.97 (0.68–9.1)	13.31(4.69–7.29)
	Widowed	2.49 (0.36–9.17)	1.47 (0.59–8.60)
	Divorced	2.38 (1.16–3.78)	1.64 (0.56–3.42)
Medical Disease	At least one	9.40 (4.78–21.26)	13.19 (4.06–

	disease		41.29)
	No medical issues	1.31 (0.77 – 1.97)	1.41 (0.51–2.64)
Work experiences	< 8 Years	2.73 (1.61–3.49)	3.24 (0.26–3.87)
	> 8 years	4.91 (1.98–9.82)	3.47 (1.23–9.69)
the first dosage being taken with hesitation	Yes	2.46 (1.62–4.15)	3.11(1.71–4.88)
	No	1.97 (0.68–9.1)	3.92 (0.37–2.84)
On anti-hypertension treatment	Yes	0.23 (0.89–1.51)	2.51 (0.12–0.39)
	No	2.49 (0.36–9.17)	3.79 (1.23–9.69)
Safety of vaccines as perceived	Do not Know	1.13 (0.21–2.92)	0.94 (0.54–1.95)
	Safe	1.91 (0.67-1.28)	2.47 (0.59–8.60)
	Unsafe	3.54 (1.65–6.85)	3.40 (1.34–7.76)

Discussion

Millions of people have continued to be impacted by the coronavirus, which has claimed millions of lives and devastated industries all over the globe. The most important stage in putting an end to this epidemic is widespread vaccination to build herd immunity, and numerous medicines are being used worldwide to immunize the populace. Despite the COVID-19 vaccines' widespread acceptance and the obvious security they provide, concerns about vaccine safety and worry about their adverse effects have persisted throughout vaccination campaigns. So this research evaluated the adverse effects of the COVID-19 immunization and its risks factors among healthcare professionals working in Pakistan.

In this research, we discovered that systemic side effects, such as temperature, headache, myalgia, tiredness, discomfort at the injection site, and vertigo, were the side effects that affected the study subjects the most frequently. This result agreed with earlier research [20,21]. The documented adverse effects in our research, however, were less common than the results reported by Riad *et al.,* (2021) [22]. The research subjects' different sex compositions could be the cause of this variance. In the prior survey, women made up more than 80% of the subjects [22] and only about 39.55% of the participants in this research were female. In contrast to men, women were significantly more likely to experience the adverse effects of the immunisation, according to other research. This suggests that before being permitted to depart the immunisation location, feminine people need to be closely monitored and encouraged about the possibility of serious adverse effects [23].

In this research, individuals who had been working for longer (≥ 8 years) experienced more adverse effects from the Covid-19 immunization. The age of the research subjects cannot be used to explain this finding because it would be in direct contradiction to existing data showing that immunization adverse effects decline considerably with age. The age structure disparity between the subjects in the current research and those who were elder in the prior study may be the cause of this discrepancy [24]. We hypothesise that as work experience grows, the likelihood that a health worker will acquire a persistent illness may also rise. This could be one possible explanation for why people with more work experience may suffer vaccine adverse effects. This is also corroborated by our most recent

discovery of at least one medical disease associated with the emergence of the adverse effects of the Covid-19 immunization. This outcome is congruent with earlier research [23]. This might be the outcome of a preexisting medical condition or a medication-vaccine combination that caused negative responses in these people. Another explanation might be related to the possibility that people with the underlying chronic illness may have previously experienced either symptoms or silent Covid-19 infection.

Our research shows that among healthcare professionals, the adverse effects of the covid-19 vaccine were considerably more common among those who delayed to receive the first dosage of the vaccine than among those who did not. Because although we failed to discover any results that were directly linked to our conclusion, we believe that this is a plausible explanation: the majority of minor and non-specific vaccine side effects may occur in people who are mentally fragile and anxious because of self-induced worry.

The present research found that there was a greater risk of adverse reactions for healthcare professionals who think the Covid-19 immunisation is risky. The fact that individuals who believe the vaccine to be dangerous won't get it may be one explanation for this discovery. As a result, the effective population may shrink. In our instance, only 12.16 percent of the population felt secure and was immunized. This reasoning backs up the finding that a strong indicator of greater immunization adoption is having faith in a possible vaccine's safety [25]. On the contrary hand, supporters will experience worry due to the belief that the vaccine is dangerous and from receiving the vaccine. Additionally, compared to those who believe the vaccine to be secure, this leads to pain and overstated reporting of vaccine adverse effects. This assertion was consistent with our diagnostic finding that 43 individuals thought the vaccine was risky, and 31 of them said the shot had negative adverse effects. This outcome is congruent with earlier research [26].

Conclusion

Healthcare professionals who received the Covid-19 vaccine were found to have the typical vaccine adverse effects. Chronic illness highlighted, risky view of vaccine safety, and hesitation to receive the first dosage were all separately and favorably related to the emergence of vaccine adverse effects. The emergence of vaccine adverse effects was inversely correlated with covid-19 vaccine recipients taking hypertension medicine. In order to increase vaccine usage by lowering reluctance and false concerns about vaccine safety, it is imperative to provide vaccine-related details to the population that will be immunized. In addition, people with persistent illnesses should receive the vaccine's initial dosage under the careful guidance of medical experts.

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