SHORT REPORT

Influencing perception of COVID-19 illness and vaccines using an educational intervention tool in a lower-middle-income country

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Abstract

The case-control study was planned to determine if an educational intervention tool could reduce coronavirus disease-2019 vaccine hesitance and resistance in people visiting a tertiary care hospital in a developing country. Participants were randomly enrolled into intervention group A and control group B from July to December 2021. Participants in group A reviewed an educational intervention tool prior to completing a questionnaire, while participants in group B did not. Responses from 440 participants were included in the final analysis. The use of the educational intervention tool significantly lowered beliefs in conspiracy theories and the impression that coronavirus disease-2019 was a simple flu that did not lead to any serious illness. It also resulted in higher levels of confidence in the effectiveness of the coronavirus disease-2019 vaccines available in the country. Of the 440 subjects, 228(51.8%) were in group A and 212(48.2%) in group B. Before reading the educational intervention tool, 26(11.4%) respondents in group A were vaccine-hesitant or resistant, of whom 10(38.5%) became vaccine-acceptable.

Key Words: COVID-19, COVID-19 vaccines, Pandemics, Communicable diseases, Prevention and control.

DOI: https://doi.org/10.47391/JPMA.20108

Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) emerged as a pneumonia of unknown origin from the Wuhan province of China in December 2019 and developed into a pandemic, infecting over 770 million people worldwide with over 7 million fatalities.[1]

To reduce morbidity and mortality, a frantic race ensued to develop a vaccine.[2] A meta-analysis of 38 studies involving 81,173 individuals from 36 countries revealed a pooled vaccine acceptance rate of 73.31% with concerns regarding safety and side effects as the most common reason cited for reluctance.[3] Vaccine hesitancy[4] is a global issue and is context-specific with variability seen among the countries.[5]

The current study was planned to determine if a simple educational intervention could reduce coronavirus disease-2019 (COVID-19) vaccine hesitance and resistance in people visiting a tertiary care hospital in a developing country. To the best of our knowledge, no such study has been conducted in Pakistan.

Methods, Results and Discussion

The case-control educational intervention study was conducted at the Aga Khan University Hospital (AKUH), Karachi, Pakistan. The 'COVID-19 Illness and Vaccine Perception Assessment Tool' was developed and consisted of 17 items that were included in the questionnaire based on reviewed literature.[6-9] It was pilot-tested among 15 participants who provided feedback on clarity and comprehensibility. Data collected during the pilot study was not included in the final analysis. To determine the internal consistency of the questionnaire, Cronbach's alpha coefficient was used. An expert panel from the Department of Medicine conducted focussed group discussions (FGDs) for content and face validation. For construct validity, exploratory factor analysis (EFA) with varimax rotation was carried out to test the domain structure. The Kaiser-Mayer-Olkin (KMO) measure was used to assess sample adequacy, with $p < 0.05$ being considered significant.

The intervention tool was developed by modifying the AKUH's Frequently Asked Questions (FAQs) document for public awareness regarding COVID-19 illness and vaccinations.

Both the questionnaire and the intervention tool were prepared in English and Urdu languages for the convenience of the participants. Approval was obtained from the institutional ethics review committee.

To assess the effectiveness of the intervention tool, the participants were randomly divided into intervention group A and control group B. Participants in group A were provided with the educational intervention tool and asked to review it before attempting the questionnaire.

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Submission complete: 27-03-2024 **First Revision received:** 10-05-2024
Acceptance: 07-09-2024 **Last Revision received:** 05-09-2024

Table-1: Intergroup comparison of responses.

