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ADVERSE EFFECTS AFTER VACCINATION AGAINST SARS-COV-2 (COVID-19) IN DOWN SYNDROME ADULTS

EFEITO ADVERSO PÓS-VACINAÇÃO CONTRA A COVID-19 EM ADULTOS COM SÍNDROME DE DOWN

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Study approved by the Ethics Committee of Nove de Julho University protocol number (48482721.4.0000.5511), São Paulo, Brazil.

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Abstract

Introduction: Comorbidities in adults with Down syndrome are common making them a risk group for COVID-19. Thus, vaccinating against COVID-19 becomes necessary, but requires care against possible side effects.
Objective: To investigate possible adverse effects after vaccination against COVID-19 in adults with Down Syndrome (DS).
Methodology: Descriptive study in which ninety-seven adults diagnosed with DS were interviewed using a questionnaire containing seventeen questions related to personal and historical data, and seven questions related to vaccination.
Results: The most applied vaccine was AstraZeneca (94%), Pfizer (4%), and CoronaVac (2%); 74% of the subjects had adverse effects, the most frequent after the first dose being pain at the injection site (65.3%), fever (37.9%), muscle pain (37.8%), malaise (29.5%); in the second dose there was a decrease in these adverse effects; 95% of symptoms disappeared after the first 24 hours following application.
Conclusion: More than half of the individuals interviewed had adverse effects after the application of the first dose of the vaccine, decreasing with the second dose; the most frequent was pain at the site of application.

Keywords: Down syndrome. Vaccines. COVID-19. Adverse effects.

Resumo

Introdução: Comorbidades em adultos com síndrome de Down são comuns tornando-os um grupo de risco para COVID-19. Dessa forma, vacinar contra a COVID-19 torna-se necessária, mas requer cuidados contra possíveis efeitos colaterais.
Objetivo: Pesquisar possíveis efeitos adversos após vacinação contra COVID-19 em adultos com Síndrome de Down (SD).
Metodologia: Estudo descritivo no qual 97 adultos diagnosticados com SD foram entrevistados por meio de um questionário contendo dezessete questões relacionadas a dados pessoais e histórico, e sete questões relacionadas à vacinação.
Resultados: A vacina mais aplicada foi a AstraZeneca (94%), Pfizer (4%) e CoronaVac (2%); 74% dos sujeitos apresentaram efeitos adversos, sendo os mais frequentes após a primeira dose: dor no local da injeção (65,3%), febre (37,9%), dores musculares (37,8%), mal-estar (29,5%); na segunda dose houve diminuição desses efeitos adversos; 95% dos sintomas desapareceram após as primeiras 24 horas após a aplicação.
Conclusão: Mais da metade dos indivíduos entrevistados apresentou efeitos adversos após a aplicação da primeira dose da vacina, diminuindo com a segunda dose; a mais frequente foi a dor no local de aplicação.

Palavras Chaves: Síndrome de Down. Vacinas. COVID-19. Efeitos Adversos.

Introduction

In December 2019, a new coronavirus, SARS-CoV-2, was identified after a reported outbreak in Wuhan, China(1). This virus is responsible for COVID-19, a disease whose symptoms may be mild, such as loss of smell and taste (1,2) to severe, such as Acute Respiratory Distress Syndrome (ARDS) and sepsis, which may end in the death of the individual (3–5).

The spread of the Sars-CoV-2 virus occurs rapidly through direct contact with respiratory droplets (6). Thus, on January 30, 2020, the World Health Organization (WHO) declared COVID-19 as a pandemic, a public health emergency of international interest, the highest level of alarm and published recommendations to reduce contamination, including accelerating the production of vaccines (7).

In December 2020, the UK Medicines and Health Products Regulatory Agency (MHRA) granted temporary regulatory approval for the Pfizer–BioNTech vaccine (8,9), thus becoming the first country to approve the vaccine and the first country in the Western world to approve the use of any vaccine for COVID-19 (10). Currently, in Brazil, there are four vaccines approved by the Ministry of Health for emergency use, ChAdOx1 nCoV-19/AXD1222 (AstraZeneca/Oxford) using viral vector technology with chimpanzee adenovirus that is genetically manipulated to insert the gene of Sars-CoV-2's "Spike" protein (protein "S") (11); Janssen- Cilag/Ad26.COV2.S also uses viral vector technology, but with a specific type of adenovirus that has been genetically modified so as not to replicate in humans(12); Pfizer/BioNTech/BNT162b2 which is based on synthetic messenger RNA technology, or mRNA, that gives the body instructions to produce proteins found on the surface of the new coronavirus, stimulating the immune system response(13); and CoronaVac/Sinovac- Biotech (14) with inactivated virus technology.

Vaccination is the most effective strategy for preventing pandemic diseases and events (15), as it requires research with a high standard of safety before its use. It, however, may still have some adverse effects (16).

An adverse effect is defined as "any unpleasant medical occurrence that occurs during the administration of a vaccine or after immunization and that does not necessarily have a causal relationship with the use of the vaccine. The adverse effect can be any unfavorable or unintentional sign, an abnormal laboratory finding, a symptom, or a disease" (17).

