Original Article

REASONS OF REFUSING COVID-19 VACCINATION AMONG ADULT POPULATION ATTENDING A TERTIARY CARE HOSPITAL OF LAHORE, PAKISTAN: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Despite widespread mass communication strategy, a considerable proportion of the adult population hesitates towards COVID-19 vaccination. This study aimed to describe reasons for refusing COVID-19 vaccination among adults attending a tertiary care hospital in Lahore, Pakistan.

Material and Methods: This descriptive, cross-sectional study was undertaken among patients and attendants presenting to OPDs of a Tertiary care hospital in Lahore from January through June 2022. Four hundred and thirteen unvaccinated individuals aged 18 years and above were interviewed about fear of complications, misconceptions, peer and family influences and vaccine administration issues. Pearson's Chi-squared test was used to examine the difference in proportions using SPSS version 25.

Results: Of 413 participants, 276 (66.8%) were males, and 76% were aged between 20-50 years, with one-third having completed primary school only. Despite higher awareness (83%) about COVID-19 vaccines, more than 50% of females showed concern about fear of long- term health effects. In contrast, according to males, non-immunization was due to family and peer influences (53%). More than half of the participants expressed doubt on predictive protection against COVID. We did not find any statistical association between fear of side effects, misconceptions, peer pressure and vaccination availability themes with age, gender, education and occupation ($p>0.05$).

Conclusion: There are still gaps in accessibility, coverage and acceptability of the COVID-19 vaccine and in addressing the concerns among men and women of low socioeconomic population strata in Lahore about its effectiveness, long-term effects and administration.

Key Words: COVID-19, Immunization, Vaccine hesitancy, Fear, Cross-sectional study

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INTRODUCTION

The COVID-19 pandemic has resulted in considerable morbidity and mortality globally. Health systems worldwide remain under enormous stress, especially in developing countries.[1] Several public health measures have been employed for its prevention and control, including active case finding, contact tracing, isolating symptomatic cases, placing asymptomatic individuals under quarantine and vaccination.[2] Amidst these measures, vaccination has proved to be the most effective strategy. A series of vaccines were developed, undergone speedy trials and approved for public consumption to target

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large populations, starting from high-risk individuals.[3] International organizations, governments and private companies joined hands and successfully massively produceseveral vaccines against COVID, such as Moderna, Pfizer, BioNTech, and Sino pharm. The next mammoth task of equitable distribution of COVID-19 vaccines is being governed by the COVAX initiative led by the World Health Organization (WHO), Global Alliance for Vaccination and Immunization (GAVI), UNICEF and other notable international organizations.[4]

COVID-19 vaccines have shown effectiveness in preventing severe forms of disease and reducing deaths from infection.[5] More than 13 billion doses have been administered to people to date around the world.[6] The proportion of fully or partially vaccinated population differs across the globe and varies even within regions in the same country. Since many reservations regarding vaccines exist, many people are suspicious about their efficacy, long-term side effects and reasons related to the socio-cultural environment. A major hurdle in vaccine success in preventing COVID-19 infection surge and repeated cycles of infection is the reduced coverage and refusal of newly developed vaccines. The uncertainty about its effects and the emergence of new variants are causing hesitancy in the public, where individuals are listening to conspiracy theories, and public health authorities are unable to communicate the right message to improve vaccine coverage.[5,6]

World Health Organization defines vaccine hesitancy as the refusal or delay in vaccine acceptance despite the availability of safe services.[7] This is a complex and multifactorial phenomenon that varies from place to place, over periods and gets affected by the type of vaccine as well. Myths, disbelief and rumours spread through social media are important in refusing the COVID-19 vaccine. This refusal is not limited to one country or region but is a global phenomenon. In the United Kingdom, a household survey of twelve thousand respondents showed vaccine hesitancy among 72% of the coloured population and 42% of South Asian respondents of Pakistani and Bangladeshi origin.[8]

To date, only 55% of the Pakistani population has received at least one dose of the COVID 19 vaccine, which is low compared to our neighbouring countries.[9] Apart from vaccine procurement issues and logistics at vaccine centres, there may be problems related to the perception of vaccine efficacy, religious beliefs, and peer pressures, which might contribute to low vaccine acceptance. A study conducted in a tertiary care hospital in the capital city of Pakistan enrolled 423 participants and reported that 47% of this urban population had reservations about the COVID-19 vaccine.[10] Another study in the urban slums of the same geographic area showed a moderate willingness to vaccinate against COVID-19. Therefore, the socio-cultural environment might play a great role in determining the refusal or acceptance of vaccination against COVID-19.[3] However, few studies have addressed the issue of examining factors that might lead to the refusal of the COVID-19 vaccine in our population. The existing study was designed to explore the factors associated with refusing the COVID-19 vaccine among the adult population presenting to a tertiary hospital in Lahore. We strived to examine sociodemographic profiles, knowledge, myths, beliefs and concerns about COVID-19 vaccines.

