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Acceptance towards COVID-19 vaccine: A cross-sectional study in the Dominican Republic.

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Abstract:

Introduction: The Coronavirus Disease 2019 (COVID-19) pandemic has hit globally, both economically and in the collective health, leaving irreparable human losses. In addition to preventive measures such as the use of masks and physical distancing to mitigate the ravages of the pandemic, the method of immunization through vaccines has been applied, the health cabinet of the Dominican Republic (DR) began with the national vaccination campaign against COVID-19 "Vacúnate RD", to establish a quicker herd immunity and thus reduce morbidity and mortality.

Objective: To determine the acceptance of the population regarding the vaccination process and the proposal of a third dose by the Public Health authorities in the DR.

Methods: A descriptive, prospective, cross-sectional study, carried out in a 10-day collection period, which consisted of an online survey with 20 questions, divided into 3 sections and written in Spanish, the official language of the country.

Results: With a total of 1096 valid answers for the statistical analysis, regarding the immunization schedule, 55.9% consider that it should not be mandatory. At the time of the survey, 6.7% had not been applied any dose from the vaccine, 7.6% had the first dose, 81.9% (n=898) had completed their scheme with the second dose, and 41 participants reported having received the third dose; the most applied vaccines among those surveyed were Sinovac (68.2%, n=747), AstraZeneca (19.6%, n=215) and Pfizer (3.8%, n=42). 41.1% (n=451) responded affirmatively to the idea of an eventual application of a third dose vaccine, while 31.5% do not feel safe to apply said, "booster dose" and 27.4% responded negatively to this idea.

Conclusion: In general, an acceptance was observed in the study population of getting the vaccine against COVID-19, trusting its protective effects, although there is still a high percentage of people who expressed doubts regarding the idea proposed by the health authorities in the DR about completing the third dose as a reinforcement of the immunization scheme already established worldwide by the relevant health organizations.

Keywords: Vaccine, COVID-19, Third Dose, Acceptance, Dominican Republic

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INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) pandemic has had a worldwide impact, both economically and in collective health, resulting in more than 4.7 million deaths and 231 million cases reported to date (Johns

Hopkins University, 2021). During this period, multiple precautionary measures have been adopted, such as physical distancing, use of protective masks, and monitoring of suspected and active cases of COVID-19, in addition to the policies proposed by the different

public health organizations applied worldwide, such as preventive and mitigating regulations for the spread of the virus (Li et al., 2021; Walter et al., 2020). To buffer the collateral effects of the COVID-19 pandemic, different laboratories and pharmaceutical companies acted by creating different vaccines to achieve the immunization of the population worldwide and therefore reduce mortality. This has resulted in striking mass vaccination campaigns in numerous countries, with the first vaccine being approved in the United Kingdom on December 2, 2020, based on a randomized clinical trial (Ledford et al., 2020; Polack et al., 2020).

Taking into consideration the time for the development and approval of vaccines historically, those registered for this disease have been created with haste and priority; however, the efficacy rates have been acceptable for some, and there are others that are still in progress, in the final stages of approval for mass production and use in humans (Polack et al., 2020; Voysey et al., 2021; Baden et al., 2021; Logunov et al., 2021; Tanne, 2020; Zimmer et al., 2020). Since the 18th century, vaccination has been an active immunization method in the prevention and eradication of infectious diseases of viral origin, reducing morbidity and mortality in the vaccinated population or through the establishment of herd immunity (Hussein et al., 2015; Fine et al., 2011).

Governments and health organizations worldwide have the mission of guaranteeing the distribution and creating logistics for the application of the vaccine against this disease, in a massive and equitable way, however, there are anti-vaccine movements that promote postmodern thinking, which has already questioned the collateral effects of vaccination, fueling the rejection of the population to be vaccinated (Dubé et al., 2013; Kata et al., 2012; Kane, 1998).

