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ARTIGO ORIGINAL

Intention to get vaccinated against COVID-19 and vaccine hesitation in Southern Brazil: Prevalence and associated factors

Intenção de se vacinar contra a COVID-19 e hesitação vacinal no Sul do Brasil: Prevalência e fatores associados

Intención de vacunarse contra la COVID-19 y vacilación vacunal en el sur de Brasil: Prevalencia y factores asociados

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Resumo

Introdução: A vacinação contra a COVID-19 é um dos principais recursos de saúde pública para mitigar a pandemia globalmente. As taxas de vacinação dependem diretamente da aceitação e adesão da população. Sabese que a aceitação vacinal é muito heterogênea entre as diferentes regiões do globo, mas há poucos estudos avaliando a percepção geral das vacinas contra a COVID-19 no Brasil. **Objetivo:** Avaliar a intenção de vacinação contra COVID-19 entre moradores do Rio Grande do Sul (RS), Brasil, durante o início da campanha de vacinação no país, e identificar fatores associados à hesitação vacinal. **Métodos:** Foi realizada uma pesquisa com coleta de dados online, que recrutou um total de 953 respondentes. O questionário foi divulgado em mídias digitais de março a maio de 2021, por meio do método de amostragem bola de neve. **Resultados:** Aproximadamente 96% da amostra informou que pretendia tomar a vacina contra a COVID-19. A hesitação vacinal foi positivamente associada a ser casado, ter filhos e ser mais velho. Indivíduos sem intenção de se vacinar também foram mais propensos a não respeitar o distanciamento social e outras ações de proteção individual. **Conclusões:** Nossos achados estão de acordo com os dados atuais de cobertura vacinal no RS. Embora o Brasil esteja apresentando taxas de vacinação superiores à maioria dos países do mundo, devemos

atentar para os grupos populacionais que não aderem à vacinação. Reforçamos a importância da constante divulgação científica e educação em saúde para toda a população como aliadas no fortalecimento das políticas públicas de vacinação.

Palavras-chaves: Vacinas contra COVID-19. COVID-19; Hesitação vacinal

Abstract

Introduction: The vaccination against COVID-19 is one of the major public health resources to mitigate the global pandemic. Vaccination rates directly depends on the acceptance and adherence by the population. It is known that the vaccine acceptancy is very heterogeneous among different regions of the globe, but there are few studies evaluating the general perception of COVID-19 vaccines in Brazil. **Aim:** To evaluate the intention of vaccination against COVID-19 among residents of Rio Grande do Sul (RS), Brazil, during the beginning of the campaign in the country, and to identify factors associated with vaccine hesitancy. **Methods:** An online survey was conducted, ending in a sample of 953 respondents. The questionnaire was divulgated through digital medias from March to May 2021, via a snowball sampling method. **Results:** Approximal 96% of the sample informed they intended to take COVID-19 vaccine. Vaccine hesitancy was positively associated with being married, having children, and being older. Subjects with no intention to get vaccinated were also more likely to not respect social distancing and other individual protection actions. **Conclusions:** Our findings are in line with current vaccination coverage data in RS. Although Brazil is showing vaccination rates higher than most countries in the world, we must pay attention to population groups that do not adhere to vaccination. We reinforce the importance of constant science communication and health education for the whole population as allies in strengthening public policies for vaccination.

Keywords: COVID-19 vaccines; COVID-19; Vaccination hesitancy

Resumen

Introducción: La vacunación contra el COVID-19 es uno de los principales recursos de salud pública para mitigar la pandemia. Las tasas de vacunación dependen directamente de la aceptación y adherencia por parte de la población. Se sabe que la aceptación de la vacuna es muy heterogénea entre las diferentes regiones del mundo, pero hay pocos estudios que evalúen la percepción general de las vacunas contra la COVID-19 en Brasil. **Objetivo:** Evaluar la intención de vacunación contra la COVID-19 entre los residentes de Rio Grande do Sul (RS), Brasil, e identificar factores asociados a la reticencia vacunal. **Métodos:** Se realizó una encuesta en línea, finalizando en una muestra de 953 encuestados. El cuestionario fue divulgado a través de medios digitales de marzo a mayo de 2021, mediante un método de muestreo de bola de nieve. **Resultados:** Aproximadamente 96% de la muestra informó que tenía la intención de recibir la vacuna COVID-19. La reticencia a la vacuna se asoció positivamente con estar casado, tener hijos y ser mayor. Los sujetos sin intención de vacunarse también tenían más probabilidades de no respetar el distanciamiento social y otras medidas de protección individual. **Conclusiones:** Nuestros hallazgos están en línea con los datos actuales de cobertura de vacunación

en RS. Debemos prestar atención a los grupos de población que no se adhieren a la vacunación. Reforzamos la importancia de la comunicación científica constante y la educación en salud para toda la población como aliados en el fortalecimiento de las políticas públicas de vacunación.