MATERIAL AND METHODS

This descriptive, cross-sectional study was conducted in Lahore's tertiary health care setting. After approval from the Ethical Research Board (ERB) of Allama Iqbal Medical College/Jinnah Hospital Lahore, men and women aged 18 years and above attending Jinnah Hospital Lahore, including patients and their attendants, were invited to participate in this study. Jinnah Hospital Lahore is an 1800 bedded

tertiary care teaching hospital, which is visited by individuals from all urban towns, surrounding semi-urban and rural areas. These visitors generally represent lower and middle socioeconomic classes of the population residing in Lahore city. Those individuals who were already immunized against COVID-19 (any vaccine brand; fully or partially vaccinated), those requiring emergency care, psychiatric illness were excluded. The sample size was calculated using Open Epi software at a 95% confidence level, taking the frequency of the anticipated factor as 50% (not refusing COVID 19 vaccination) with a precision of 5%. The estimated sample size was 375, to which we added 10% as an adjustment for non-response and missing data, yielding a sample size of 413 individuals. However, 453 individuals were invited to participate in this study, of which 34 refused, and six (06) subjects had missing data. Data was collected through an in-person interview using a pre-tested semi-structured questionnaire. These respondents were selected through a non-probability convenient sampling technique. The questionnaire comprises a set of questions asking sociodemographic characteristics, awareness about available vaccines, religious beliefs, misconceptions/myths, unavailability of vaccines, the influence of family members and peers for a decision on the vaccine, restrictions due to disability, fear of needles, overcrowding of vaccination centres. After obtaining informed verbal consent and explaining the aims of our study, ensuring the individual data confidentiality, a trained interviewer was interviewed in a separate place. Each interview took an average of 15-20 minutes. After completing every interview, the interview form was reviewed for missing entries and handed over to the supervisor. SPSS software version 25 was used to manage and analyze data. De-identifying names, addresses and contact details was done using a code file. Data were cleaned and checked for consistency before final analyses. Age (<20 years, 20-50 years and >50 years), monthly income (Pakistani Rupees), education (no schooling, completed primary and secondary or above education) and occupation (unemployed, skilled and unskilled workers) were categorized. The frequency and percentage of these categories were calculated separately for men and women. The difference of proportions was examined using Pearson's Chi-squared test with a value of p less than 0.05, which was considered statistically significant. A tornado chart was created to compare participants' responses on four themes (fear of complication/ long term health effects, Misconception about the COVID 19 vaccine, family and peer pressures, and immunization management issues) representing refusal of the COVID-19 vaccine. A logistic regression technique was also used to examine the association between sociodemographic characteristics and the four themes of refusal to immunization against COVID-19 and to adjust the confounding effect. Lower values of categories were taken as a reference for comparison. The odds ratio with a 95% confidence interval was used as a measure of association with a p-value of less than 0.05, which was considered statistically significant.

RESULTS

Of 453 eligible individuals invited for the study, 34 (7.5%) refused to participate, and 413 completed the in-person interview. Data from six participants were not included in the final analysis due to missing entries on essential variables (Figure 1). Table 1 shows the sociodemographic characteristics of participants. Of 413 participants, 276 (66.8%) were males. Most men (77.5%) and women (80.3%) were aged 20-50. Among these, 7% of men versus 4% of women were below the age of 20 years, and 15% of men and women were 50 years or above. The monthly income of almost 80% of women and 47% of men was less than twenty thousand rupees, which