Developing proactive communication for decision-making requires the collection of accurate and up-to-date information, knowing the attitude and acceptance of the population regarding the vaccination process. According to official data, in the Dominican Republic (DR), in their data presented from the national vaccination campaign against COVID-19 "Vacúnate RD", until September 25th of the current year, a total of 11,782,825 vaccine doses had been applied and of these, a total of 6,027,322 represent the first dose; 4,826,748 the second dose and 892,75 the booster dose (MISPAS, 2021). The decision of the Dominican public health authorities on the expansion of the pre-established vaccination schedule against COVID-19, adding a third dose, has opened a debate, and

questioning between the medical community and the general population in the country (Quiroz, 2021). Especially when entities such as the Pan American Health Organization and the World Health Organization (PAHO/WHO) highlight the great management in the vaccination campaign in the DR, but on the other hand, they emphasize that there is no scientific evidence so far as for recommending booster doses (PAHO/WHO, 2021).

The objective of this cross-sectional study is to determine the acceptance of the Dominican population regarding the vaccination process nationwide and the third dose proposed in July 2021 by the public health authorities in the DR.

MATERIALS AND METHODS.

A descriptive, prospective, cross-sectional study using theoretical sampling was carried out in a 10-day collection period to determine the attitude and acceptance of the population regarding the COVID-19 vaccine use in the population and towards the mandatory application of a third dose in the DR.

The study was directed to all permanent residents in the DR. over 18 years of age, who agreed to participate by virtually signing the informed consent, answering a maximum of 20 questions, received by their mobile phones using a link <https://docs.google.com/forms/d/ea> through the WhatsApp application, which was advertised through social media and using referements from doctors from different hospitals from the territory in DR, that shared the link of the questionnaire to their patients if they agreed to take part in the investigation.

The questionnaire which was generated for this particular study alone, consists of three segments of questions written in Spanish, being the official language of the country; collecting in the first segment personal, sociodemographic, educational, and professional data of the participants through 8 questions, a second segment with 3 closed questions using a likert scale like, where the acceptance level of the population about the third dose, and 9 others related to the vaccine in general, were looked at, and in the last segment, comprehends responses related to the type and side effects of the vaccine according to the dose applied. The questionnaire was sent using the non-probability convenience sampling method and the snowball method.

The data gathered from the questionnaire were handled strictly by the investigators, to avoid any breach of confidentiality as stated in the informed

consent form; all the personal data from the participants would be saved under a password, that only the investigators would have access to and after a period of time of 1 year after the publication of the results, all of this data would be deleted to have a secure data management system.

The results obtained were tabulated in Excel 2020 and analyzed in SPSS 26. All variables will be described through descriptive statistics through relative and absolute frequency for categorical variables, along with using mean, mode, and standard deviation for the continuous variables.

Results

Of a total of 1134 respondents, 1099 people (96.9%) answered affirmatively to participate in the study, and 1096 met the inclusion criteria for the effectiveness of 96.6%. (**Table 1**). A predominance of the female gender was observed (n=658; 60%) while the remaining 39.7% (n=435) were male, and 0.3% (n=3) preferred not to identify their gender. The range of age of the

participants was between 18-74 years (mean: 37 years). Single people represented 44.7% (n=490), followed by married people with 40.8% (n=447).

The participants were mainly distributed in Santiago de los Caballeros 44.5% (n=488), Distrito Nacional 18.5% (n=203), Santo Domingo 7.9% (n=87), La Vega 5.7% (n=63), Espaillat 4.6% (n=50), Valverde 3.6% (n=40), and Puerto Plata 3.3% (n=36).

Regarding the highest educational level achieved, 31.5% (n=345) have obtained a bachelor's degree level, 20.9% (n=229) doctorate, 27.5% (n=301) have a master's level, 1.9% (n=21) has accomplished a PhD; furthermore, the rest of the respondents are divided between people who did not attend school, technicians and who have completed high-school or elementary school. 14.7% (n=161) are unemployed; the remaining 85.3% actively work in the public, private sector, or independently. A total of 43% (n=471) of participants are health personnel.

Around 41.1% (n=451) responded affirmatively to the idea of an eventual application of a third dose of the COVID-19 vaccine; 31.5% are not sure, (n=345), and the remaining 27.4% (n=300) responded negatively to the idea of applying a third booster dose (**Table 2**). Respecting the acceptance towards a third dose based on the gender, 34% (n=224) of female agree with the application of a booster dose, while 66% (n=434) are against or just not sure or receiving, conserving the male gender 52.2% (n=227) responded affirmatively on the booster dose idea and 47.8% (n=208) responded no or that they are unsure of the application of the third dose of a COVID-19 vaccine.

