Events allegedly attributable to vaccination and immunization of COVID-19 in people who received up to the third dose, Tacna-Peru, 2022

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ABSTRACT

Purpose: This study aimed to analyze the events supposedly attributable to vaccination or immunization (ESAVI) after the administration of vaccines against COVID-19 in the population of Tacna, Peru.

Design/Methodology/Approach: An observational, descriptive and transversal design was used with a sample of 383 residents who received three doses of the Pfizer, AstraZeneca and Sinopharm vaccines. Data collection was carried out through surveys using a questionnaire validated by experts and evaluating reliability using Cronbach's alpha coefficient. Statistical analysis was carried out with SPSS version 26 software.

Findings: The findings revealed that the majority of participants were women between the ages of 18 and 32. The most common ESAVI related to local reactions was injection site pain with rates of 63.4%, 60.6% and 45.20% for the first, second and third doses, respectively. In terms of systemic effects, transient fever predominated in the first two doses (7.8% and 5.7%) while headache predominated in the third dose (8.90%). These adverse effects manifested mainly on the first day after vaccination and lasted 24 to 48 hours.

Conclusion: The most common local symptom was pain among the systemic symptoms.

Practical Implications: This study contributes by providing valuable information on the safety and side effects of COVID-19 vaccines in a specific population. These results may be useful to inform public health policies and give people a clearer understanding of what to expect after being vaccinated.

Contribution to the Literature: This study in residents of Tacna, Peru characterizes the effects of COVID-19 vaccines reporting on common local and systemic reactions that may be relevant for future research and public health decisions related to vaccination.

Keywords: *COVID-19 vaccines, COVID-19,* Events supposedly attributable to vaccination or immunization*, Immunization, Prevention, Vaccines.*

1. INTRODUCTION

The World Health Organisation (WHO) declared the epidemic a health crisis of worldwide concern on January 30, 2020. At that time, the number of confirmed cases worldwide was 7,818, most of them in China and only 82 spread across 18 countries. According to the WHO, both the global and Chinese risks are high. The WHO declared COVID-19 to be a pandemic on March 11, 2020 after examining the epidemic's rapid spread, severity and levels of inaction (Enríquez & Sáenz, 2021). Creating collective immunity is one of its tactics for effective control. The scientific community postulated the vaccine as one of the solutions to this pandemic and quickly commenced the path to achieving it. Vaccines have become a fundamental tool to reduce the incidence and mortality of a large number of infectious diseases (Doherty, Buchy, Standaert, Giaquinto, & Prado-Cohrs, 2016).

COVID-19 vaccinations were seen as a means of preventing infection and reducing its associated medical problems. When the opportunity to get vaccinated arose, it generated hope in the world population. Theoretical and popular misconceptions about potential negative vaccination-related effects have also caused some concern (World Health Organization, 2019). As a result, vaccines with WHO certification were being manufactured in laboratories all over

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the world. On December 12, 2020, China began immunizing its citizens with the Sinopharm vaccine in the greatest risk groups such as healthcare workers, individuals, complications and health (World Health Organization, 2021). The World Health Organization until January 12, 2022 included the following COVID-19 vaccines in the list for emergency use: BioNTech, Oxford and Janssen's Ad26.CoV2.S. Moderna's vaccine against COVID-19 is made of messenger ribonucleic acid (mRNA-1273), Sinopharm COVID-19 vaccine, Sinovac CoronaVac vaccine, Bharat Biotech vaccine (BBV152) called Covaxin and Nuvaxovid vaccine (World Health Organization, 2022).

