ORIGINAL ARTICLE

ACCEPTANCE OF COVID-19 VACCINE AMONG THE RESIDENTS OF KARACHI, PAKISTAN

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ABSTRACT

Objectives: This study aimed to evaluate the acceptance of the coronavirus vaccine and the attitude of people residing in the southern part of Karachi, Pakistan.

Methods: This web-based cross-sectional research was conducted among the citizens of the southern part of Karachi from Oct to Dec 2021. The survey for the study was adopted and modified from the formerly conducted study by El-Elimat et al, comprising individuals aged more than 18 years of age. Acceptance and predictors of vaccine acceptance were assessed using the Chi-square test and Binary logistic regression.

Results: The acceptance rate for the coronavirus vaccine was quite high (87%). Males demonstrated a higher acceptance rate. The older aged individuals (>35 years old) also showed higher acceptance when likened to younger participants (OR = 1.84, 95 CI% = 2.893–1.171, p < .008). Individuals not infected with COVID-19 showed less acceptance towards vaccinations (OR = 0.431, 95CI% = 0.233– 0.799, p < .008). Similarly, respondents believing the COVID-19 vaccine to be a conspiracy were less likely to show acceptance towards the vaccination process (OR= 0.893, 95 CI% = 0.575- 1.387, p= 0. 614).

Conclusion: Differences in the acceptance rate between males of older age as compared to younger population and females have demonstrated higher acceptance towards vaccination. Sinopharm followed by Sinovac was the most frequently used to provide immunization to the Pakistani population.

Keywords: Adverse effects, Immunology, Coronavirus, Vaccine.

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INTRODUCTION

Vaccines can be described as biological mediators which can provoke an immune reaction against a particular antigen, created from the pathogen.[1] Vaccine comprises antigens that are derived from either pathogen or formed synthetically that signifies the components of the pathogen.[2] Vaccines can be categorized as living or non-living, as the latter contains attenuated forms of the particular pathogen. In addition to this, "viral vectors", "nucleic acid-based RNA", virus-like elements, and DNA-based vaccines have also been incorporated within the vaccines.[3] Vaccine protects with the help of B and T cell-dependent pathways, by producing antibodies, and lastly due to the presence of immune memory.[2] Vaccines help prevent not only the clinical manifestations of infection but also protect against asymptomatic illness, thus reducing the risk of infection by creating herd immunity.[4]

COVID-19 caused by SARSCoV-2 originated in China, in December 2019.[5] Due to its spread worldwide, WHO declared coronavirus as a pandemic.[6] The major features included fever, shortness of breath, and cough while in some cases it presented as sore throat, anorexia, malaise, nausea, and diarrhea.[7] The prime mode of transmission was airborne in form of respiratory droplets that

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could remain as an aerosol on any surface for a longer duration.[8,9] These aerosols can travel all the way through the ventilation systems in buildings and enclosed spaces.[10] Until January 2021 reports from 81 countries, revealed that about 20.5 million lives were lost due to the current pandemic.[11] In Pakistan males in the age group 19-59 were highly susceptible to COVID-19 due to greater social interaction.[12]

Till now, numerous vaccines have been articulated for immunization.[13] Safe and easily obtainable vaccines assist in reducing the illness, that has badly affected the health, financial, and communal aspects.[14] Though, vaccine trials were initiated in March 2020, and by April 2020, various vaccines were articulated, amongst them, five reached the clinical assessment phase whereas more than 70 entered the exploratory phase.[15,16] However by November 2020, the number of vaccines amplified and increased in the figure. Vaccines efficaciously that entered into final phase comprised AstraZeneca, Moderna, Pfizer, University of Oxford, and Gamaleya's Sputnik V vaccine.[16,17]

World Health Organization's " Strategic Advisory Group of Experts (SAGE)" has described "vaccine hesitancy" as a setback in acknowledgment or denial of vaccine acceptance regardless of vaccine availability.[17] Vaccine reluctance is quite variable and time specific.[18] It has been found that vaccine hesitancy arises when individuals feel less confident concerning the efficacy of the vaccine and especially about the organization endorsing and providing it.[19] Lastly, they also felt that access to the vaccine was quite difficult and troublesome.[20]

A previously conducted study in the U.S. identified that the criteria for recognition of coronavirus immunization among the individuals were founded on providing sufficient understanding regarding the effectiveness of vaccine along with the extent of immunity provided, and more importantly, faith of the public in the government leaders and organizations.[21] Research by Ruiz and Bell also demonstrated that recognition rate of coronavirus vaccine was quite less at 14.8%.[22] While in Hong Kong, it was noted that the acceptance rate for the vaccine got reduced from 44.2% to 34.8% owing to greater apprehension regarding the safety and possibility of side effects from the coronavirus vaccine.[23] Analysis concerning the beliefs regarding the COVID-19 vaccine will help improve vaccine acceptance across different populations. The present research was meant to identify the acceptance of coronavirus vaccine along with the attitude towards vaccinations among the residents of the southern part of Karachi, Pakistan.