Regarding the idea that vaccination schedules could be mandatory, 38.3% (n=420) agree, 5.7% (n=63) are hesitant, and 55.9% (n=613) of the study population answered no.

As much as 56.4% (n=618) agreed that the COVID-19 vaccine should be applied to minors, 9.1% (n=100), are not sure, 20.7% (n=227) said their decision would be based on the local health authorities' recommendations, and 13.8% (n=151) entirely disagree with this idea.

The safest sources of information about this vaccine were told to be: physicians (42%; n=519), international sources (34%; n=420), traditional media 8% (n=102); the rest include scientific journals, social networks, the information provided by WHO / PAHO and scientific research in general.

Of the total of 1096 responses, 6.7% of the participants (n=73) expressed that they had no dose of the vaccine applied, while 93.3% (n=1023) had already

VARIABLE	N=1096
	RANGE (Media)
Age	18 – 74 years (37 years)
VARIABLE	FRECUENCY
Gender (%)	
Female	658 (60%)
Male	435 (39.7%)
Marital Status (%)	
Married	447 (40.8%)
Single	490 (44.7%)
Co-habitant	146 (13.3%)
Widowed	13 (1.2%)
Higher educational level achieved (%)	
Bachelor degree	345 (31.5%)
Doctorate	229 (20.9%)
Masters Degree	301 (27.5%)
phD	21 (1.9%)
Elementary School	3 (0.3%)
High-School	124 (11.3%)
Technical	73 (6.7%)
State of residency in the D.R. (%)	
Santiago de los Caballeros	488 (44.5%)
Distrito Nacional	203 (18.5%)
Santo Domingo	87 (7.9%)
Espaillat	50 (4.6%)
La Vega	63 (5.7%)
Valverde	40 (3.6%)
Puerto Plata	36 (3.3%)
Monseñor Nouel	17 (1.6%)
Others	112 (10.3%)
Working Area (%)	
Unemployed	161 (14.7%)
Independent	125 (11.4%)
Private and Public Sector	187 (17.1%)
Private Sector	315 (28.7%)
Public Sector	308 (28.1%)
Health Personnel (%)	
Yes	417 (43%)
No	625 (57%)

Table 1. Participant's description

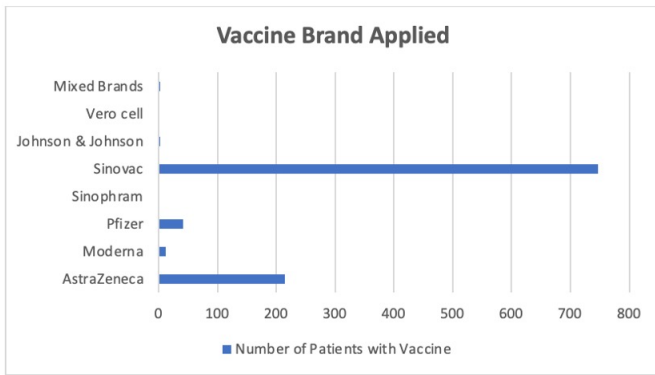


Figure 1. Vaccine Brand Applied

been vaccinated, either with the first dose (n=83; 7.6%), the second dose 81.9% (n=898) and 3.7% (n=41) would have already completed the booster dose. Among the types of vaccines used by the respondents mainly are Sinovac with 68.2% (n=747), AstraZeneca with 19.6% (n=215), Pfizer 3.8% (n=42), Moderna 1.1% (n=12), and the remaining had some dose of the vaccine manufactured by Johnson & Johnson, Sinopharm or Vero cell; It should be noted that several participants report having two doses of the Sinovac vaccine and a third dose of the Pfizer-type vaccine at the time of filling out the questionnaire (Figure 1).

In reference to the vaccinated participants, 36.6% (n=401) report having experienced symptoms after getting the vaccine, 25.5% (n=280) with the first dose, 10.3% (n=113) at the second dose, and 0.7% (n=8) with the application of the third dose (Figure 2); of these 401 participants, 5.3% (n=58) required outpatient medical attention and 0.4% (n=4) were hospitalized. Regarding the type of vaccine related to the presentation of adverse effects in the first dose applied, it was noted that 67% reported some symptoms with AstraZeneca, 58.3% with Moderna, 52.5% with Pfizer, and 30% with Sinovac.

