COVID-19 vaccine acceptance among the public diagnosed with the flu-like syndrome

Aceitação da vacina contra COVID-19 entre público diagnosticado com síndrome gripal

Aceptación de la vacuna contra la COVID-19 entre el público diagnosticado con síndrome gripal

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Abstract

Objective: To analyze COVID-19 vaccine acceptance among people diagnosed with flu-like illness.

Methods: This is a cross-sectional study with a random sample consisting of 454 participants. Data were collected from March to August 2020, in two stages: in the first, data available in the information systems were collected, using an instrument adapted from the investigation form of flu-like illness suspected by COVID-19, and in the second stage, primary data was collected from the participant through a telephone call. For the bivariate analysis, Pearson's chi-square test was performed (X^2). To explain the joint effect of predictor variables on the dependent variable, Multiple Logistics Regression (MRL) with adjusted Odds Ratio (aOR) was used.

Results: Participants most willing to receive a COVID-19 vaccine are those who learned about it on social media (aOR = 4.56, 95% CI: 1.77-11.72) and on newspapers and TV (aOR =2.74. 95%CI= 1.07-7.04).

Conclusion: Having information about the vaccine, whether through social networks or newspapers and TV, increased the predisposition to take it. Thus, it is necessary to intensify effective information about the benefits of vaccines that will be approved by the Brazilian National Health Regulatory Agency (*Agência Nacional de Vigilância Sanitária* - ANVISA).

Resumo

Objetivo: Analisar a aceitabilidade da vacina contra COVID-19 entre pessoas com diagnóstico de síndrome gripal.

Métodos: Estudo transversal, com amostra aleatória composta por 454 participantes. Os dados foram coletados no período de março a agosto de 2020, em duas etapas: na primeira, coletaram-se os dados disponíveis nos sistemas de informação, utilizando-se instrumento adaptado da ficha de investigação de síndrome gripal suspeito de doença por COVID-19, e na segunda etapa, procedeu-se a coleta do dado primário junto ao participante, por meio de ligação telefônica. Na análise bivariada foi realizado o teste qui-quadrado de Pearson (X^2). Para explicar o efeito conjunto das variáveis preditoras sobre a variável dependente foi utilizada a Regressão de Logística Múltipla (RLM) com razão de chance ajustada (ORa).

Resultados: os participantes mais dispostos a receber uma vacina contra COVID-19 são os que se informaram sobre a mesma nas redes sociais (ORa = 4,56, IC 95%: 1,77-11,72) e nos jornais e TV (ORa =2,74. IC95%= 1,07-7,04).

Conclusão: Ter informação sobre a vacina, seja por meio das redes sociais ou dos jornais e TV, aumentou a predisposição para tomá-la. Assim, se faz necessária a intensificação de informações efetivas sobre os benefícios das vacinas que serão aprovadas pela Agência Nacional de Vigilância Sanitária.

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Conflicts to interest: extracted from a esearch project entitled "*Avaliação dos casos de síndromes gripais, suspeitos de infecção pelo novo coronavírus e a respectiva condução pela atenção primária à saúde*" from the *Universidade Federal do Piauí*, Teresina, PI, Brazil, 2020.

Resumen

Objetivo: Analizar la aceptación de la vacuna contra la COVID-19 entre personas con diagnóstico de síndrome gripal.

Métodos: Estudio transversal con muestra aleatoria compuesta por 454 participantes. Los datos fueron recopilados en el período de marzo a agosto de 2020, en dos etapas. En la primera, se recopilaron datos disponibles en los sistemas de información, utilizando instrumento adaptado de la ficha de investigación del síndrome gripal con sospecha de enfermedad por COVID-19; y en la segunda etapa, se realizó la recopilación del dato primario con el participante, por medio de llamada telefónica. En el análisis bivariado se realizó la prueba χ^2 de Pearson. Para explicar el efecto conjunto de las variables predictoras sobre la variable dependiente, se utilizó la regresión logística múltiple (RLM) con razón de momios ajustada (ORa).