MATERIAL & METHODS

ETHICAL CONSIDERATIONS

The official ethical approval for the study was attained from the institutional ethical committee of Bahria University Medical and Dental College. This study was conducted according to the declaration of Helsinki.

STUDY POPULATION AND SAMPLING METHOD

This cross-sectional survey was conducted amongst the citizens residing in the southern part of Karachi, Pakistan, from October to December 2021. Participants aged 18 years and over and from both genders were considered for this study, while participants not willing to consent and providing incomplete information were excluded. It required 5-7 minutes to completely fill out the questionnaire.

STUDY QUESTIONNAIRE

The questionnaire used for the research was adopted from a study led by El-Elimat et al.[24] The questionnaire included questions on sociodemographic factors, which comprised of gender, age, education level marital and smoking status, presence of medical insurance, and details regarding the medical history. The next section assessed information related to COVID-19, which included getting infected with coronavirus or knowing people who got infected, the most trusted source regarding coronavirus vaccines, kind of vaccine, any side effects, and personal views regarding the vaccine. Participants' responses to the questionnaire were assessed using Likert-type scale.

QUESTIONNAIRE DISTRIBUTION

The survey was formed on google forms and it was distributed using social media platforms which included Facebook and WhatsApp to circulate the questionnaire among the participants from the city of Karachi.

SAMPLES SIZE CALCULATION & ANALYSIS

The sample size for the study was found to be 1200, which was evaluated using OpenEpi software. Keeping the α at 0.05, the margin of error at 4.7%, and confidence limit at 95%. The statistical analysis was performed using SPSS v.23. Categorical variables have been described as frequency and percentages; Binary logistic regressions were conducted to assess the acceptance of vaccine amongst the Population.

RESULTS

GENERAL CHARACTERISTICS OF THE STUDY POPULATION

The total questionnaires completed were 1194 from a total of 1200 and were considered for further analysis. Among them more than half comprised of 56.4% females while 43.6% were males. About 26% of participants aged more than 35 years, 47.9% were aged 18-25 years

and 26.4% belonged to the 26-35 years of age group. Among the study participants 35.4 % were married, 53.6 % were single and 11% did not specify. Most of the participants (70.3%) had no medical insurance while only 29.7% were insured. Ninety percent stated being nonsmokers. About 81.7% confirmed being medically sound, whereas 15.9% responded as being unsure and 2.3% were medically compromised.

Regarding the education level of participants, 13.1% completed high school, 49.2% participants had undergraduate degrees and 37.7% had postgraduate qualifications. Employment status included the majority 51% being unemployed while 49% were employed. (See Table 1)

Table 2 represented the participant's knowledge regarding the COVID-19 vaccination. Only 28% received the influenza vaccine. A considerable number of participants were vaccinated (83%), while only 17% remained unvaccinated. 77.4% stated not infected with COVID-19, while 22.6 responded positively. Approximately 70% responded COVID-19 is a conspiracy. Regarding getting tested for COVID-19, 40% of the participant's family members got infected. About 60% stated not getting worried about the news circulated regarding vaccination, while 20.4% responded positively.

Information provided by the health care providers (40.6%) followed by government officials was the most trusted source of information.Acceptance for Vaccine

As described in Table 3, the acceptance level for getting vaccinated was 83%, while 17% responded negatively. Linear regression analysis was performed to identify the independent factors that predicted the acceptance level. Males showed higher acceptance for the vaccine (OR = 1.927, 95 CI % = 1.290 – 2.878, $p < .001$). The older age groups (>35 years old) also demonstrated higher acceptance as compared to younger age groups (OR = 1.84, 95 CI% = 2.893–1.171, $p < .008$). In addition, employed