indicates that the lower-to-middle socioeconomic class of individuals were visiting the study area. About formal education, we found that one-fourth of men and one-third of women did not attend any school, whereas about one-third of men and women completed at least primary school. This difference in obtaining formal education comparing men and women was statistically significant ($p<0.005$). Similarly, there was a difference in employability, comparing men and women, such that about 94 (69%) women and 74 (16%) men were unemployed. Twenty-six men (46%) in this sample were unskilled workers. We found that more than 80% of men and women were aware of the availability of COVID-19 vaccination (Figure 2). About 30% of respondents also stated that one or more of their family members contracted COVID-19 infection, and around 75% had one or two doses of COVID-19 vaccination (Table 1). When asked why participants refused to be vaccinated despite a higher proportion of family members having opted for COVID-19 vaccination, 53% of women versus 45% of men feared that COVID-19 vaccination had long-term unknown health effects. About 50% of men and women showed concern that the vaccine would not give protection against the infection (Figure 2). There were several misconceptions about the COVID-19 vaccines. About 42% of men feared that this vaccine would induce infection and may result in death. One-third of men and women stated COVID-19 vaccination was a Western conspiracy in collaboration with government agencies to reduce the Muslim population (Figure 2). We found some vaccination program management issues stated by 20% of men and women. These factors include overcrowding at vaccination points, non availability of vaccines in a few centres and inaccessibility of vaccine centres (Figure 2).

This study found four refusals to COVID-19 vaccination themes: fear of complications and long-term health effects, misconceptions about COVID-19 vaccines, peers and family influences and immunization management issues. Table 2 shows results related to the association of these four refusal themes with age, sex, education and occupation. About 168 (80.8%) participants aged 20-50 years feared vaccine-related complications and long-term health effects. We found statistically significant differences in responses among different age groups (unadjusted p=0.04). Men expressed this fear more in men (70%) than women (28%), whereas one-third of those with primary education and unskilled workers stated this fear of COVID-19 vaccination related health effects. Unadjusted estimates found no statistically significant proportion difference among sex, education and occupational categories. Differences in responses to Misconceptions about COVID-19 vaccines were statistically significant regarding education (unadjusted, p=0.004) and occupation (unadjusted, p=0.01), with those who completed primary education and unskilled workers having more misconceptions about the vaccine (Table 2). Peers and family influences played a significant role among those with primary education compared to those without education. On the other hand, 76% of those men aged 20-50 showed concerns about vaccination administration issues such as overcrowding, shortages of vaccines and inaccessibility of vaccination centres (Table 2). Our adjusted estimates indicate that there is no statistically significant association between age, gender, occupational status and education with fear of complications /long–term health effects ($p>0.05$), with probability of refusing vaccination based on this theme higher in those aged 20-50 years (OR=1.97; 95% CI: 0.74-5.21;p=0.17); among men (OR=1.45;95% CI:0.79-2.65; p=0.22) and among unskilled workers (OR=1.28; 95% CI:0.65-2.48; p=0.95) (Table 3).

The adjusted estimates about misconceptions of COVID-19 vaccines and the likelihood of refusal of vaccine about

sociodemographic characteristics show that those aged 20-50 years, compared to other age groups, are three times more likely to refuse vaccine due to their misconceptions (OR=3.00; 95% CI:1.16-7.72) and this association was statistically significant (p=0.02). Similarly, those who completed primary education compared to those who did not attend formal school were 1.92 times (95% CI:1.02-3.60; p=0.04) more likely to refuse vaccination due to misconceptions about COVID-19 vaccines (Table 3). Regarding peers and family influences, men had fewer odds of refusing COVID-19 vaccination than women (OR: 0.42; 95% CI: 0.24-0.72; p=0.02) after adjusting for other socioeconomic factors and other themes (Table 3). Similarly, after adjustment, the odds of refusing COVID\ 19 vaccination due to peers and family influences were higher among those with secondary education (OR:2.07; 95% CI:1.16-3.71; p=0.01) and skilled workers (OR:1.88; 95% CI:1.03 3.43; p=0.01). We did not find any statistically significant difference in refusing COVID-19 vaccination due to immunization management issues, sex, educational status and occupation, except among those aged more than 50 years (OR:3.73; 95% CI:1.25-11.10; p=0.01) (Table3)