Resultados: Los participantes más dispuestos a recibir una vacuna contra la COVID-19 son los que se informaron sobre ella en las redes sociales (ORa = 4,56, IC 95 %: 1,77-11,72) y en periódicos y por televisión (ORa =2,74. IC95 %= 1,07-7,04).

Conclusión: Tener información sobre la vacuna, ya sea por medio de las redes sociales o periódicos y televisión, aumentó la predisposición a recibirla. De esta forma, es necesario intensificar la información efectiva sobre los beneficios de las vacunas que serán aprobadas por la Agencia Nacional de Control Sanitario.

Introduction

The circulation of the New Coronavirus (SARS-CoV-2) worldwide has produced an unprecedented crisis, resulting in many conflicts, especially in the health sector. COVID-19 refers to the disease caused by SARS-CoV-2 that causes several clinical manifestations, from milder cases to severe diseases mainly involving the respiratory system, with the occurrence of severe acute respiratory syndrome, in addition to immune-mediated multisystem manifestations.[1,2]

The first cases were registered in Wuhan province, China, in December 2019 and the spread advanced in the first three months of 2020, so that by December 26, 2020 80,293,196 cases had already been registered, in 220 countries and 1,759,457 deaths.[3] The World Health Organization declared the dissemination of COVID-19 as a pandemic in March 2020, since then, combating it has become a challenge in the scientific community to elucidate the clinical progression of the disease, appropriate therapies and the development of vaccines.[4]

In Brazil, the first case dates from February 26, 2020 in the city of São Paulo, aired by a Brazilian from Italy. Most of the cases are concentrated in São Paulo, and in other states it is believed that the initial contamination was also presented by travelers, being mostly spread by community transmission. As of December 26, 2020, the country already had 7,448. 560 cases, 190,515 deaths and 2.6% lethality. In the state of Piauí, in the same period, there was a record of 140,245 confirmed cases, distributed in 224 cities, 2,802 deaths and an estimated mortality rate of 2.2%. Teresina on the same date registered 48,408 confirmed cases with 1,204 deaths.[5,6]

Considering the uncertainties that still surround COVID-19 and without an effective treatment to change its course, the adoption of protective measures is essential in the pandemic management, and among these, the development of vaccines is essential for controlling the infection. The speed of development of SARS-CoV-2 vaccines is unprecedented and a variety of technology platforms have been tested globally.[7]

According to the WHO, as of December 29, 2020, there were 172 COVID-19 vaccines under development in the pre-clinical phase and 60 vaccine candidates in the clinical research phase.[8] The document that operationalizes the Brazilian national vaccination plan against COVID-19, considers as possible candidates the 13 vaccines that are in phase III clinical trials for evaluation of efficacy and safety, and subsequent immunization of population.[9]

Despite the fact that the vaccination process is, as a rule, covered by safety and efficacy, the phenomenon of vaccine hesitation, which is characterized by the refusal or delay in accepting vaccines, is growing worldwide. There are some studies[10-14] on COVID-19 vaccine acceptance, which indicate that countries such as China, Ecuador, Brazil, Malaysia, Indonesia, South Korea, South Africa, Denmark and the United Kingdom United, show acceptance ranging from 65 to 97%. On the other hand, Russia and France have acceptance rates between 55 to 62%.

Discussing the acceptance of existing vaccines is relevant, especially in the context of the COVID-19 pandemic, considering that this pandemic was accompanied by an infodemic, boosted by social networks. The rise of rumors, misinformation and conspiracy theories have caused distrust and insecurity about vaccines.

Thus, it is important to identify people's acceptance of vaccines, as this information is useful for defining strategies that improve population understanding and favor disease control.[10] In this context, it was proposed to develop the first national study that addresses COVID-19 vaccine acceptance, as so far data related to this issue have been published only in a multinational study, which included Brazil.[13] Thus, the objective of this study is to analyzeCOVID-19 vaccine acceptability among the public diagnosed with flu-like illness.