Palabras clave: Vacunas contra la COVID-19; COVID-19. Vacilación a la vacunación

Introduction

Since the beginning of the COVID-19 pandemic, there has been a race to develop a vaccine capable of effectively generating immunity against the virus. In fact, the process of developing, testing, and releasing an immunizer has never been faster in human history[1,2]. From the report of the first case, in China, until the application of the first vaccine, it took only a little more than twelve months. Although the vaccination process against COVID-19 has already started in most of the world in the first half of 2021, vaccination coverage rates are still very heterogeneous among different countries and regions [3]. In these sense, recent studies have highlighted several factors that were correlated with low rates of vaccination among some populational groups, including political and economic aspects, vaccine availability and distribution, and vaccine acceptancy and knowledge[4-7].

Vaccine hesitancy is not a new phenomenon in the world, as well as the antivaccine movements[8,9]. Due to the importance of having a high vaccination adherence among population as a public strategy to mitigate de COVID-19 impact, several studies around the world were performed to evaluate people´s intention to get vaccinated, and to identify factors that could be associated with vaccine hesitancy[10,11]. One multicenter study, for example, evaluated the vaccine acceptance rates of 13,426 respondents from 19 different countries, and found that 71.5% of them were likely or very likely to get vaccinated[12]. The percentage of respondents willing to get vaccinated ranged from 90% in China to less than 55% in Russia[12]. In general, sociodemographic variables, health conditions, and vaccine and COVID-19 knowledge and risk perception are associated with the vaccination acceptancy worldwide[6,12,13].

In Brazil, several epidemiological studies have reported a decline in the populational rates of vaccination during the last decade[14,15]. In this scenario, population hesitancy is being studied as one of multiple factors than can be influence vaccination coverage[16], and, therefore, could be an extra limitation to end the pandemic in the country. In this sense, to evaluate the population's intention to get vaccinated for COVID-19, and to identify population groups that are prone to not adhere to vaccination strategies is a major concern. Consequently, the aim of this study was to evaluate the intention of vaccination against COVID-19 among residents of Rio Grande do Sul (RS), Brazil, during the beginning of the campaign in the country, and to identify if sociodemographic variables and risk perception are associated with vaccine hesitancy.

Methods

This study was approved by the Institutional Review Board at Universidade do Vale do Rio dos Sinos, São Leopoldo, RS, Brazil (CAAE 43802021.0.0000.5344) and followed all the instructions and considerations of the

Declaration of Helsinki. All participants gave their consent to participate in the study upon the presentation of the free and informed consent form.

Study design and participants

A cross-sectional study was conducted by enrolling adults (aged ≥18 years) residents from the Rio Grande do Sul state, the southeast state of Brazil, using a web-based survey that was disseminated using social media platforms, including Instagram, Facebook, and WhatsApp. The enrollment of subjects started on March 8th, 2020, and ceased on May 5th, 2020. The snowball sampling technique, a nonprobability sampling method which yields a convenience sample, was used to recruit participants. A minimum sample size was estimated on 317 participants, considering a confidence level of 95%, statistical power of 80%, population size of 11.29 million inhabitants, and estimating a vaccination acceptance for COVID-19 of 71%[17]. In order to conduct further association analysis, the recruitment of a larger sample size was carried out.

From the disclosure on social media, potential participants were invited to enter a link that directed them to the online questionnaire. Initially, the Informed Consent Form was presented, which contained all the information about the project. By selecting to continue to the next page, the subject indicated consent to their participation in the study.

Instruments

A standardized questionnaire was built and pre-tested. The questionnaire was self-applicable and consisted of closed and open questions on the perception of the risk of COVID-19 and its vaccination according to the assumptions of the Diffuse Trait Theory[18-20]. The final questionnaire was built into three sections.

The first part of the questionnaire included questions about sociodemographic conditions (eg, age, gender, marital status), working conditions (eg, professional category), personal and professional aspects related to COVID-19 (eg, face-to-face work, social distancing), aspects related to the disease (eg, previous diagnosis), previous flu vaccinations, and intention to get vaccinated for COVID-19. General acceptance of a COVID-19 vaccine was measured by the following question: “Do you intend to get vaccinated against COVID-19?”, which presented yes or no as options of answer. Subjects who had already been vaccinated were instructed to answer yes in this question.