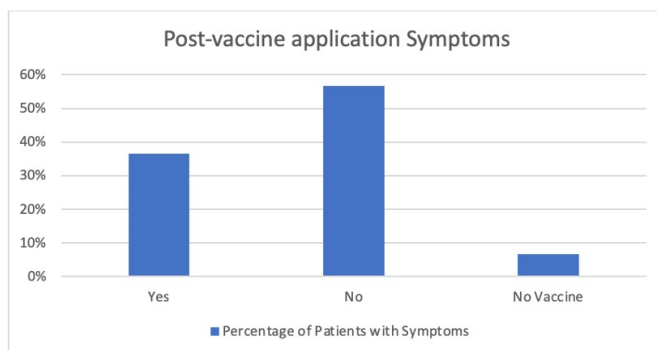


Figure 2. Participants presented side-effects after a vaccine?

Among the most frequent symptoms experienced after a dose of the vaccine are, in order of frequency: headache (51.9%), fatigue (50.1%), fever (42.1%), myalgia (41.1%), sensitivity around application (37.4%), general malaise (35.9%), weakness and chills (32.7% each), dizziness (15.7%), nausea (10.7%), sore throat (8.7%), skin allergies and diarrhea (6.2% each), respiratory distress (5.2%) and cough (4.5%). Some, presented to a lesser extent, include vomiting, tachycardia, sustained erection, sleep, and anosmia. (Figure 3).

Regarding the rate of infections before or after the application of the vaccine, a 20.7% (n=227) referred be afflicted with COVID-19 before getting any dose of the vaccine, up to 1.8% (n=20) were infected with the virus after having the first dose of the vaccine, 2.6% (n=29) of the participants got COVID-19 after the second dose and 68.2% (n=747) up to the date of their inclusion in the trial have not been infected with the virus. Respondents vaccinated with Sinovac had a higher infection rate after the first dose (2.3%); however, regarding the population that got the virus after the second dose, the contagion rate was higher with those that got shots of AstraZeneca (2.8%); relating to other vaccines.

Discussion

An online survey was conducted to determine the attitude and acceptance of the Dominican Republic population about the vaccination process and the third dose proposed by the public health authorities in the DR, yielding the following results.

The two cities with the highest participation were Santiago and Santo Domingo due to their large population and the increased contact reach of the pollsters through their social networks.

1099 participants (96.9%) out of the total 1134 answered affirmatively to participate in the study, and 1096 met the inclusion criteria, so the reached effectiveness was 96.6%. A greater participation of the female gender, single, highly educated, employed, and with a high rate of health personnel was observed.

More than half of the respondents, mostly women, do not agree or are not sure with the application of a third dose, with the immunization schedules offered by the authorities, nor with the idea of their mandatory nature; results that agree with a study carried out on the level of acceptance of the vaccine at the beginning of the pandemic, showing a greater rejection among women, conducted in the United States of America (Malik et al., 2020).

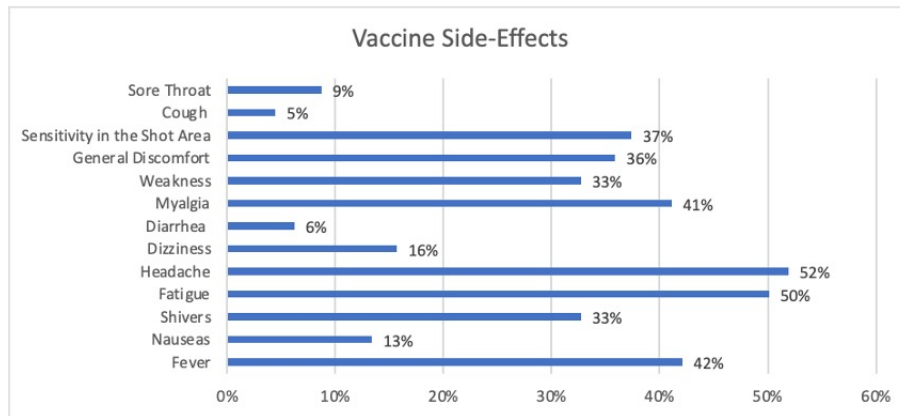


Figure 3. Vaccine Side-Effects presented by participants.