Methods

This is a cross-sectional study carried out from the database of notification of suspected flu-like illness caused by Coronavirus. Developed in the municipality of Teresina, whose basic health network is composed of 91 Basic Health Units (BHU), of which 73 are in the urban area and 18 are located in the rural area, distributed in regional health coordinators (RHC): North, South, East and Southeast. It was adopted as an inclusion criterion, BHUs that are a reference for the care of cases of flu-like syndrome. Among the 91 BHU, 20 met this criterion, being distributed as follows: 6 in RHC South; 5 in RHC North; 6 in RHC East; 3 in RHC Southeast.

The source population was composed of the universe of cases with suspected or confirmed infection by COVID-19, treated and notified in the selected BHU (n=20), in the period of March 2020, when the community transmission of Coronavirus in the Brazil, until August 2020. Regarding the sample size, based on an assumed prevalence of 50%, since there is no data in the literature on the subject, and this value maximizes the sample,[15] tolerable error of 5% and level of 95% confidence, a minimum of 384 participants was obtained. A 20% rate was applied for recomposition, having losses during the research. Considering that seven were excluded due to lack of access to their telephones, the final sample consisted of 454 participants.

At first, the BHUs were listed by geographic area, according to the location of the establishment, enumerated, and from this list, they were organized in the four RHC areas of the municipality (North, South, East and Southeast). As for the sample distribution (n=454) in the selected BHU, it was proportional to the number of cases registered in them. After the proportional distribution of the sample, and in possession of the list of people served at BHU, participants were drawn by lot.

It took place in two stages, in the first stage, the data available in the information systems were collected, using an instrument adapted from the investigation form of influenza-like illness suspected by the Coronavirus - COVID-19, and in the second stage, the collection of primary data from the participant, through a telephone call, with a view to complementing the necessary information and the presentation of the Informed Consent Form (ICF).

The study variables are: Age, education, income, sex, race, occupation, comorbidities, testing for COVID, interest in taking the COVID-19 vaccine, reason for not interest, and source of information about the vaccine. Interest in being vaccinated against COVID-19 (outcome variable) was measured with the question: "When a COVID-19 vaccine is available, do you agree to be vaccinated? The answer options were "yes", "no". Participants who answered "no" were asked to provide a reason. They were also asked which source they used to find out about the vaccine.

Data were analyzed using the Statistical Package for Social Science (SPSS) application, version 22.0. For univariate analysis, absolute and percentage distribution were used. For the bivariate analysis, Pearson's chi-square test (X^2) was used to associate the explanatory quantitative variables with the study response variables: Interest in being vaccinated, reason for not being interested in the vaccine and source of information about the vaccine. To explain the joint effect of the predictor variables on the dependent variable, the Multiple Logistics Regression (MLR) with aOR was used. The criterion for inclusion of variables in the logistic model was the association at the 20% level ($p<0.200$) in the bivariate analysis. [16-18] The criterion of significance or permanence of the variables in the model, in turn, was the association at the 5% level ($p<0.05$).

The research was carried out after approval by the Institutional Review Board (IRB) of the *Universidade Federal do Piauí*. All ethical precepts contained in Resolution 466/2012, of the Brazilian National Health Council (*Conselho Nacional de Saúde*) (CAAE

Table 1. Bivariate analysis of interest in COVID-19 vaccine according to sociodemographic variables and test result for COVID-19

Variables		Interest in the vaccine		p-value*
		No n(%)	Yes n(%)	
Sex	Male	58(21.9)	207(78.1)	0.381
	Female	35(18.5)	154(81.5)	
Race/color	White	29(27.9)	75(72.1)	0.189
	Brown	49(18.8)	211(81.2)	
	Yellow	3(15.0)	17(85.0)	
	Black	12(17.1)	58(82.9)	
Age	Less than 60 years old	80(20.2)	316(79.8)	0.697
	Greater than or equal to 20 years:	13(22.4)	45(77.6)	
Education	Non-literate	5(27.8)	13(72.2)	0.437
	Elementary school	11(15.5)	60(84.5)	
	High school	44(19.5)	182(80.5)	
	Higher education	33(23.7)	106(76.3)	
Income (minimum wage)	Less than 1	14(19.2)	59(80.8)	0.339
	1 to less than 2	29(16.7)	145(83.3)	
	2 to 4	24(23.8)	77(76.2)	
	More than 4	26(24.5)	80(75.5)	
Healthcare professional	No	157(38.1)	255(61.9)	0.003
	Yes	8(18.7)	34(81.3)	
COVID-19 testing	Positive	67(24.0)	212(76.0)	0.019
	Negative	26(14.9)	149(85.1)	
Vaccine information source	Social networks	22(12.4)	156(87.6)	<0.001
	Healthcare professional	40(32.3)	84(67.7)	
	Newspaper/TV	22(17.3)	105(82.7)	
	Did not seek information	9(36.0)	16(64.0)	