Statement	Group A		Group B		
	Agree n(%)	Disagree/ Undecided n (%)	Agree n(%)	Disagree/ Undecided n (%)	p value
COVID-19 illness perception					
COVID-19 is an illness that has infected and lead to the death of millions of people throughout the world					
.	208	20	179	33	0.029
	(91.2)	(8.8)	(84.4)	(15.6)	
COVID-19 is an illness that can lead to very serious illness and also death.					
	207	21	170	42	0.002
	(90.8)	(9.2)	(80.2)	(19.8)	
	Agree/ Undecided n (%)	**Disagree n (%)**	**Agree/ Undecided n (%)**	**Disagree n (%)**	
COVID-19 is a simple flu that does not lead to any serious illness.					
	26	202	59	153	<0.001
	(11.4)	(88.6)	(27.8)	(72.2)	
COVID-19 is not an illness and is a conspiracy by foreign countries against Pakistan					
	50	178	83	129	<0.001
	(21.9)	(78.1)	(39.2)	(60.8)	
COVID-19 vaccine effectiveness perception					
	Agree n (%)	**Disagree/ Undecided n (%)**	**Agree n (%)**	**Disagree/ Undecided n (%)**	
COVID-19 vaccines that are available in Pakistan are effective.					
	188	40	132	80	<0.001
	(82.5)	(17.5)	(62.3)	(37.7)	
Getting myself vaccinated is important for the health of others in my community.					
	198	30	175	37	0.210
	(86.8)	(13.2)	(82.5)	(17.7)	
Getting vaccinated against COVID-19 is a good way to protect myself from getting infected with COVID-19.					
	206	22	176	36	0.023
	(90.4)	(9.6)	(83)	(17)	
COVID-19 vaccine safety perception					
New vaccines carry more risks than older ones					
	26	202	24	188	0.978
	(11.4)	(88.6)	(11.3)	(88.7)	
COVID-19 vaccines can lead to serious adverse effects.					
	56	172	69	143	0.063
	(24.6)	(75.4)	(32.5)	(67.5)	

COVID-19: Coronavirus disease-2019

Participants assigned to group B were asked to fill out the questionnaire without prior review of the educational intervention tool. The tool was given to group B participants after the completion of the questionnaire as a token of appreciation for participation.

Vaccine hesitance/ resistance for COVID-19 was 35% and 31% in a survey of over three thousand respondents from Ireland and the United Kingdom, respectively.[10] A sample size of 350 was calculated to be sufficient using OpenEpi software and a prevalence of 35% with a bound-on error of 5, and a 95% confidence interval (CI). To account for missing data, a

Table-2: COVID-19 vaccine acceptability factors and hesitance and resistance factors.

Serial Number	COVID-19 Vaccine Acceptability Factors
1.	Agreement with the statement that COVID-19 is an illness that has infected and lead to the death of millions of people throughout the world.
2.	Disagreement with the statement that COVID-19 is a simple flu that does not lead to any serious illness.
3.	Agreement with the statement that COVID-19 is an illness that can lead to very serious illness and also death.
4.	Disagreement with the statement that COVID-19 is not an illness and is a conspiracy by foreign countries against Pakistan
5.	Agreement with the statement that getting myself vaccinated is important for the health of others in my community.
6.	Agreement with the statement that getting vaccinated against COVID-19 is a good way to protect myself from getting infected with COVID-19.
7.	Agreement with the statement that COVID-19 vaccines that are available in Pakistan are effective.
8.	Vaccinated for COVID-19 or not yet vaccinated but had an intent to get vaccinated
Serial Number	**COVID-19 Vaccine Hesitance and Resistance Factors**
1.	Agreement with the statement that new vaccines carry more risks than older ones
2.	Agreement with the statement that COVID-19 vaccines can lead to serious adverse effects.

COVID-19: coronavirus disease-2019.

sample size of 500 was chosen for the study.
Participants were enrolled using a convenience sampling technique. Those included were individuals of either gender aged 18 years or more. Those excluded were individuals unable to comprehend the questionnaire due to mental disability or illiteracy. Patients and attendants coming to the outpatient clinical areas of the university hospital from July to December 2021 were randomly chosen and assigned to groups A or B after obtaining written informed consent.