Table 1: Demographic characteristics of study participants

Variable	n	%
Gender		
Female	674	56.4
Male	520	43.6
Age		
>35 years	307	25.7
18-25 years	572	47.9
26-35 years	315	26.4
Marital status		
Married	423	35.4
Others	131	11
Single	640	53.6
Education		
Postgraduate	450	37.7
School education	156	13.1
Undergraduate	588	49.2
Employment status		
Employed	574	49
Unemployed	620	51
Health Insurance		
Insured	355	29.7
Uninsured	839	70.3
Smoking Status		
Current Smoker	32	2.7
Ex-smoker	28	7.3
Non-smoker	1134	90
Medically fit and well		
Maybe	190	15.9
No	26	2.3
Yes	976	81.7

Table 2: Participants attitude towards COVID-19 vaccination

Variable	n	%
Received the influenza vaccine		
No	861	72.1
yes	333	27.9
People tested positive for COVID-19		
A family member	480	40.2
Friend	177	14.8
Neighbor	58	4.9
Colleague	46	3.9
Myself	138	11.6
No one	295	24.7
Infected with COVID-19?		
No	924	77.4
Yes	252	22.6
Maybe	18	1.5
Are you vaccinated?		
No	194	17
Yes	1000	83
Do you find vaccines safe?		
Maybe	287	24.0
yes	307	26
No	600	50
Is COVID-19 a conspiracy?		
No	837	70.1
yes	357	29.9
News of side effects prevented you from getting vaccinated?		
Maybe	236	19.8
No	714	59.8
Yes	244	20.4
Chances of reinfection is lessened after vaccination?		
Maybe	573	48
No	423	35.4
Yes	198	16.6
Most trusted source		
Family member	129	10.8
Government official	218	18.3
Health care providers	485	40.6
Television news	56	4.7
Pharmaceutical companies	22	1.8
Research articles	140	11.7
Social media	144	12.1
Is it imp to get vaccinated to protect against covid-19		
Maybe	187	15.7
No	34	2.8
Yes	973	81.5

Table 3: Predictors of acceptance regarding COVID-19 vaccine

	Parameters	B	S.E.	Wald	P-value	OR	95% C.I. for EXP(B)	
							Lower	Upper
Gender	Male	0.656	0.205	10.275	0.001	1.927	1.290	2.878
	Female					reference		
Age	18-25					reference		
	26-35	0.568	0.271	4.402	0.036	1.764	1.038	2.999
	> 35years	0.610	0.231	7.002	0.008	1.841	1.171	2.893
Marital Status	Not Specified					reference		
	Single	-1.234	0.324	14.495	0.000	0.291	0.154	0.550
	Married	-2.423	1.006	5.804	0.016	0.089	0.012	0.637
Education	Postgraduate					reference		
	Undergraduate	-0.124	0.220	0.318	0.573	0.883	0.573	1.360
	School	-0.297	0.297	0.997	0.318	0.743	0.415	1.331
Employment status	Employed	0.482	0.343	1.973	0.160	1.619	0.826	3.173
	Un-employed					reference		
Health insurance	Insured	0.811	0.266	9.263	0.002	2.250	1.335	3.792
	Un-insured					reference		
Smoking status	Non-smoker					reference		
	Ex-smoker	-0.412	0.545	0.572	0.449	0.662	0.228	1.926
	Current Smoker	-1.059	0.473	5.021	0.025	0.347	0.137	0.876
Systemic health fitness	Yes					reference		
	No	-0.567	0.250	5.152	0.023	0.567	0.348	0.926
	Maybe	-1.913	0.413	21.499	0.000	0.148	0.066	0.331
Received the influenza vaccine this year	Yes					reference		
	No	17.575	0.852	0.000	0.998	0.429	0.000	0.
Association with COVID-19 positive	Family member	19.462	2.824	0.000		reference		
	Friend	0.771	0.238	10.477	0.001	2.162	1.355	3.448
	Neighbour	1.609	0.446	12.989	0.000	4.996	2.083	11.983
	Colleague	0.824	0.544	2.293	0.130	2.279	0.785	6.619
	Myself	1.350	0.741	3.316	0.069	3.857	0.902	16.487
	No one	0.290	0.312	0.864	0.353	1.337	0.725	2.464
Infected with COVID-19	Yes	18.207	0.935	0.000		Reference		
	No	-0.841	0.315	7.136	0.008	0.431	0.233	0.799
Do you feel vaccines are safe?	Yes					Reference		
	No	-0.379	0.241	2.477	0.116	0.684	0.427	1.098
	Maybe	-1.934	0.295	42.872	0.000	0.145	0.081	0.258
Do you think that COVID-19 pandemic is a conspiracy?	Yes	-0.113	0.225	0.255	0.614	0.893	0.575	1.387
	No					Reference		