*p-value - statistical significance was set at $p \leq 0.05$

(*Certificado de Apresentação para Apreciação Ética* - Certificate of Presentation for Ethical Consideration) 33801920.4.0000.5214) were respected.

Results

The study was conducted with 454 participants, aged from 18 to 88 years old, and predominantly male (60.5%), brown race/color (57.3%) and higher education (49.8%). Regarding insertion in the labor market, 65.7% had a job. The declared income ranged from less than one minimum wage (38.3%) to more than four (23.3%). As for the professional category, 9.3% were healthcare professionals and 90.7% were from other professions (Table 1). It was found that 79.5% (361) of participants were in favor of COVID-19 vaccine. Interest in the vaccine was associated with being a healthcare professional (p=0.003), being tested for COVID-19 (0.019) and seeking sources of information about the vaccine (p<0.001) (Table 1).

Table 2 shows the factors involved in the decision not to take the COVID-19 vaccine: adverse event following immunization and distrust of the

Table 2. Bivariate analysis of reasons for not being interested in vaccinating against COVID-19 according to sociodemographic variables and information about the vaccine

Variables		Reason for not being vaccinated					
		Fear of AEFI*			Distrust		
		No n(%)	Yes n(%)	p-value†	No n(%)	Yes n(%)	p-value†
Sex	Male	29(50.0)	29(50.0)	0.689	28(48.3)	30(51.7)	0.437
	Female	16(45.7)	19(54.3)		14(40.0)	21(60.0)	
Race	White	14(48.3)	15(51.7)	0.231	13(44.8)	16(55.2)	0.229
	Brown	24(49.0)	25(51.0)		22(44.9)	27(55.1)	
	Yellow	3(100.0)	-		3(100.0)	-	
	Black	4(33.3)	8(66.7)		4(33.3)	8(66.7)	
Age	Less than 60 years old	40(50.0)	40(50.0)	0.441	37(46.3)	43(53.8)	0.601
	Greater than or equal to 20 years old	5(38.5)	8(61.5)		5(38.5)	8(61.5)	
Education	Non-literate	15(45.5)	18(54.5)	0.059	4(80.0)	1(20.0)	0.252
	Elementary school	5(100.0)	-		3(27.3)	8(72.7)	
	High school	3(27.3)	8(72.7)		21(47.7)	23(52.3)	
	Higher education	22(50.0)	22(50.0)		14(42.4)	19(57.6)	
Income (minimum wage)	Less than 1	6(42.9)	8(57.1)	0.242	6(42.9)	8(57.1)	0.492
	1 to less than 2	12(41.4)	17(58.6)		11(37.9)	18(62.1)	
	2 to 4	10(41.7)	14(58.3)		10(41.7)	14(58.3)	
	More than 4	17(65.4)	9(34.6)		15(57.7)	11(42.3)	
Healthcare professional	Yes	9(56.3)	7(43.8)	0.489	9(56.3)	7(43.8)	0.327
	No	36(46.8)	41(53.2)		33(42.9)	44(57.1)	
Vaccine information source	Social networks	12(54.5)	10(45.5)	0.834	11(50.0)	11(50.0)	0.764
	Healthcare professional	20(50.0)	20(50.0)		20(50.0)	20(50.0)	
	Newspaper/TV	10(45.5)	12(54.5)		9(40.9)	13(59.1)	

*AEFI - adverse event following immunization; †p-value - statistical significance was set at $p \leq 0.05$

seriousness of the vaccine manufacturing process. Neither of the two reasons was statistically associated with sociodemographic characteristics or participants' source of information.

