

Hesitation regarding the COVID-19 vaccine among medical students in Brazil

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SUMMARY

OBJECTIVE: This study aims to know the main determinants of hesitation to the vaccine against COVID-19 mentioned by medical students in Brazil.

METHODS: A cross-sectional study with 250 students who answered the online questionnaire between December 18, 2020 and January 8, 2021.

RESULTS: Most students (84%) mentioned the intention to take anti-COVID vaccine and 14% were hesitant. Information provided by governments (59.2%), the pharmaceutical industry (54.4%), and the press (51.6%) were the items that most generated vaccine hesitation.

CONCLUSION: In the context of the COVID-19, vaccine hesitation is an additional concern because adherence to vaccination is a recurring challenge. The category of contextual influences predominated among the main determinants of anti-COVID vaccine hesitation expressed by medical students in Brazil, disfavoring vaccine adherence in this public.

KEYWORDS: COVID-19. Vaccination refusal. Health literacy. Students, medical.

INTRODUCTION

The vaccine against COVID-19 is the preventive measure most awaited by the global population. Immunizers are being developed using various technological platforms, such as messenger RNA, and synthetic and modified particles, such as viruses, among others¹, originating immunobiologicals with different mechanisms of action for the same purpose.

The dissonance in this context is that a vaccine takes at least an average of 10 years to be released for consumption², which was not the case with anti-COVID vaccines. As a result, the increasing speculation contributed to raising doubts and divided opinions about accepting or refusing the vaccine.

In Brazil, the acceptance of vaccines has been decreasing since 2016, which may be due to experiences with vaccination, low health literacy, perception of the pharmaceutical industry,

and lack of information. As a result, vaccine-preventable diseases have increased in different Brazilian regions³.

Vaccination hesitancy, defined as the delay in accepting or refusing vaccination⁴, is an additional concern in the context of COVID-19. This is because vaccination adherence is a recurrent challenge in different segments of society, including Brazilian health professionals, which is verified by the low vaccine coverage against diseases such as hepatitis B⁵.

Although health care professionals and students have basic training on vaccines in general, a recent review study with medical students⁶ revealed a lack of knowledge about their own vaccine status. Another study⁷ with 39 physicians and 53 students from a medical school in Brazil found that most were in favor of nonmandatory vaccination, considering it reasonable

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to respect the desire of someone who refused to have themselves or their children vaccinated.

According to the National Curricular Guidelines for medical programs in Brazil⁸, students must experience health services from the early semesters, thus being exposed to a higher risk of immunopreventable diseases. Intensified by the COVID-19 pandemic, this problem raised the following question: how do medical students formulate their opinions regarding anti-COVID vaccination? The importance of exploring this topic lies in the fact that their vaccination aims at both protection against contamination during the program's practical activities and their inclusion in the taskforce of health professionals working during the pandemic.

Moreover, even knowing that vaccine hesitancy varies according to the time and is specific to each context and that vaccine literacy resulting from necessary information ensures the right and autonomy in decision-making⁹, this study identified the main determinants of hesitancy regarding the COVID-19 vaccine reported by medical students in Brazil.

METHOD

This cross-sectional study uses the opinion survey method without identification of participants, as provided for in Resolution 510/2016 of the National Health Council, which was conducted by posting an electronic questionnaire and a request for disclosure on a fanpage of directories of medical students. Virtual snowball sampling, which uses social media for data collection, was employed.

Data collection began on December 18, 2020, after the Supreme Court ruled that COVID-19 vaccination would be compulsory in nature in Brazil, and ended on January 8, 2021, when the Butantan Institute and Fiocruz submitted an authorization request to Anvisa for the emergency use of the CoronaVac/Sinovac and Oxford/AstraZeneca vaccines in Brazil.

The data obtained from the questionnaires were analyzed using BioEstat 5.0 software. Descriptive statistics, Pearson's chi-square, and G-tests (Williams) were used to evaluate the associations between the variables, and the results were classified according to the three categories of influences proposed by the World Health Organization (WHO) Matrix of Determinants of Vaccine Hesitancy:

- (1) contextual, encompassing aspects of communication mediated by influential people, policy, and perception of the pharmaceutical industry;
- (2) individual and group, through personal or family experiences with vaccines; and
- (3) vaccine/vaccination-specific, encompassing topics related to immunizers⁴.