The National Vaccination Plan against COVID-19 is authorized in Peru by Ministerial Resolution No. 848-2020 Ministry of Health (MINSA). Monitoring the safety of vaccines and adverse responses, case management and proper and rapid response are some of its specific goals (Ministry of Health, 2020). Since February 9, 2021, Peru has begun the vaccination process against COVID-19 in accordance with the efforts and plans arranged by the government and local health authorities (Escobar-Agreda, Vargas Herrera, & Rojas-Mezarina, 2021). There are four most widely used COVID-19 vaccines: BNT162b2 from Pfizer-BioNTech which uses an mRNA platform; Oxford/AstraZeneca which is a non-replicating viral vector vaccine, Sinopharm's COVID-19 vaccine which is an inactivated whole virus vaccine and Janssen's Ad26.CoV2 S which is a vector vaccine (Ayme et al., 2022). On February 10, the first 1,709 vaccines from the Chinese laboratory Sinopharm against COVID-19 arrived in the Tacna regions which were distributed to frontline health personnel working in the Intensive Care Unit (ICU), COVID areas and emergencies. The adverse effects that vaccines can produce are being monitored (Peruvian Andean News Agency, 2021).

Events supposedly attributable to vaccination and immunization are a set of clinical manifestations, abnormal laboratory findings or diseases that occur after immunization and that do not necessarily have a causal relationship with the vaccination process and are considered suspicious (Pan American Health Organization, 2021; Public Health Agency of Canada, 2023).

According to Lascano, Ortiz, Rodríguez, Soto, and Paredes (2019), adverse events supposedly attributable to vaccination and immunization (ESAVI) can be classified into serious and non-serious: They are serious because they endanger their lives and require prolonged hospitalization. On the other hand, the non-serious ones do not represent a risk to the life of the vaccinated individual (the embryo, fetus or newborn in the event that the vaccinated person was pregnant), they disappear without treatment or with symptomatic treatment, they do not require hospitalization and they do not cause long-term disability or disorders (Ministry of Public Health of Ecuador, 2022).

The ESAVI are classified as local when symptoms or signs emerge at the injection site within 48 hours of vaccination, vary in intensity individually and spontaneously decrease in 1 or 2 days and typically display systemic symptoms or signs (Comes et al., 2021; Mezarina-Mendoza, Carrasco-Freitas, & Aguirre-Siancas, 2021). Depending on their frequency of appearance, they can be very common (when they occur one or more in ten), common (if they appear less than one in ten and one or more in every 100), uncommon (if they appear less than one in 100 and one or more in 1,000), rare (if less than one in 1,000 and one or more in 10,000 appear) and very rare (if less than one in 10,000 of those vaccinated appear) Pérez-Conforme & Rodra (2021).

The adverse reactions to the Pfizer-BioNTech (BNT162b2) and Oxford-AstraZeneca (ChAdOx1 nCoV-19) vaccines were investigated throughout the world and in the United Kingdom. The findings revealed that those who participated in the study reported experiencing one or more adverse reactions with systemic reactions including fatigue and headache occurring within the first 24 hours and lasting for one day and local effects including tenderness and local pain around the injection lasting for two days Allergic skin reactions such as skin burns, rashes and red pimples on the lips and face might occur (Menni et al., 2021). Similarly, according to reports from the pharmacovigilance programs compiled by the Pan American Health Organization (PAHO), 937,338 doses of the Pfizer-BioNTech and Moderna vaccine had been vaccinated in Canada and the presence of 480 ESAVI (0.051% of the doses administered) of which 68 were considered serious (0.007%). The most frequent adverse events were injection site reactions, paresthesia, pruritus, urticarial, headache, hypoesthesia, nausea and anaphylaxis, 91% of which were reported in women (Pan American Health Organization, 2020).

1,131,805 doses of the COVID-19 vaccine have been administered in Spain and 1,555 notifications of adverse events have been received. The most frequently reported events continue to be general (fever, injection site pain), central nervous system (headache, dizziness) and digestive system (nausea, diarrhea) disorders. Most of the cases correspond to women (83%) and people between the ages of 18 and 64 (67%) (Ministry of Health, 2021). Similarly, according to Álvarez Collado et al. (2021), when the COVID-19 vaccine was administered to workers of a tertiary

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hospital, adverse reactions were reported. It turned out that 76.8% of respondents were older than 55 years (dose 1), 15.9% of respondents had dose 2, 2.57% had symptoms that were already described in the data sheet and 70.5% had dose 2.