As COVID-19 is a new disease and vaccination has only recently begun, adverse effects in all populations and age groups are not yet fully known. Thus, this study aims to describe which vaccines were applied in Brazilian adults diagnosed with Down Syndrome (DS) and to

report possible adverse effects resulting from vaccination against COVID-19. The importance of this study is that this population has lower immunity and a higher frequency of comorbidities that are part of the risk factors for COVID-19 when compared to the healthy population of the same age group (18).

Methodology

This is a cross-sectional, descriptive, and exploratory epidemiological study in which ninety-seven adults with Down Syndrome and their caregivers were interviewed using a questionnaire sent by e-mail, WhatsApp, or social media. The study was approved by Nove de Julho University's Ethics Committee on Human Research, São Paulo, Brazil (CAAE: 48482721.4.0000.5511)

Participants were recruited using convenience sampling and responded to an online survey between May to December 2021, the initial contact with participants was made using telephone, or through WhatsApp, Instagram, or Facebook groups, from May to December 2021. In this initial contact, those responsible for individuals with Down Syndrome were informed about the content of the research and confirmed whether those individuals presented the necessary criteria to be included in the study.

Eligibility criteria

To participate in the study, individuals diagnosed with Down Syndrome needed to be more than eighteen years old and have taken two doses of the COVID-19 vaccine, in addition to having signed an informed consent form.

After participation was agreed upon, a questionnaire was sent through the Google Forms application, via email or WhatsApp with questions related to vaccination against COVID-19; individuals also had the option of answering the questionnaire by video call or even by phone.

COVID-19 vaccination questionnaire

The questionnaire, elaborated by the researchers, was made up of two parts. The first part had seventeen questions related to participants' data, such as full name, telephone contact, email, birthdate, age, gender and if they practiced any physical activity. The second part consisted of seven questions related to vaccination like dates of the first and second dose, brand of the vaccine, and possible adverse effects after receiving each vaccination dose. Participants indicated whether they experienced pain at the vaccine site, fever, malaise, muscle pain,

headache, diarrhea, nausea, vomiting, nasal secretion, cough, and chest pain, or indicated any other adverse effect different from these and, in case of the presence of adverse effects, how long they lasted.

Data analysis

The database was built and analyzed by the SPSS software version 22.0. The distribution of data normality was evaluated using the Kolmogorov-Smirnov test. For characterization of the sample, descriptive analysis of quantitative variables was used, represented in mean and standard deviation for parametric data, median and Interquartile interval for nonparametric data, and absolute and relative frequencies for categorical variables.

Results

Ninety-seven adults diagnosed with Down Syndrome participated in the study. Those individuals' clinical-demographic characteristics are shown in Table 1:

Table 1 - Characteristics of participants (n=97)

Characteristics	(N=97)
Age (in years), mean±SD	27.12 ± 6.52
Gender (F/M), n	43/52
Type of Down Syndrome	
Trisomy 21 Simple, n	96
Did Not Know, n	1
Height (m), mean±SD	1.52 ± 1.05
Weight (kg), mean±SD	64.90 ± 11.61
BMI	
Low Weight, n	2
Normal Weight, n	30
Overweight, n	42
Pre-Obese, n	17
Obesity I, n	6
Comorbidities	
Hypothyroidism, n	56
Heart Disease, n	9
Diabetes, n	2
Allergies, n	3
Medication	
Puran® , n	46
Synthroid®, n	3
Glifage®, n	1
Levothyroxine®, n	1
Atorvastatin®, n	2
Euthyrox®, n	2
Sertraline®, n	1

Characteristics	(N=97)
Region of Brazil (where participants currently live)	
Southeast, n	91
Northeast, n	6
Vaccination	
AstraZeneca, n (%)	91(94)
CoronaVac, n (%)	2 (2)
Pfizer, n (%)	4 (4)
Janssen, n (%)	0 (0)

Legend: Data expressed in mean ± standard deviation (SD); (F/M): Female and Male; (m): meter; (Kg): kilogram; BMI: Body Mass Index; n: the total amount of individuals; n (%): the total amount of individuals/percentage of individuals.
Source: Personal reproduction.

Table 1 shows that the individuals were young adults, under thirty years old, with a higher predominance of males and a diagnosis of Down Syndrome of the Simple Trisomy type. A little over half of the sample evaluated had comorbidities, and the predominant one, hypothyroidism, was controlled with medication. Regarding BMI, participants were classified as pre-obese. Most participants received the AstraZeneca vaccine.

Table 2 shows the duration and frequency of adverse effects experienced by participants after receiving the first and second doses.