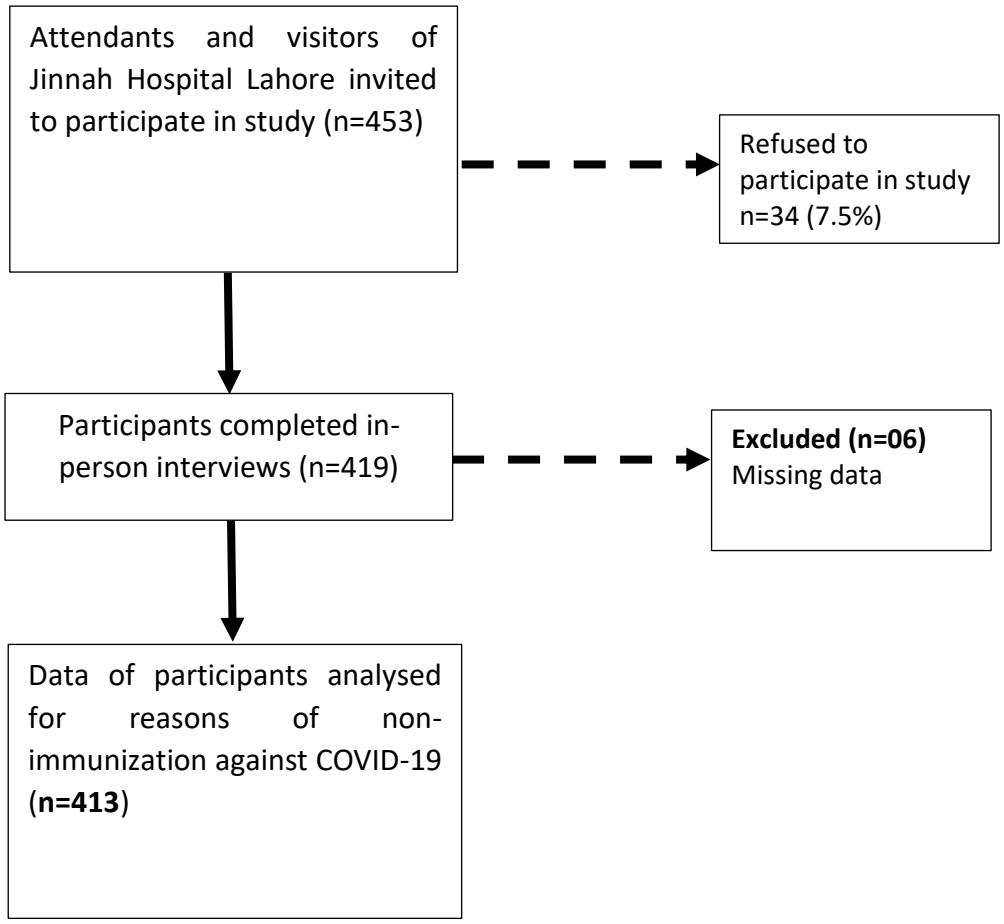

Figure-1: Flow of study participants for examining reasons for not immunizing against COVID-19 among the adult population presenting to a Tertiary Care Hospital in Lahore

Table-1. The sociodemographic characteristics of participants were examined to examine reasons for refusing to immunize against COVID-19 among the adult population presenting to a Tertiary Care Hospital in Lahore (n=413)

Characteristics	**Men** (n=276)		**Women** (n=137)		***p-value***
	Numbers	Percentage	Numbers	Percentage	
Age (years)					
Less than 20	20	7.2 %	06	4.4%	0.52
20-50	214	77.5%	110	80.3%	
More than 50	42	15.2%	21	15.3%	
Monthly Family Income (PKR)					
<20 K	131	47.5%	114	83.2%	<0.001
20 K-50 K	102	37.0%	17	12.4%	
>50 K	43	15.6%	06	4.4%	
Education					
No Schooling	74	26.8%	57	41.6%	0.005
Completed Primary School	110	39.9%	50	36.5%	
Secondary School or above	92	33.3%	30	21.9%	
Occupation					
Unemployed	43	15.6%	94	68.6%	<0.001
Unskilled worker	126	45.7%	24	17.5%	
Skilled Workers	107	38.8%	19	13.9%	
COVID-19 infection in family					0.53
Yes	93	33.7%	42	30.7%	
No	183	66.3%	95	69.3%	
COVID-19 vaccination in family					
Yes	216	78.3%	104	75.9%	0.59
No	60	21.7%	33	24.1%	