In a phase 1/2 clinical study evaluating the safety, tolerability and immunity of the Corona vaccine conducted in China on a total of 550 individuals between the ages of 3 and 17, it was discovered that the adverse effects were mostly mild to moderate, with the most frequent being pain at the puncture site (13%) and fever (5%). These occurred within the first 7 days of vaccination and disappeared within the first 48 hours (Ministry of Health, 2021).

Comes et al. (2021) describe the occurrence of ESAVI following immunization with Sputnik V, Sinopharm and AstraZeneca using the notification form of the surveillance team at the Latin American level in Argentina in their article "Analysis of the safety of vaccines against the 2019 coronavirus disease (COVID-19)". 13,740 cases of 5,020,756 applied doses were reported and it was concluded that among the most frequent local symptoms of these vaccines were local pain, edema, erythema and induration. In terms of systemic symptoms, the most common were fever and headache in more than 30% of cases.

According to Perez-Conforme and Rodriguez-Parrales's (2021) research on the Sinovac vaccine's efficacy and side effects against COVID-19 in Ecuador are pain, edema, redness round the injection site, fever and fatigue. The most frequent local reaction was arm pain which occurred in 52.92% of the children while fever was the most common systemic adverse effect accounting for 8.77% of the events later in 2022 according to a study on events purportedly related to the vaccination and immunization (ESAVI) of COVID-19 in boys and girls from 6 to 11 years old (Duma, Maza, Carrión, & Arévalo, 2022).

The study "Adverse effects post-application of COVID-19 vaccines in students from the health area of the Colombian Atlantic coast" found that the adverse effects which were most frequently pain and tumor at the puncture site, temperature changes, headache, muscle pain and fatigue were mild and went away quickly (Salas Taborda, Dominguez Salcedo, & Salgado Guadarrama, 2022).

Mezarina-Mendoza et al. (2021) conducted a study on the side effects of the COVID-19 vaccination in Peru using a sample of 207 dentists between the ages of 20 and 65. It was obtained as results that the Pfizer-BioNTech vaccine reported headache and fatigue as common adverse events. The Sputnik V vaccine presented 58% of cases with pain in the inoculated area and there was local erythema and edema.

When the vaccination campaign launched in Peru in February 2021, some people had not fully accepted the vaccine. According to a survey published by IPSOS, if there was a free and available vaccine for COVID-19, at the national level, 35% of the population would not be vaccinated because all the adverse effects that the vaccine could have are not known (Ipsos, 2022).

The importance of conducting the current investigation is seen with the objective of characterizing the events allegedly attributable to the vaccination and immunization (ESAVI) of COVID-19 in residents of Tacna in the local context because no study has been conducted in the city of Tacna after the administration of COVID-19 vaccines.

2. RATIONALE FOR THE STUDY

The current research is conducted to improve our understanding of the treatment and prevention of acute respiratory syndrome caused by coronavirus type 2 (SARS-CoV-2) infection and its variants. As the vaccination has recently been approved by the European Union, it is necessary to analyze the ESAVI. Therefore, it is important to continue adding data to clinical trials and pharmacovigilance reports. It is essential that adverse reactions to vaccines are recognized and reported quickly, accurately and transparently. As a result, it will lead to the strengthening of scientific data on ESAVI.

3. MATERIAL AND METHOD

The current study is a descriptive, retrospective design with a quantitative methodology that takes a cross-sectional approach to investigate any adverse effects that may occur following the administration of three doses of the COVID-19 vaccination. These vaccines include Pfizer-BioNTech's BNT162b2, Oxford-AstraZeneca (ChAdOx1 nCoV-19) and the Sinopharm vaccine whose scientific name is BBIBP-CorV.

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3.1. Methodology

The research was carried out between February and August 2022. The frequency of symptoms experienced in different vaccination periods was analyzed: first, second and third doses. The study was carried out in the district of Tacna and used a sample calculated using the formula for a finite population resulting in 383 residents.

3.2. Participants

The target population consisted of inhabitants of the Tacna district with an age range of 18 to 60 years who had received at least one dose of the mentioned vaccines against COVID-19. Unvaccinated people and those who left data blank in the questionnaire were excluded.