Among the three variables that met the requirements of the multivariate model, as a predictor of interest in receiving the COVID-19 vaccine, the source of information, through access through social networks, increased the chances of taking the vaccine by 4.56 times, as well as information through newspapers and TV, which increased by 2.74. Being a healthcare professional was associated with interest in receiving the vaccine; however, there was no statistical significance (Table 3).

Table 3. Logistic regression of interest in receiving the COVID-19 vaccine according to professional category, tests for COVID-19 and source of information about the vaccine

Variables		aOR*	95%CI†		p-value‖
			LI‡	LS§	
Healthcare professional	No	1			0.086
	Yes	1.90	0.91	3.93	
COVID-19 testing	Positive	0.67	0.38	1.16	0.153
	Negative	1			
Vaccine information source	Social networks	4.56	1.77	11.72	0.002
	Healthcare professional	1.62	0.63	4.17	0.314
	Newspaper/TV	2.74	1.07	7.04	0.036
	Did not seek information	1			

*aOR- adjusted Odds Ratio; †95% CI-95% confidence interval; ‡LI-lower limit; §LS-upper limit; ‖p-value - statistical significance was set at $p \leq 0.05$

Discussion

The study revealed that a significant majority of adults would be willing to take the COVID-19 vaccine, a result that is consistent with published studies on the vaccine acceptability.[19-23]It should be noted that this finding represents an estimate of COVID-19 vaccine acceptability and can be used to guide planning and communication strategies to increase adherence to the vaccination campaign when using the vaccine being available. The vaccine acceptability was more prevalent among healthcare professionals, among those who tested negative for COVID-19 and among those who sought information about the vaccine on social networks and newspaper/TV, being statistically associated with the search for information.

In the United States, a study designed to understand attitudes and obstacles towards COVID-19 vaccination showed that approximately 68% of all participants supported vaccination, but side effects, efficacy and duration of the tests remained a concern. Longer trials, greater efficacy were significantly associated with increased vaccine acceptance. Promotion of information campaigns on COVID-19 vaccination should clarify the concerns of those who are already hesitant about the vaccine, and address the benefits of vaccination for the country. Sufficient time should be devoted to allay concerns about side effects before the vaccine is launched.[24]

Another study conducted in the United States, which investigated a participant's probability of selecting and receiving a hypothetical vaccine, found that 79% of participants selected one of the hypothetical vaccines and 21% did not select any of the vaccines. The main attributes of the vaccine for selection and willingness to receive it were increased efficacy, followed by longer duration of protection and lower incidence of adverse events. Participants were less likely to select a vaccine developed outside the United States, particularly China, or a vaccine approved via emergency use authorization from the Food and Drug Administration (FDA). Endorsements from the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) were associated with increased odds of vaccine selection.[21] These results are similar to those of this study, whose prevalence of vaccine acceptance also reached approximately 80% and possible adverse events following immunization constitute one of the reasons for non-acceptance.

A survey conducted in Saudi Arabia that investigated the willingness to accept the future COVID-19 vaccine found that 64.7% said yes to receiving the COVID-19 vaccine, 7.0% said no, and 28.2% said not sure. Moreover, elderly and married people are more likely to accept the COVID-19 vaccine. Study participants' confidence in the healthcare system and perceived risk of acquiring infection were considered significant predictors to explain acceptance of COVID-19 vaccine.[25]In contrast, in this study, no association was observed between interest in receiving vaccine and participants' sociodemographic data.