RESULTS

The study included 250 students, of which 58.5% (n=147) were females, aged between 18 and 25 years (n=209; 83.6%), belonging to the basic cycle (n=125; 50.0%), clinical cycle (n=102; 40.8%), and internship (n=23; 9.2%) and attending public higher education institutions (HEIs) (n=146; 58.4%). The Northeast region had the highest percentage of participants (n=125; 50%), followed by the Southeast (n=66; 26.4%), South (n=17; 6.8%), North (n=14; 5.6%), and Midwest (n=08; 3.2%). Cases of COVID-19 or infected family members were reported by 66.4% of students, and 35.2% said they knew someone who had died from the disease.

Most students (84%) expressed the desire to be vaccinated, and 14% were hesitant. Information provided by governments (59.2%), the pharmaceutical industry (54.4%), and the press (51.6%) were the items that caused most vaccine hesitancy. Conversely, 93.2% of the participants showed confidence in the development process of anti-COVID vaccines, and 66.4% were in favor of mandatory vaccination (Figure 1).

Students from public and private HEIs reported doubts about the new coronavirus (61 and 64.4%; p=0.0004) but stated that they would have the vaccine when it became available to the population (89 and 76.9%; p=0.04) (Table 1).

DISCUSSION

The main determinants of hesitancy regarding the COVID-19 vaccine revealed the great variety of aspects that influence how the medical students viewed vaccination.

Similar to other studies¹⁰, the high percentage of students in favor of vaccination indicates confidence in immunobiologicals and the perception of risk of acquiring the disease when not immunized. Conversely, differing from other studies¹¹, the hesitant students cited topics peculiar to the pandemic scenario in Brazil, highlighting political issues involving access to vaccines, which demonstrates that contextual influences overlay individual and specific experiences of vaccination.

Although these results are encouraging when compared to those in a medical school in the United States, where 23% were undecided¹², 2% of students who were against vaccination should be considered. This may be due to the anti-vaccination movement, which, although having greater influence in North America and Europe, may constitute a potential barrier to the effectiveness of vaccination in Brazil¹³. When attending health services in training activities, these students are more vulnerable to contagion when they are not vaccinated and are potential hidden reservoirs for COVID-19¹⁴.

Contextual influences were expressed through the low level of confidence in some information media in Brazil, with