3.3. Instrument Validity

The survey technique was used to collect data through a questionnaire designed by the research team. This questionnaire was based on the EsSalud survey for suspected Adverse Drug Reaction (ADR) and the World Health Organisation (WHO) and Pan American Health Organisation (PAHO) inquiry sheets for occurrences attributable to vaccination. The Delphi technique was used to validate it with the participation of three experts. Similarly, the reliability analysis was carried out through the Cronbach's alpha coefficient validated by Cronbach's alpha of 0.77 (a value that is between 0.7-1.00) which was determined to be highly reliable.

The application of the instrument was carried out online, the sampling was non-probabilistic and the confidentiality of the information collected was guaranteed ensuring its use only for academic and research purposes.

The information gathered was statistically analysed using the statistical software SPSS Statistics version 26 for Windows. A descriptive statistical analysis was applied that involved the calculation of numerical, percentage and frequency distributions presented in the form of tables and figures.

This robust methodological approach allows for a detailed exploration of adverse reactions following the administration of COVID-19 vaccines in a specific context providing valuable information for understanding events attributable to vaccination or immunization in the study population.

4. RESULTS

4.1. Sociodemographic Aspects

In terms of age, the majority of the 383 respondents (40.7%) were between the ages of 18 and 32. In terms of gender, women accounted for 56.4% of the total with men accounting for the remaining 43.6% (see Table 1).

Table 1. Sociodemographic characteristics of study participants.

Age (Years)	Sex					
	Women		Man		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
18-32	85	54.5	71	45.5	156	100
33-46	48	57.8	35	42.2	83	100
47-60	63	57.3	47	42.7	110	100
61-74	17	58.6	12	41.4	29	100
75-89	3	60	2	40	5	100
Total	216	56.4	167	43.6	383	100

4.2. COVID-19 Vaccination

The majority of biological products used in Peru require two doses to be effective in preventing COVID-19 although a third dose was used. At the time of the study, 80.93% of the sample had received the third dose of the corresponding biologics.

Regarding the first dose of the biologicals applied to the sample, the Pfizer vaccine led with 64.5%, 31.3% was occupied by Sinopharm and 4.2% by AstraZeneca (see Table 2).

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Table 2. Vaccines applied (first dose).

Vaccines	Frequency	Percentage
AstraZeneca	16	4.2
Pfizer	247	64.5
Sinopharm	120	31.3
Total	383	100

According to the type of ESAVI, after the first dose, the most frequent local reaction was pain where the injection was applied (63.4%) followed by muscle pain, (11%) and the least frequent was local pruritus (0.5%). Among the systemic reactions, the one that prevailed was temporary fever with 7.8% followed by headache with 5.2%, and the least frequent, diarrhea, dizziness or nausea with 0.3% and 8.4% did not present any symptoms or signs related to vaccination (see Table 3).

Table 3. Events supposedly attributable to the vaccination and immunization of COVID-19 in residents of Tacna, Peru; from February to August 2022 (first dose).

Adverse events	Frequency	Percentage
Local		
Pain where the injection is given	243	63.4
Muscle pain	11	2.9
Local redness	10	2.6
Swelling	5	1,3
Local pruritus	2	0.5
Systemic		
Temporary fever	30	7.8
Diarrhea	1	0.3
Headache	20	5.2
Fatigue	14	3.7
General discomfort	2	0.5
Dizziness	1	0.3
Nausea	1	0.3
Drowsiness	4	1
Inflammation of axillary nodes	7	1.8
No symptoms	32	8.4
Total	383	100

The adverse effects appeared after the application of the first dose, on the first day, they were 70.76%, on the second day, they were 20.10% and less frequently, on the third day, they were 0.52% (see Figure 1).