In a UK survey conducted to investigate factors associated with an intention to be vaccinated against COVID-19, despite uncertainty around the details of a vaccination, most participants reported an intention to be vaccinated against COVID-19, 64% had high probability of being vaccinated, 27% were unsure and 9% reported being very unlikely to agree to be vaccinated. Intention to be vaccinated was associated with general beliefs and attitudes about COVID-19 vaccination, weaker beliefs that vaccination would cause adverse effects or be unsafe, greater perception of sufficiency of information to make an informed decision about vaccination, greater perception risk of COVID-19, old age, and having been vaccinated against influenza in the past. The population needs to be informed about the importance of vaccinating all the people that make up the priority groups and about the potential risk of COVID-19 continuing with high circulation if a significant number of the population is not vaccinated.[26]

In this perspective, the involvement of healthcare professionals, especially those inserted in primary health care, in strategic actions that bring safe, assertive and objective information to the population, is of fundamental importance. It is noteworthy that it is necessary for healthcare professionals to be sufficiently trained, because their knowledge and attitudes towards vaccines are an important determinant of their own adherence to the vaccine and the probability of recommending the vaccine to their patients.[27]

It was observed that a large percentage of healthcare professionals (81.3%) were in favor of vaccination, contrary to the study carried out in Congo, in which only 27.7% of healthcare professionals said they would accept a COVID-19 vaccine if available.[21] Many factors can be associated with the predisposition to accept the vaccine. The high rate of infection by COVID-19, regardless of whether the lethality rate is high or not, the lack of treatment based on strong scientific evidence, the perceived individual risk, the insufficient structure of services to care for the most severe cases and the high The effectiveness of vaccines that are being produced illustrate the circumstantial conditions in the context of the pandemic, which favor attitudes favorable to its acceptance.[20]

In each location where the surveys were conducted, factors may differ depending on the local context and how the vaccine and other prevention measures are being carried out. Therefore, the importance of using the means of communication to intensify the information about the COVID-19 vaccine is highlighted, adapting it, focusing on issues such as vaccine efficacy, duration of protection, regimen, vaccination and recommendation of healthcare services as well as clarification on adverse events following immunization and on the vaccine manufacturing process.

It was observed in this research that among study participants who are still hesitant to accept the vaccine, factors related to adverse events following immunization and distrust of the seriousness of the vaccine manufacturing process were predominant, corroborating other studies on the vaccine acceptability, published in different countries. It is noteworthy that the reasons for vaccine hesitation identified may be due to the moment the research was carried out.

A study conducted in the United States found that only about six out of ten respondents said yes when asked whether they will be vaccinated when a COVID-19 vaccine is available. However, 10% reported that they would not receive the vaccine, for not believing in vaccines, not wanting the vaccine, not feeling comfortable with it, in addition to concern about safety, side effects and general distrust. This group can be very difficult to persuade to be vaccinated and consistent information must be handled with care, due to the strengthening of the anti-vaccine movement and continued politicization of the vaccine. There is also the group that makes up the hesitation movement around the COVID-19 vaccine, whose percentage is around 30%. Their reasons revolve around safety, efficacy, and a strong need for more information about the vaccine.[28]

Negative attitudes towards general vaccination, due to adverse post-vaccination events and possible long-term harm, independently contributed to the hesitation to accept the COVID-19 vaccine. Reports of adverse events from some to the vaccine being tested can further undermine people's confidence in the vaccine.[29]

Given the hesitation of some to be vaccinated, it is necessary to establish effective communication with the population, highlighting some aspects related to the importance of vaccination, the safety and efficacy of vaccines and the need to maintain non-pharmacological preventive measures, even after vaccination, in addition to fighting fake news.[25]

A limitation is the cross-sectional design, which does not allow the follow-up of the decision to accept or not the vaccine among participants. Moreover, data collection took place during the early stages of development of a COVID-19 vaccine, and it is not possible to provide participants with information about it, which may affect acceptability.

Conclusion

The study provides an initial insight into COVID-19 vaccine acceptability, with results indicating that a high percentage (79.5%) of adults would be willing to be vaccinated. Participants most likely to receive a COVID-19 vaccine are those who learned about the vaccine on social media or newspaper/TV. Thus, it is recommended that information campaigns on the benefits of vaccines that will be approved by ANVISA be carried out.

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Collaborations

Araújo TME, Carvalho AMC, Fronteira I, Silva AAS, Rodrigues KA, Queiroz GS and Carcará LRA contributed to the study design, data analysis and interpretation, article writing, relevant critical review of the intellectual content and approval of the final version to be published.

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