Concerning the sources of information on the COVID-19 vaccine preferred and considered to be the safest and most reliable, the opinion of and shared by the medical doctors stands out, confirming the decisive role of physicians in guiding the general population on different aspects in times of pandemic.

Despite the fact that a high proportion of the respondents were vaccinated at the date of this study, it is prudent to clarify that this information does not reflect the reality of the general population in the Dominican Republic since most of them belong to the healthcare area, to whom the application of the vaccine was prioritized for being part of the high-risk population, additionally with the high level of education of the participants, which could justify the observed results (MISPAS, 2021).

More than a third of those surveyed reported suffering side effects after the application of the vaccine, especially with AstraZeneca and Moderna vaccine brands, of which a minimal share required medical attention in outpatient clinics and hospitalizations in a minor proportion.

The predominant side effects were headache, fatigue, and fever, respectively, coinciding with reports from the Philippine health department where the vaccine brands of Sinovac and AstraZeneca were also applied in the same way as in the DR. (Republic of the Philippines Department of Health, 2021).

Is of utmost importance to talk about the protective effect of the vaccine in the population surveyed after the first dose and how the results suggest an increase in infections with the COVID-19 after the second dose, presumably due to the arrival of new variants in the territory, or overconfidence in their health among the study population.

Due to the current debate on back-to-school and face-to-face teaching, the acceptance of vaccinating

minors is questioned, where more than half agree and the rest have doubts and give negative answers, evidencing the existing weaknesses represented in the study population.

Along the way of this trial some limitations were found that could have been the cause of introduction of some bias, as selection bias, because of not being able to acquire the voting registry of the Central Electoral Board to perform a simple random sampling method, including all the over 18 years of age population from the DR, which could also show a sampling bias as a possibility, this could have been the reason on why the majority of the population were from the two biggest cities in the country on which the authors had the most of the collaborators that helped to distribute the study questionnaire.

Taking into account the fact that surveys are opinions of the population, prone to changes in a dynamic way, depending on the information received by the respondents each day; could have been a limitation based on the design of the trial, being a cross-sectional study and not allowing the respondents to change their response, in case they have changed their mind regarding their opinion on behave the acceptance over the COVID-19 vaccine. Other limitations found were linked to the platform used for the questionnaire using the Google forms platform, where only people with internet access and a Gmail account could take part in the study; which coming from a poor country not all possible participants meet the requirements in order to access the internet or own an email. Lastly, a large proportion of the participants were from higher academic levels than the national average, showing a disproportion that might have influenced the questionnaire's responses.

Presenting information regarding post-vaccination symptoms, side effects, and the proportions

of each vaccine type that was applied to the vaccinated population from the study sample from the DR aids the general population from this country to own a source of information with enough representativeness from which education can be done and share, hoping for a change of mind in those that see the vaccine negatively, but also show proper data to those that are researching about their protective effects and how the different COVID-19 vaccines' behavior has been up to the date of this trial. Pooling with the diffusion of the results from this trial to the health local authorities in an effort to guide the last decision of making vaccination schedules mandatory and the use of a third dose as a booster dose for the scheme.

CONCLUSIONS

Considering the obtained results, a considerable general acceptance was evidenced, despite all the secondary effects of the vaccines expressed by the respondents, with higher participation of women who had a lower level of acceptance towards the vaccine than men. On the other hand, a high percentage of doubts and rejection were noted against the third dose. There was a high rate of rejection of the mandatory nature of the immunization schedule; however, the administration of the vaccine to minors was favored. Medical doctors were considered the most reliable source of information.

Given the findings of this analysis, it is suggested to apply a questionnaire to every subject at the time of vaccination in each center, with the aim of achieving a broader vision and a larger representation of the population from the DR regarding the acceptance and obtaining the necessary information to improve the processes of immunization in possible future scenarios.

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Conflict of interests

The authors do not have conflicts of interests to declare.

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