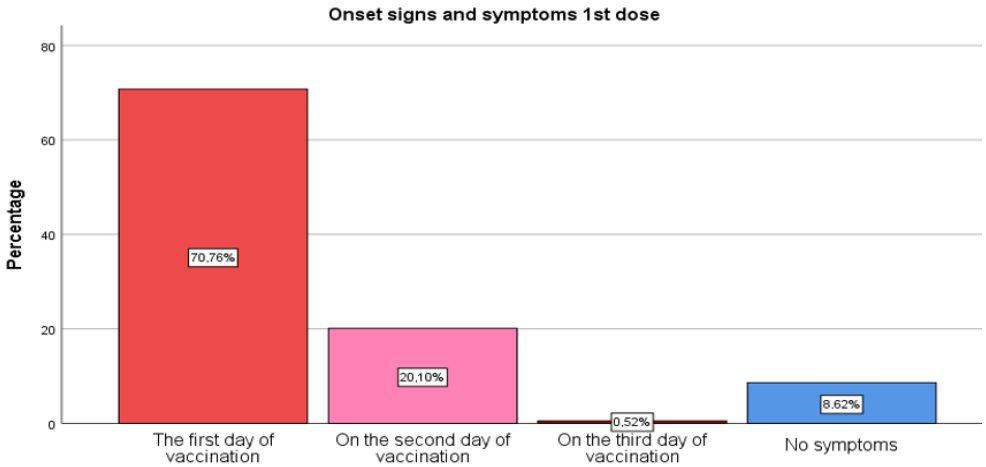

Figure 1. Start of events supposedly attributable to the vaccination and immunization of COVID-19 in residents of Tacna, Peru from February to August 2022, first dose.

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According to the participants, these effects were resolved in 31.3% of cases after two days, 29.5% the day after they appeared, 18.5% after three days, 6.5% after more than four days and 5.7% after four days (see Figure 2).

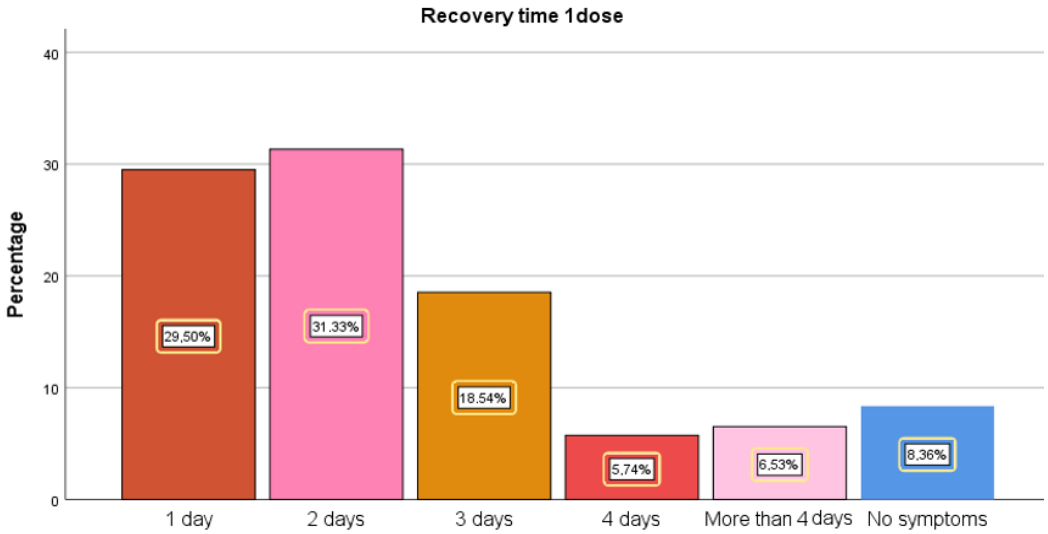

Figure 2. Duration of events supposedly attributable to the vaccination and immunization of COVID-19 in residents of Tacna, Peru from February to August 2022 (first dose).

In the second dose of biologics applied to the sample, the Pfizer vaccine led with 66.1% while 31.1% were held by Sinopharm and 2.9% by AstraZeneca (see Table 4).

Table 4. Vaccines applied (second dose).