Type of vaccine received	AstraZeneca					Reference		
	CanSino	-2.186	0.467	21.867	0.000	0.112	0.045	0.281
	Moderna	-1.363	0.493	7.646	0.006	0.256	0.097	0.672
	Pfizer	-2.541	0.524	5.624	0.998	0.953	0.022	0.1859
	Sinopharm	-3.033	0.423	51.445	0.000	0.048	0.021	0.110
	Sinovac	-0.918	0.277	10.989	0.001	0.399	0.232	0.687
	Family members					Reference		
	government	0.596	0.875	0.464	0.496	1.814	0.327	10.074
	Healthcare providers	-2.000	0.538	13.840	0.000	0.135	0.047	0.388
	News from TV	-1.090	0.535	4.161	0.041	0.336	0.118	0.958
	reports from pharmaceutical companies	-1.435	0.666	4.640	0.031	0.238	0.065	0.879
	research articles	-2.996	0.673	19.786	0.000	0.050	0.013	0.187
	body ache					Reference		
	fatigue, body ache	-0.916	0.405	5.112	0.024	0.400	0.181	0.885
	fatigue, fever, body ache, pain on arm	-1.548	0.326	22.615	0.000	0.213	0.112	0.402
	fatigue, fever, nausea, body ache	-1.689	0.608	7.728	0.005	0.185	0.056	0.608
	fatigue, nausea	-3.682	0.605	37.087	0.000	0.025	0.008	0.082
	fatigue, nausea, body ache	-2.008	0.622	10.434	0.001	0.134	0.040	0.454

B, B coefficient; SE, standard error; Wald, Wald chi-square test; p, p-value; OR, odds ratio; CI, confidence interval.

*Significance taken at $p < 0.05$

participants (OR = 1.619, 95 CI% = 0.826– 3.173, p < .160) seemed less likely to show acceptance for coronavirus vaccines as compared to unemployed participants. Participants who were unsure regarding their medical history were less likely to accept COVID-19 vaccination (OR = 0.148, 95CI% = 0.066– 0.331, p < .001) Individuals not infected with COVID-19 showed less acceptance towards vaccinations (OR = 0.431, 95CI% = 0.233– 0.799, p < .008).

Study participants who seemed unsure regarding finding a vaccine to be safe seemed less likely to demonstrate acceptance towards vaccination (OR= 0.145, 95CI% =0.081- 0.258, p < 0.00). Respondents believing the COVID-19 vaccine to be a conspiracy, exhibited reduced acceptance (OR= 0.893, 95 CI% = 0.575-1.387, p= 0. 614). Respondents receiving Pfizer would demonstrate higher acceptance (OR = 0.953, 95 CI% = 0.022–0.1859, p=0.998), while participants receiving Sinopharm will have lower acceptance (OR = 0.048, 95CI% = 0.021–0.110, p=0.048). Participants whose trusted source of information regarding vaccination was provided by government officials were more likely to demonstrate higher acceptance (OR = 1.814, 95CI% = 0.327–10.074, p=.496).

DISCUSSION

This research intended to assess the acceptance of the coronavirus vaccine among the residents of Karachi. It is known that vaccination plays an essential role in decreasing the burden of infections.[25] Vaccinations can play an effective role in providing herd immunity among the community, provided its acceptance rate is high.[26] In the current study acceptance rate of 87% was identified regarding their willingness towards getting vaccinated. Among the previously conducted research evaluating the public readiness to obtain the coronavirus vaccines globally, Jordan had the lowermost acceptance rate.[24] Similarly many developing countries such as India, South Africa, and Brazil also demonstrated higher predisposition toward acceptance of vaccines.[27] A previously conducted study in Pakistan identified that 50% of the study participants seemed unsure regarding the COVID-19 vaccine.[26] However, this can be attributed to the increasing number of health campaigns conducted by healthcare officials

and the strict action taken by the government regarding vaccination.

Findings from the current study revealed that older people demonstrated higher acceptance of vaccines which is in line with the previously conducted studies which have also identified higher acceptance rates among older participants.[28,29] These outcomes are however in disagreement with a study done by El-Elimat et al where the majority of the younger participants should willing towards the vaccine.[24] This can be because older individuals being more experienced, understand the importance of getting immunized.