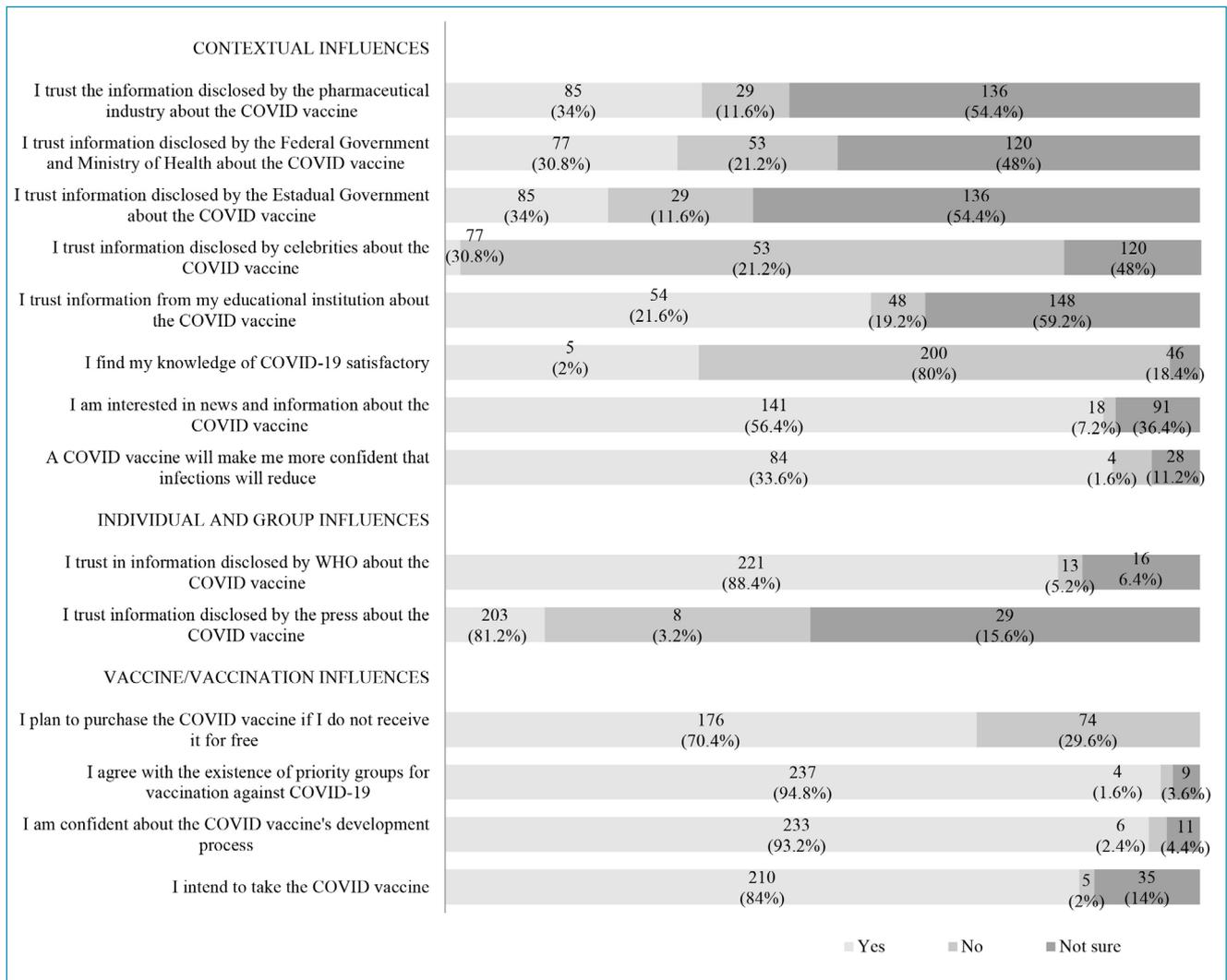


Figure 1. Vaccine acceptance, refusal, and hesitancy among medical students.

hesitancy being mostly attributed to the pharmaceutical industry and the three spheres of government. Similar to the results revealed in a study with Americans, this aspect, which considered the support from the government of the country as a way to increase the acceptance of vaccination¹⁵, surpasses the technical and individual limits of the vaccine decision processes and establishes deep interfaces with economic and political issues.

Students considered HEIs reliable sources of information about COVID-19. These findings support the social responsibility agenda of these institutions, which are strategic locations for the promotion of educational interventions that increase behavioral trust in this group¹⁶, as adolescents and young adults are included as an eligible group for vaccination in some Brazilian states.

Knowledge about COVID-19 and interest in the topic also exerted a contextual influence on the students. These results

are similar to a study conducted in France with students from 32 medical universities. More than one-third were not confident in explaining the risks and benefits of vaccines to patients, revealing gaps in medical education¹⁷.

Information provided by the WHO and news reported by press media also affected the students' vaccination decisions. This lack of synchrony between information and viral contamination leads to government instability and misinformation, accelerating the epidemic outbreak and weakening trust in institutions¹⁸. Such situations, exacerbated by fake news that raise doubt on the scientific validation of vaccines, can make students less prone to follow legitimate health guidelines and take proven preventive measures¹⁹.

The students' personal reports about the existence of cases and deaths of family members from COVID-19, which was also found in other studies²⁰, may have influenced their opinions,

Table 1. Association between items regarding the COVID-19 vaccine and the groups of interest.