The second part of the questionnaire evaluated the general perception of risks and benefits of COVID-19 vs vaccination. In this sense, subjects were asked how they considered: i) the risk of getting infected by coronavirus; ii) the benefit of using individual protection equipment for preventing COVID-19; iii) the risks of COVID-19 vaccines, and iv) the benefits of COVID-19 vaccines. The possible answer ranged from (0) none to (4) high. In this section, they were also asked to range, from 0 to 100%, how likely they were to i) get contaminated by COVID-19; ii) develop a more severe form of disease if they 19 after being vaccinated.

The third part of the questionnaire evaluated participants comprehension about COVID-19 and vaccines. Several affirmatives regarding individual, familiar and commentary risks and benefits of COVID-19 and vaccination were presented, as well as affirmatives regarding biological comprehension of disease, vaccination development and testing, the trust of information, among others. For each affirmative, participants must answer as following (1) completely disagree (2) partially disagree, (3) not disagree neither agree, (4) partially agree, or (5) completely agreed.

All multiple-choice questions were designed in such a way as to require some answer, avoiding forgetting the respondent. Considering that the sample was of convenience and self-applicated, some questions of the questionnaire were repeated at different moments of the application for quality control.

Statistical Analysis

Categorical variables were presented as absolute frequency and percentages, while continuous variables were presented as media ± standard deviation or median [interquartile range], depending on their distribution. The univariate analysis was performed using an independent T-Student teste or Mann–Whitney U test for continuous variables and Chi-square test for categorical variables as appropriate. Prevalence ratios (PR) and 95% confidence interval were also calculated to show the association of independent variables with the intention to get vaccinated. All analysis considered a significant level of 5%, and were performed using the SPSS v.20.

Results

Sample characteristics and vaccine acceptance among participants

A total of 985 subjects answered the questionnaire, and 3 were excluded because they reported being < 18 years old. Of the eligible participants, 29 did not answered the question regarding their intention to get vaccinated, and were, therefore, excluded of the present analysis. Therefore, the final sample of the present study consists of 953 participants.

The final sample comprises participants aged between 18 and 68 years, with 70.8% being female. Most participants (79.5%) reported having a bachelor's degree or a higher level of education. Non healthcare workers accounted for 66.1% of the total participants, and 49.6% of the participants were working in person (**Table 1**).

Most participants (77.9%) reported not being infected by COVID-19, and 98.1% of the total sample affirmed that they were respecting the social distancing and using individual protection equipment, such as mask by the time they answered the questionnaire. A total of 37 participants (3.9%) reported they did not have the intention of taking the COVID-19 vaccine. The vaccine hesitancy was associated with being married, having children, and being older (**Table 1**).

Table 1. Sociodemographic characteristics of the sample (n=953) and its association with the intention to get vaccinated for COVID-19.

Variable	Total Sample (n = 953)		Intention to get vaccinated (n=953)				p-value
			Yes (n=916)		No (n=37)		
	N	%	N	%	N	%	
Gender							0.767
...Female	674	70.8	647	70.7	27	73.0	
Race (n=952)							0.948
...White	878	92.2	843	92.1	35	94.6	
...Brown	51	5.4	50	5.5	1	2.7	
...Black	15	1.6	14	1.5	1	2.7	
...Others	8	0.8	8	0.8	0	0	
Education level							0.835
...Primary School	17	1.8	16	1.7	1	2.7	
...High School	178	18.9	173	18.9	5	13.5	
...Higher Education	274	28.8	264	28.8	10	27.0	
...Technical Education	50	5.2	47	5.1	3	8.1	
...Post Graduation	434	45.5	416	45.4	18	48.6	
Marital Status (n=952)							0.011
...Married/living with a partner	521	54.7	492	53.8^{+}	29	78.4^{-}	
...Single	375	39.4	370	40.4^{-}	5	13.5^{+}	
...Divorced	44	4.6	42	4.6	2	5.4	
...Widow	12	1.3	11	1.2	1	2.7	
Children (n=951)							<0.001
...No	517	54.2	511	55.9^{+}	6	16.2^{-}	
...Yes, they live with me	316	33.2	295	32.3^{-}	21	56.8^{+}	
...Yes, but they don't live with me	118	12.4	108	11.8^{-}	10	27.0^{+}	
Risk group for COVID-19							
...Yes	282	29.6	268	29.3	14	37.8	0.262
Living with elderly or people in group risk (n=951)							0.177
...Yes	302	31.7	294	32.2	8	21.6	
Region of residence (n=951)							0.060
...Porto Alegre	332	34.8	326	35.7	6	16.2	
...Metropolitan Region	265	27.8	254	27.8	11	29.7	
...Countryside	201	21.1	191	20.9	10	27.0	
...Serra Gaúcha	153	16.1	143	15.6	10	27.0	
Health professional							0.789
...Yes	317	33.3	306	33.4	11	29.7	
On-site/presential work							0.160
...Yes	471	49.4	449	49.2	22	61.1	
Age*	36	27,0 - 49,0	36	27,0 - 49,0	45	37,5 - 56,5	**<0.001**