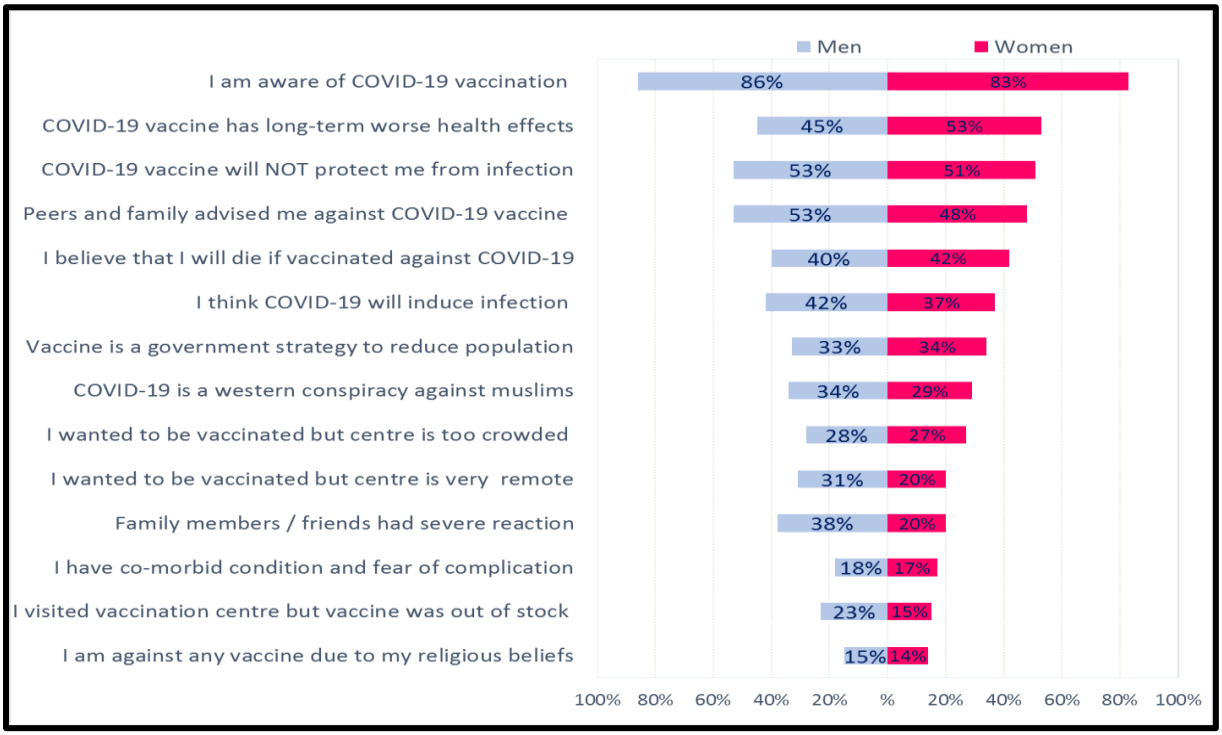

Figure-2: Reasons for not immunizing against COVID-19 among adult Population presenting to a Tertiary Care Hospital in Lahore (n=413

Table-2. Association between sociodemographic characteristics and the main themes of refusal to immunization against COVID-19 among adult Population presenting to a Tertiary Care Hospital in Lahore (n=413)