Table 2 - Duration of Adverse Effects

	First Dose				Second Dose			
		Duration of Symptoms				Duration of Symptoms		
	Presence of symptoms	**24 hours**	**48 hours**	**3 days or more**	**Presence of symptoms**	**24 hours**	**48 hours**	**3 days or more**
AstraZeneca	100%	93%	5%	2%	31,87%	14.29/5	9.89%	7.69%
Pfizer	50%	0%	50%	0%	50%	0%	50%	0%
CoronaVac	0%	0%	0%	0%	0%	0%	0%	0%

Legend: Data expressed in percentage (%) of individuals.
Source: Personal reproduction.

Table 2 shows that all participants who took the AstraZeneca vaccine had adverse effects, and only two had an adverse effect with the Pfizer vaccine. Those receiving CoronaVac did not have adverse effects in any of the doses administered.

The duration of adverse effects was longer for the first twenty-four hours, practically disappearing after three days. The adverse effects found in the second dose decreased compared

to the first dose; less than half of the sample who took AstraZeneca, showed symptoms in the second dose, and the adverse effects reached their highest peak in the first twenty-four hours.

Table 3 - Results of the Frequency (%) of Adverse Effects Presented by Individuals with Down Syndrome after Receiving the First and Second Doses

Adverse effects	Frequency (%) 1st dose	Frequency (%) 2nd dose
Pain at injection site	65.3	54.7
Fever	37.9	0
Muscle pain	37.8	0
Malaise	29.5	0
Headache	28.4	10.5
Chills	16.8	0
Cravings	11.6	0
Vomiting	3.2	0
Nausea	1.1	0
None	24.2	43.2

Legend: Data expressed in percentage (%) of individuals. First (1st); Second (2nd).
Source: Personal reproduction.

Table 3 shows that the frequency of adverse effects after the first dose was higher than after the second, except for pain at the vaccine site, which presented almost equal values. After the second dose, there was a reduction in the presence of symptoms; however, they were still present in 43% of the population evaluated.

Discussion

The aim of this study was to describe which vaccines were applied in Brazilian Down Syndrome adults from May to December 2021 and to report possible adverse effects resulting from vaccination against COVID-19 in these individuals.

AstraZeneca was the most widely used vaccine for adults with Down Syndrome. It should be noted that at the time this research was carried out, AstraZeneca was also the widely available vaccine.

The participants did not present any severe adverse effects. The most reported adverse effects were pain at the injection site, fever, muscle pain, headaches, and malaise. The duration of these symptoms was three days, with a higher peak during the first twenty-four hours. Folegatti et al. (11) conducted a study to verify the AstraZeneca vaccine's safety and efficacy in healthy adults; they described the following adverse effects: pain at the injection site,

tenderness, heat, redness, tumescence, hardening, and itching. Systemic symptoms were malaise, muscle pain, joint pain, fatigue, nausea, headache, and chills; these symptoms had an average duration of seven days, with the first three days seeing the peak of symptoms.

A systematic review (19) analyzed the adverse effects in active and placebo groups of COVID-19 vaccines and reported a frequency of similar adverse effects in both groups. These were fatigue, headache, local pain, injection site reactions, and myalgia.

Only two adult individuals with Down Syndrome in our study received the Pfizer vaccine and had adverse effects from it. Meo et al. (20) reported that the Pfizer vaccine may cause mild adverse effects after the first or second dose, such as pain, redness or tumescence at the vaccine injection site, fever, fatigue, headache, muscle pain, nausea, vomiting, itching, chills, muscle pain, and joint pain. In the study by Raw et al. (21), it was observed that, after the second dose of the Pfizer vaccine, there were more adverse effects than after the first; however, the study's main objective was to verify whether there was a worsening in adverse effects in individuals who had COVID-19 before vaccination. As a result, there was a potentiation of the vaccine's adverse effects in those who had already contracted COVID-19 than in individuals who had not contracted the disease; however, this second dose effects` potentiation was found in individuals who had and had not COVID-19.

The differences in adverse effects found in our results concerning the Pfizer adverse effects in the study by Meo et al. (20) and Raw et al. (21) may be related to the sample size; since, in our sample, only four individuals received the Pfizer vaccine. In addition, the samples of the studies cited were from the general population.

Adult individuals with Down Syndrome who received the CoronaVac vaccine had no adverse effects. It has been reported that the CoronaVac vaccine has low rates of adverse effects (14).

The higher frequency of adverse effects found after the first dose in our results compared to the second dose differs from the findings of Raw et al. (21), Amanzio et al. (19), and Wi, Kim & Peck (22). They had a higher response to adverse effects after the second dose; however, the individuals evaluated did not have Down Syndrome.

The importance of this report is that this is the first to analyze adverse effects after vaccination against COVID-19 in adults with Down Syndrome. It is relevant because the participants` study presented comorbidities such as hypertension, heart disease, allergies, and diabetes, which could bring them some risk. However, none had severe adverse effects, showing that vaccination is safe for this population.

Conclusion

The most widely used vaccine in Brazilians with Down Syndrome was AstraZeneca at the time of this study. The most common adverse effects after the vaccine were injection site pain, fever, headaches, and malaise, especially after the first dose, and these adverse effects decreased after the application of the second dose of the vaccine. Vaccination proved to be safe for this population.

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