Qualitative variables were compared by chi-square test.
* Presented by median and interquartile range and compared by Mann-Whitney U test.
$^{+}$ Adjusted standardized residual > 1.96; $^{-}$ Adjusted standardized residual < 1,96

Having the intention to get vaccinated was more prevalent among those that were respecting social distancing and following individual protection recommendations (PR: 4.94; CI95% 1.49 – 16.3). However, there was no association between individual or familiar previous COVID-19 contamination and the intention of being vaccinated (**Table 2**).

Table 2 – Prevalence of previous coronavirus infection among participants, among their cohabitants, and following COVID-19 preventive indications and their association with the intention to get vaccinated for COVID-19.

Variable	Total Sample (n = 953)		Intention to get vaccinated (n=955)				p-value
			Yes (n=916)		No (n=37)		
	N	%	N	%	N	%	
History of COVID-19 contamination (n=951)							0.101
...No	741	77.8	715	78.2	26	70.3	
...Had symptoms, but wasn't diagnosed	69	7.2	63	6.9	6	16.2	
...Yes, was diagnosed	141	14.8	136	14.9	5	13.5	
History of COVID-19 contamination among someone who lives with the participant (n=951)							0.844
...No	682	71.7	657	71.9	25	67.6	
...Had symptoms, but wasn't diagnosed	42	4.4	40	4.4	2	5.4	
...Yes, was diagnosed	227	23.9	217	23.7	10	27.0	
Are you following distancing and individual protection indications? (n=952)							**0.005**
...No	18	1.9	15	1.6	3	8.1	
...Yes	934	98.1	900	98.4	34	91.9	
Frequency of following distancing and using personal protection equipment (n=934)							0.533
...Never	1	0.1	1	0.1	0	0	
...Not many neither few times	21	2.2	19	2.1	2	5.9	
...Many times, when go out	131	14.0	126	14.0	5	14,9	
...Always when go out	781	83.6	754	83.8	27	79.4	

Qualitative variables were compared by chi-square test.

Perceived risk on COVID-19 contagious and COVID-19 vaccination

The great majority of the respondents (96.6%) considered the risk of COVID-19 contagious as being medium or high. Respondents that considered COVID-19 contagious risk as none or small presented 3.58 times greater prevalence of vaccine hesitancy than those who considered this risk as medium or high (95%CI 1.35 – 9.51). Just 14.3% of the respondents considered the risk of COVID-19 vaccines being medium or high. As the same way, seeing a low the risk of COVID-19 vaccination as positively associated with the intention to get vaccinated (PR 1.27, 95%CI 1.16 – 1.39).

A total of 96.3% and 97.3% of the sample perceived a high or medium benefit of COVID-19 vaccines and individual protection equipment use (e.g., masks), respectively. Intention to get vaccinated were 30.6

times more prevalent among the individuals who perceived benefit of the vaccination (95%CI: 17.6 – 53.2) and 12 times more prevalent among individuals who perceived benefit of individual protection equipment use (95%CI: 6.9 – 24.2).

Discussion

In Brazil, the first vaccine for COVID-19 applied was the CoronaVac on January 17th, 2021, in the city of São Paulo. Almost one year after the beginning of the vaccination in the country, it is still difficult to massively reach the population – the country has approximately 67.2%[21] of the total population vaccinated, and the state of RS has 82% of the eligible population full immunized[22]. Thus, considering that the immunization against COVID-19 is currently the only effective tool to control the spread and lethality of the disease, and the major way to prevent the emergence of new variants of the virus, it is extremely necessary to understand the reasons for vaccine hesitancy and the lack of adherence to vaccination.