	Fear of complications/ long term health effects			***Misconceptions about COVID-19 vaccination***			***Peers and family influences***			***Immunization management issues***		
	Yes	***No***	***p***	**Yes**	***No***	***p***	**Yes**	***No***	***p***	**Yes**	***No***	***p***
	N (%)	**N (%)**		**N (%)**	**N (%)**		**N (%)**	**N (%)**		**N (%)**	**N (%)**	
Age (years)												
Less than 20	07 (3.4)	19 (9.3)	0.04	04 (3.0)	22 (7.9)	0.08	15 (7.3)	11 (5.3)	0.66	06 (5.2)	20 (6.7)	0.38
20-50	168 (80.8)	156 (76.1)		104 (78.2)	220 (78.6)		158 (77.1)	166 (79.8)		88 (75.9)	236 (79.5)	
More than 50	33 (15.9)	30 (14.6)		25 (18.8)	38 (13.6)		32 (15.6)	31 (14.9)		22 (19.0)	41 (13.8)	
Sex												
Women	62 (29.8)	75 (36.6)	0.14	39 (29.3)	98 (35.0)	0.25	73 (35.6)	64 (30.8)	0.29	40 (34.5)	97 (32.7)	0.72
Men	146 (70.2)	130 (63.4)		94 (70.7)	182 (65.0)		132 (64.4)	144 (69.2)		76 (65.5)	200 (67.3)	
Education												
No Schooling	58 (27.9)	73 (35.6)	0.21	35 (26.3)	96 (34.3)	0.004	53 (25.9)	78 (37.5)	0.01	40 (34.5)	91 (30.6)	0.64
Completed Primary School	83 (39.9)	77 (37.6)		67 (50.4)	93 (33.2)		81 (39.5)	79 (38.0)		41 (35.3)	119 (40.1)	
Secondary School or above	67 (32.2)	55 (26.8)		31 (23.3)	91 (32.5)		71 (34.6)	51 (24.5)		35 (30.2)	87 (29.3)	
Occupation												
Unemployed	59 (28.4)	78 (38.0)	0.07	31 (23.3)	106 (37.9)	0.01	61 (29.8)	76 (36.5)	0.20	37 (31.9)	100 (33.7)	0.94
Unskilled worker	77 (37.0)	73 (35.6)		56 (42.1)	94 (33.6)		74 (36.1)	76 (36.5)		43 (37.1)	107 (36.0)	
Skilled Workers	72 (34.6)	54 (26.3)		46 (34.6)	80 (28.6)		70 (34.1)	56 (26.9)		36 (31.0)	90 (30.3)	

Table-3. Adjusted Odds ratio and 95% confidence interval showing the association between refusal factors to COVID-19 immunization in adult Population presenting to a Tertiary Care Hospital in Lahore (n=413)

	Fear of complications/ long term health effects			***Misconceptions about COVID-19 vaccination***			***Peers and family influences***			***Immunization management issues***		
	Odds ratio	***95% CI***	***p***	**Odds ratio**	***95% CI***	***p***	**Odds ratio**	***95% CI***	***p***	**Odds ratio**	***95% CI***	***p***
Age												
Less than 20 years	**Reference**	**Reference**		**Reference**	**Reference**		**Reference**	**Reference**		**Reference**	**Reference**	
20-50 years	1.97	0.74 - 5.21	0.17	3.00	1.16-7.72	0.02	0.48	0.19-1.17	0.11	2.16	0.85 - 5.71	0.12
>50 years	2.74	0.85 - 8.84	0.09	1.59	0.52 – 4.90	0.42	0.77	0.25 - 2.01	0.52	3.73	1.25-11.10	0.01

Sex												
Women	**Reference**	**Reference**		**Reference**	**Reference**		**Reference**	**Reference**		**Reference**	**Reference**	
Men	1.45	0.79 - 2.65	0.22	1.47	0.78 - 2.76	0.23	0.42	0.24 - 0.72	0.02	0.71	0.42 - 1.19	0.20
Education												
No formal Schooling	**Reference**	**Reference**		**Reference**	**Reference**		**Reference**	**Reference**		**Reference**	**Reference**	
Primary School	0.92	0.51 – 1.66	0.77	1.92	1.02 - 3.60	0.04	1.51	0.89 - 2.51	0.12	0.72	0.44 - 1.19	0.20
Secondary School	1.53	0.77 – 3.01	0.22	1.05	0.53 - 2.12	0.88	2.07	1.16 - 3.71	0.01	0.88	0.50 - 1.53	0.65
Occupation												
Unemployed	**Reference**	**Reference**		**Reference**	**Reference**		**Reference**	**Reference**		**Reference**	**Reference**	
Unskilled workers	1.28	0.65-2.48	0.46	0.95	0.47 – 1.91	0.88	1.74	0.97-3.14	0.07	1.41	0.80 - 2.49	0.23
Skilled worker	1.00	0.50 - 1.98	0.99	1.67	0.82 – 3.40	0.15	1.88	1.03 - 3.43	0.04	0.95	0.53 - 1.70	0.85