Item	Groups	Answers			p-value*
		Yes (%)	Not sure (%)	No (%)	
Do you consider your knowledge about COVID-19 satisfactory?	Type of program	Yes (%)	Not sure (%)	No (%)	p-value*
	Public	47 (32.2)	89 (61.0)	10 (6.9)	0.0004
	Private	37 (35.6)	67 (64.4)	0	
	Total	84 (33.6)	156 (62.4)	10 (6.9)	
Would you have a vaccine that has been authorized for use in Brazil?	Type of program	Yes (%)	Not sure (%)	No (%)	p-value*
	Public	130 (89)	14 (9.6)	02 (1.4)	0.04
	Private	80 (76.9)	21 (20.1)	03 (2.9)	
	Total	210 (84.0)	35 (14.0)	05 (2.0)	
	Period of the program	Yes (%)	Not sure (%)	No (%)	p-value*
	Basic	103 (82.4)	20 (16.0)	02 (1.6)	0.68
	Clinical	86 (84.3)	13 (12.8)	03 (2.9)	
	Internship	21 (91.3)	02 (8.7)	0	
Do you trust the information given by our educational institution about COVID vaccines?	Period of the program	Yes (%)	Not sure (%)	No (%)	p-value*
	Basic	73 (58.4)	46 (36.8)	06 (4.8)	0.47
	Clinical	56 (54.9)	35 (34.3)	11 (10.8)	
	Internship	12 (52.2)	10 (43.5)	01 (4.5)	
	Total	141 (56.4)	91 (36.4)	18 (7.2)	
Do you consider that vaccination against COVID-19 should be mandatory?	Period of the program	Yes (%)	Not sure (%)	No (%)	p-value*
	Basic	85 (68.0)	20 (16)	20 (16)	0.50
	Clinical	67 (65.7)	13 (12.8)	22(21.6)	
	Internship	14 (60.9)	06 (26.1)	03 (13)	
	Total	166 (66.4)	39 (15.6)	45 (18.0)	

*G test (Williams).

favoring vaccine acceptance, as the still persistent epidemiological panorama of COVID-19 indicates that without specific vaccine protection, the disease can quickly spread among people and cause irreparable damage to society²¹.

Specific aspects of the vaccine/vaccination were the factors that contributed less to hesitancy. The development of vaccines was a positive aspect for vaccine acceptance, even with some of the students disbelieving or being unsure about the manufacturing process of immunizing agents. These results differ from the hesitations that would be expected in this group, such as those reported by health professionals who mentioned side effects, vaccine efficacy, and virus mutation potential as the main determinants^{22,23}.

None of the students indicated the acquisition of an anti-COVID vaccine with their own financial resources, if it was not provided by the public administrators, as a cause for hesitancy,

but this item was rejected by some students. Situations that make it difficult to offer these vaccines include the absence of national planning, slow negotiations with manufacturers, and political disputes between the federal government and state managers. Added to the presidential discourse that presents vaccination as an individual choice and encourages the population to distrust a particular immunizing agent²⁴, these obstacles place the pandemic in a challenging context that impact their willingness to take the vaccine, even if it is necessary to acquire it with their own financial resources.

Although most of the students agreed with the prioritization of groups for vaccination against COVID-19, some were hesitant. It is clear that a vaccination plan with priority groups was established due to the insufficient number of immunizations purchased by the federal government. However, even though it is acceptable the most vulnerable are vaccinated first, efforts

should be made to ensure a vaccination scheme that encompasses all the population, given that, even among health professionals, coverage with the second dose is still insufficient, as it represents 55.9% of those who received the first dose²⁵, indicating poor vaccination performance in Brazil.

Even in the face of this increasingly worrying scenario, the existence of an anti-COVID vaccine by itself will not be enough to eliminate vaccine hesitancy among populations²⁴, as the elements involved in this process bring the confrontation between technical-scientific, sociocultural, political, and economic aspects to the core of the pandemic, resulting in the temporal unpredictability that will mark its end.

CONCLUSIONS

This study revealed multifaceted aspects that influence the opinions of medical students on the reliability of anti-COVID vaccines and acceptance of vaccination. Contextual influences

were the main determinants of expressed hesitancy, to the detriment of vaccine adherence in this group. These findings indicate the need for strategies that promote vaccine literacy and vaccination, contributing to students' biosafety in teaching and learning scenarios.

AUTHORS' CONTRIBUTIONS

ÍESC: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **PRPB:** Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **MRCM:** Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **JGBAR:** Formal analysis, Writing – original draft, Writing – review & editing. **ELC:** Formal analysis, Writing – original draft, Writing – review & editing. **MSC:** Formal analysis, Writing – original draft, Writing – review & editing.

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