With the start of vaccination against COVID-19, multiple countries began to analyze the behavior and perspective of their population upon the vaccines, specifically regarding its acceptancy. According to data collected in different studies, it was noticed that the acceptability and adherence of vaccination campaigns against COVID-19 was not uniform, and may vary according to social, educational, and even religious factors[23-26]. In our study, we found a small percentage of individuals that reported no intention to get vaccinated, which are in line with the current epidemiological status of vaccination coverage in RS[22]. As shown in other studies[27], being married, having a low-risk perception of the disease, and not respecting the social preventive protocols (e.g., social distancing and use of masks) were associated with vaccine hesitancy among our sample.

In general, being married is considered as a protective factor for several health conditions and behaviors[28,29]. However, for vaccination intention, being married is appearing as a risk factor, with our study and others showing a higher prevalence of vaccine hesitancy among married persons[30]. In our study, having children was also a factor associated with a negative intention of getting vaccinated. This finding has important public health impact and could lead to a further concern regarding infant and children vaccination since are the parents who usually assumes this responsibility. However, it is important to highlight that the great majority of our participants who have children (90%) affirmed their positive intention to get vaccinated. In England, in a survey carried out with parents and guardians of minors, 55.8% of the participants answered that they had no doubts that they would have the vaccine as soon as it was available, and 34% answered that they had some doubts, but that they probably would anyway [34]. The same study also reported thar parents are more likely to accept or were leaning towards accepting a COVID-19 vaccine for themselves than for their child/children[31]

Age is being reported as an important factor for vaccine acceptability as well, but with contradictory results in different investigations. In our study, the median age of the subjects who reported no intention to get vaccinated was higher than those in the group with a positive intention. Younger age was also identified as a protective factor against vaccine hesitancy in other studies conducted with participants from France[32] and from low- and middle-income countries in Africa and America[33]. However, being young was reported as a

risk factor for vaccine hesitancy among samples from the United States of America[34] and from New Zealand[35] Therefore, it is important to consider the cultural and social differences of specific populations when considering the influence of age in such outcomes.

Behaviors, knowledge and experiences about COVID-19 and COVID-19 vaccines are also presenting associations with adherence to vaccination campaigns. Individually, according to the Diffuse Trait Theory, the decision-making process for getting vaccinated is related to knowledge and perceptions of risk regarding this behavior, but it also involves the values and principles of each person[19,20]. In our study, the group of participants with no intention to get vaccinated presented a higher proportion of subjects who were also not adhering to social distancing and to other social restrictions. In the same way, not perceiving COVID-19 risk and vaccine benefits was also associated with vaccine hesitancy. An online survey with more than ten thousand participants from low- and middle-income countries in Africa and America, including from Brazil, showed that the greatest chance of vaccination was among subjects who perceived vaccination as an important form of individual protection and among those who had a higher level of knowledge about the disease[33]. These findings highlight the need of massive informative campaigns regarding the vaccines, in order to instrument the population with information and to fight against fake news.

Some studies reported other variables as associated with vaccine hesitancy, such as level of education[32,33] and the presence of comorbidities[33], but we did not find differences for these variables in our sample. In this sense, it is important to note that our samples comprise a great majority of high educated individuals, which can impact on these results. The literature also showed the heterogeneity of acceptance of vaccination according to the place of production of the vaccine and the intention of vaccination in case the subjects had to pay for it[36,37], but our data did not include such variables. In this sense, it is important to considered that our study present some limitations. The fact of having a cross sectional study did not allowed us to investigate if the intention of getting or not getting the vaccines were consummated by the participants. However, it was possible to get a situational diagnosis of populational intention. Other important aspect was conducting the recruitment of subjects entirely by convenience via online platforms. This is probably the reason of the high level of education presented by our sample. Therefore, the data presented here should be analyzed with caution when generalizing for the population in RS. By the other hand, one interesting factor was that we were able to recruit individuals from all RS regions. Even with the present limitations, the proportion of subjects reporting the intention to get vaccinated in our sample (96.1%) is similar of the proportion of the eligible population in RS that took at least one dose (94.4%) until the present moment[22].

Conclusion

Although Brazil is one of the countries with the highest vaccination coverage rate in the world[38], we still find limitations to reach ideal rates, especially if we verify the discrepancy in the proportions between the first and second dose coverage. The incredibility in science, particularly with regard to the safety and effectiveness of vaccines, is not a new movement in modern society[9]. However, anti-vaccination movements seem to have

gained traction during the COVID-19 pandemic, impacting the acceptability and intention of vaccination in different proportions, depending on the population analyzed[39,40]. Since vaccination is the main way to control the pandemic, it is extremely important to identify the main determinants that lead to decision-making on vaccination, in order to guide managers and health professionals on health priorities and actions.

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