DISCUSSION

The COVID-19 pandemic has visibly impacted healthcare delivery systems worldwide and has affected economic growth and the socio-cultural environment, especially in developing countries.[11] Global alliances and concerted efforts of countries against this menace achieved an appreciable target of curtailing this huge public health problem; introducing the COVID 19 vaccine is the cornerstone strategy. However, immunization refusal is the major obstacle to attaining the ultimate goal of its elimination. Why many individuals refuse despite the availability and access to vaccines is sparsely investigated in our population. The current study aimed to examine the sociodemographic factors, perception of the vaccine and social or cultural factors of refusing the COVID-19 vaccine. We found that more than eighty percent of individuals were aware of vaccine availability against COVID, but half of these participants believed that vaccines would not protect them. We report that misconceptions about vaccines and the fear of long-term effects were the main factors related to refusal/ hesitancy in individuals aged between 20 to 50 years, while female subjects in skilled occupations and with secondary education tend to be influenced more by peers and family members to decide for COVID-19 vaccination. Similar findings were observed by Qasim *et al.*[12,] who reported that gender and literacy level influenced decision-making and acceptance of the vaccination.[12] Likewise, Ahamed *et al.* showed that the perceptions and fear of COVID vaccination differ in different age groups, including employment and marital status.[13] Health awareness and literacy has influenced the decision to accept newly implemented health\

intervention like vaccination.[12] However, our results indicated that refusal of COVID-19 vaccine was higher among those with high literacy and among skilled professionals. This variation may be explained that COVID-19 was a novel infection, with lots of conspiracies around and inconsistent data coming from various sources, which might result in mistrust of the COVID-19 vaccine. The speed by which new vaccines were developed and the way these were granted provisional approval, contrary to conventional drug or vaccine approval procedures, might have created doubts in the minds of many individuals in the community. Individuals with some education appeared to be more watchful of these novel vaccines. Our findings are consistent with the results of Arshad *et al.*[14] who reported a refusal rate of 48.9% in health care professionals owing to the fears of safety and efficacy.[14] Similarly, Rehman *et al.* observed a high refusal rate to booster doses of COVID vaccination among healthcare workers.[15] Few studies involving nursing and pharmacists have also reported hesitancy to COVID-19 vaccination, further supporting the current study's findings.[16,17] This finding may also be attributed to the fact that educated subjects are more exposed to e``lectronic and social media influence, which has proved to be a platform of infodemics, leading to the spread of Misconception and false information regarding vaccination.[18] Since the emergence of COVID-19 infection, much misinformation has been circulating, including conspiracy theories that the Western world is against developing countries and there may be a monetary gain associated with developing vaccines during the pandemic. These factors have also played a fundamental role in making refusal decisions by individuals against COVID-19 vaccination. In addition, a lack of trust in government officials and the public health care system may contribute to nonadherence to the vaccination program.[19] In summary, hesitancy towards COVID-19 vaccination in a population is multifactorial: fear of developing long term health effects, disbelief about vaccine efficacy, misconceptions and peer/family influences are major themes contributing to refusing COVID-19 vaccination. Public health measures such as raising awareness about the COVID-19 vaccine, addressing misconceptions and myths and communicating correct information about side effects using social media, mobile messages and opinion-makers on mainstream media would improve vaccination coverage. Health authorities can support vaccination campaigns by providing accessible vaccination centres and ensuring the availability of vaccines with trained health staff. Strengths of our study include its rigorous methodology and large sample size. The study's subjects represent the population living in various diverse settings. Moreover, in-person interviews were conducted using a standardized structured interview schedule. The identified themes of refusal are specific and provide sufficient information to public health authorities to target high-risk refusal individuals for communicating health education messages and developing health promotion campaigns in the community. A few limitations should be considered before interpreting the findings of this study: a cross-sectional design was used in which determining the association between independent and dependent variables may suffer from reverse causality. Furthermore, a larger sample size could have provided more precise estimates and improved external validity. Lastly, Mass media and social media communication addressing the identified factors may improve effective COVID-19 immunization campaigns. The government should facilitate the immunization drive by opening more accessible vaccine points to reduce overcrowding and ensure the availability of vaccines with trained health staff.

CONCLUSION

There are still gaps in accessibility, coverage and acceptability of the COVID-19 vaccine and in addressing the concerns among men and women of low socioeconomic population strata in Lahore. There are misconceptions

about vaccine effectiveness, its long-term effects and fear of death among those with comorbid conditions.

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Conflict of interest: None

AUTHOR'S CONTRIBUTION

SM: Conception and development of study proposal
SHE: Questionnaire Design
SAA: Data collection tool and testing
SAC: Data collection
SI: Data management and Data Analysis
MA: Manuscript writing
SB: Manuscript writing
MS: Manuscript Review

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