Contrasting reports regarding the gender-wise acceptance of COVID- 19 vaccines have previously been reported.[24, 30] Pakistani males responded positively by getting vaccinated. These findings are in agreement with research conducted by Nikolovski et al.[31] This could be clarified by the fact that gender-based differences exist with respect to adverse reactions and the humoral immune reactions subsequently that occurs once vaccinated, more common amongst the females, whereas for males there are higher risks associated for complications, infections, and death.[32,33] Employed participants in the current research seemed less inclined to accept the vaccine, which is in contrast with the previously carried out research in the USA, where jobless participants demonstrated lower acceptance of the coronavirus vaccine.[28] These findings identify the point that despite the presence and availability of vaccines some individuals whether employed or unemployed would remain highly susceptible to continued health outbreaks.

Most of the respondents stated finding the COVID-19 vaccine to be safe, these results are in contrast with the formerly led research in Jordan, where a low acceptance rate among Jordanians was found.[24] It could be linked with the pace at which the whole process of vaccine formulation and process was conducted resulting in the availability of vaccine quite early which could have resulted in reducing the acceptance of vaccine worldwide. Additionally, many participants responded positively regarding the COVID-19 vaccine being a conspiracy, these outcomes are in line with research piloted by Hughes et al.[28] This can be attributed to the fact that negative and falsely fabricated news spread by anti-vaccination groups on social media due to vaccine development in a such a short span of time has influenced and affected the beliefs of many people.

The Sinopharm vaccine had been formulated using an inactivated virus.[34] In Pakistan the majority of the individuals got immunized with the Sinopharm and with the Sinovac vaccine. Pfizer and Astra Zeneca both formulated using RNA and DNA-based viral vectors were introduced quite later in Pakistan and for the majority of individuals provided as a booster dose.[35] During phase one of vaccination in Pakistan healthcare professionals directly in contact with patients were initially vaccinated followed by law professionals and professions having minimal public contact subsequently got vaccinated.[36] Various previously conducted studies have evaluated the post-vaccination adverse effects associated with Pfizer, Moderna, Sinopharm, Sinovac, and Astra Zeneca vaccines.[37-40] The severity and type of side effects linked with the vaccines have a significant association with the vaccine type. AstraZeneca had higher side effects as compared to Pfizer-BioNTech, while Sinopharm has the least.[41] However in Pakistan most of the population was vaccinated initially with Sinopharm followed by Sinovac. However, the frequently stated side effects included fatigue, temperature, and body aches. The most reliable source providing adequate evidence about the coronavirus vaccines was the information provided by health workers and government officials. These outcomes are consistent with the previously led research by Malik et al carried out in the USA where many respondents trusted the opinions of Health care professionals more than any other source.[27] Additionally, these findings are confirmed by other studies that also predicted higher faith in health providers.[42, 43]

LIMITATIONS

Despite a comparatively large sample, the generalizability of the findings can be affected due to the non-random sampling technique used. Participants under 18 years were not involved and the efficacy of the vaccine in this age group remains unknown. Secondly, as the questionnaire was formed using google forms hence the respondents required the use of a smartphone, Laptop, or any other electronic device to participate, which could have probably led to selection bias. Moreover, we wanted to evaluate the attitude of participants when vaccines were recently developed and the majority of the southern Karachi population got vaccinated, hence this can affect the attitude towards the vaccine, as identified from the study. The current research did not evaluate the psychological issues and their impact on acceptance. Nonetheless, the current research evaluated various factors associated with the suitability of COVID-19 vaccination, which can assist in directing future community health attempts aiming to escalate the acceptance of COVID-19 vaccines.

CONCLUSION

The findings from the current study made an important contribution to the scientific literature by identifying a higher acceptance rate of 87% among the citizens of southern Karachi, regarding COVID-19 vaccination. The difference in the acceptance rate between males of older age as compared to younger population and females have demonstrated higher acceptance towards vaccination. Sinopharm followed by Sinovac was the most frequently used to provide immunization to the Pakistani population.

It was further identified that general public greatly trusted the information provided by the health care professionals and the government officials, hence government should make sure in the future also to incorporate the trust of the population on themselves.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

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Khan U:	Literature search, Data collection
Iqbal K:	Write up, Proof Reading
Fahim MF:	Statistical analysis and data handling
Haider I:	Overall supervision and bibliography
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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.