Data was analysed using SPSS 23. Qualitative variables were expressed as frequencies and percentages, while quantitative variables were reported as mean +/- standard deviation. Categorical variables were analysed using chi-square test, while numerical and categorical values were analysed using independent sample t-test. P<0.05 was considered significant. KMO measures were used to assess sample adequacy for factor analysis, and p<0.05 was deemed significant. Multivariable logistic regression was also performed to identify independent factors associated with vaccine acceptability. P< 0.05 with 95% CI was considered significant.

Of the 724 individuals approached, 500(69%) agreed to participate. After discarding questionnaires with missing data, 440(88%) responses were analysed; 228(51.8%) in group A and 212(48.2%) in group B.

The mean age of the study population was 35.1±12.2 years. There were 245(55.7%) males, 211(48%) had an undergraduate degree, 92(21%) had a past history of COVID-19 infection, and 167(38%) reported knowing someone among friends or family members who had died from a COVID-19-related illness.

The number of participants who disagreed with the statement that COVID-19 was a simple flu that did not lead to any serious illness was significantly higher in group A 202(88.6%) compared to group B 153(72.2%) (p<0.001). The number of subjects who disagreed with the statement that COVID-19 was not an illness and a conspiracy against Pakistan was significantly higher in group A 178(78.1%) compared to group B 129(60.8%) (p< 0.001) (Table 1).

There were 19(4.3%) subjects who were vaccine hesitant and 20(4.5%) were vaccine resistant. Group A had 9(3.9%) vaccine hesitant individuals and 8(3.5%) vaccine-resistant individuals. In Group B, 10(4.7%) and 12(5.7%) participants were vaccine hesitant and resistant, respectively. Before reading the educational intervention tool, 26(11.4%) respondents in group A were vaccine hesitant or resistant, of whom 10(38.5%) became vaccine acceptable.

Cronbach's alpha coefficient of the questionnaire was 0.70, indicating a level of consistency that was acceptable. The content and face validity of the questionnaire were established through a satisfactory level of agreement among the panellists in FGDs. Factor analysis was used to establish construct validity. In order to assess the degree of correlation, a correlation matrix was used. Sampling adequacy was determined with KMO value 0.827 and the Bartlett test of sphericity value df = 45 (p=0.001). This was followed by factor analysis using principal component analysis and varimax rotation to examine domain structure. Based on the screen plot, the number of factors that might be tenable was determined. To determine the number of factors, an eigenvalue with a cut-off of 1 was used. Consequently, 10 factors were retained in the final questionnaire. These factors were divided into two groups; COVID-19 vaccine acceptability factors, and COVID-19 vaccine hesitance and resistance factors (Table 2).

In multivariable regression analysis, undergraduate or higher level of education (odds ratio [OR] 3,65; 95%CI: 1.57-8.46; p=0.003), disagreement with the statement that COVID-19 is not an illness and is a conspiracy by foreign countries against Pakistan (OR: 5.85; 95% CI: 2.34-14.65; p<0.001), and agreement with the statement that COVID-19 vaccines available in Pakistan are effective (OR: 12.47; 95%CI: 4.74-32.52; p<0.001) were significant predictors of vaccine acceptability.

Conclusion

The educational intervention tool significantly lowered beliefs in conspiracy theories and the impression that COVID-19 was a simple flu that did not lead to any serious illness. It also resulted in higher levels of confidence in the effectiveness of the COVID-19 vaccines available in the country.

Disclaimer: The text was presented as a Poster at the Pakistan Society of Internal Medicine Research Awards 2022, held as part of the Pakistan Society of Internal Medicine International Conference from May 6 to May 8, 2022, in Karachi, Pakistan.

Conflict of Interest: None.

Source of Funding: None.

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Authors' Contribution:
HJ: Concept, writing, drafting and formal analysis.
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ES: Data curation, writing and drafting.
SBZM: Concept, writing, methodology, review & editing.
SA: Formal analysis.
AA: Concept, project administration, methodology, writing, review & editing.
All Authors agreed to be accountable for all aspects of the work.