Vaccines	Frequency	Percentage
AstraZeneca	11	2.9
Pfizer	253	66.1
Sinopharm	119	31.1
Total	383	100

Table 5. Events supposedly attributable to the vaccination and immunization of COVID-19 in residents of Tacna, Peru from February to August 2022 (second dose).

Adverse events	Frequency	Percentage
Local		
Pain where the injection is given	232	60.6
Muscle pain	16	4.2
Local redness	3	0.8
Swelling	0	0
Local pruritus	19	5
Systemic		
Temporary fever	22	5.7
Diarrhea	3	0.8
Headache	35	9.1
Fatigue	10	2.6
General discomfort	0	0
Dizziness	1	0.3
Nausea	2	0.5
Drowsiness	4	1
Inflammation of axillary nodes	4	1
No symptoms	32	8.4
Total	383	100

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After the second dose of ESAVI, the most common local reaction was pain at the injection site (60.6%) followed by local pruritus (5%). Local redness was reduced (0.8%). In terms of systemic effects, headache (9.1%), transient fever (5.7%) and dizziness (0.3%) were the most common (see Table 5).
After administering the second dose, participants experienced adverse effects that manifested on day one in 66.84% of cases, on day two in 24.02% of cases and on day three in 0.78% of cases (see Figure 3).

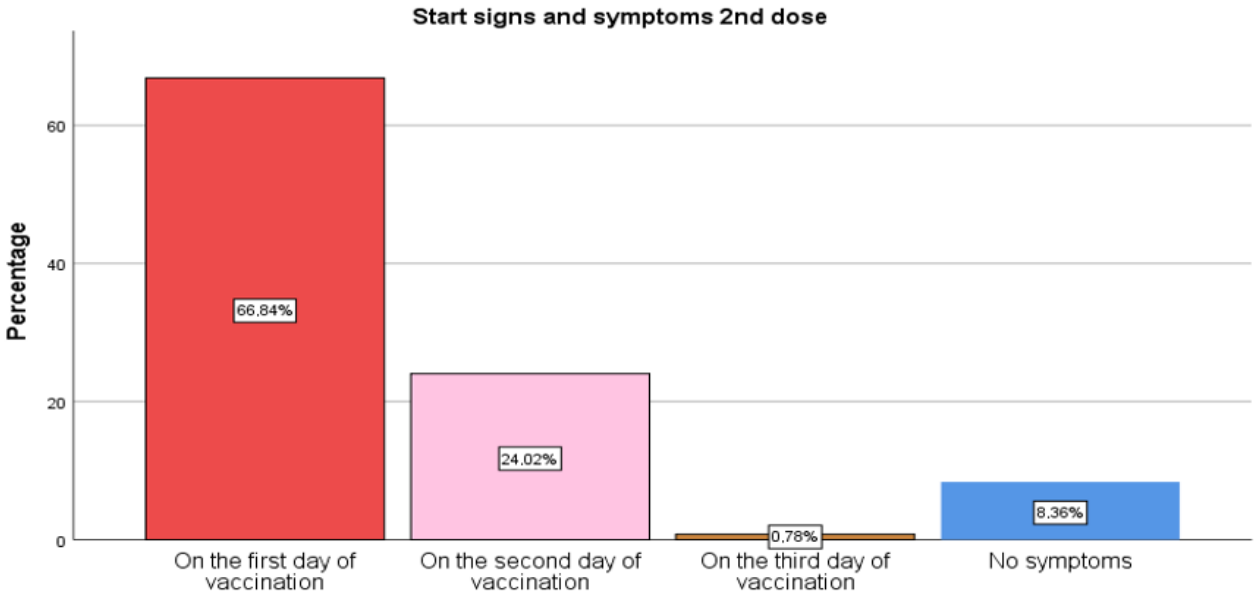

Figure 3. Start of events supposedly attributable to the vaccination and immunization of COVID-19 in residents of Tacna, Peru from February to August 2022 (second dose).

In 32.90% of cases, they were resolved the day after their appearance, 30.03% after two days, 19.58% after three days 4.96% or more than four days and 4.70% after four days (see Figure 4).

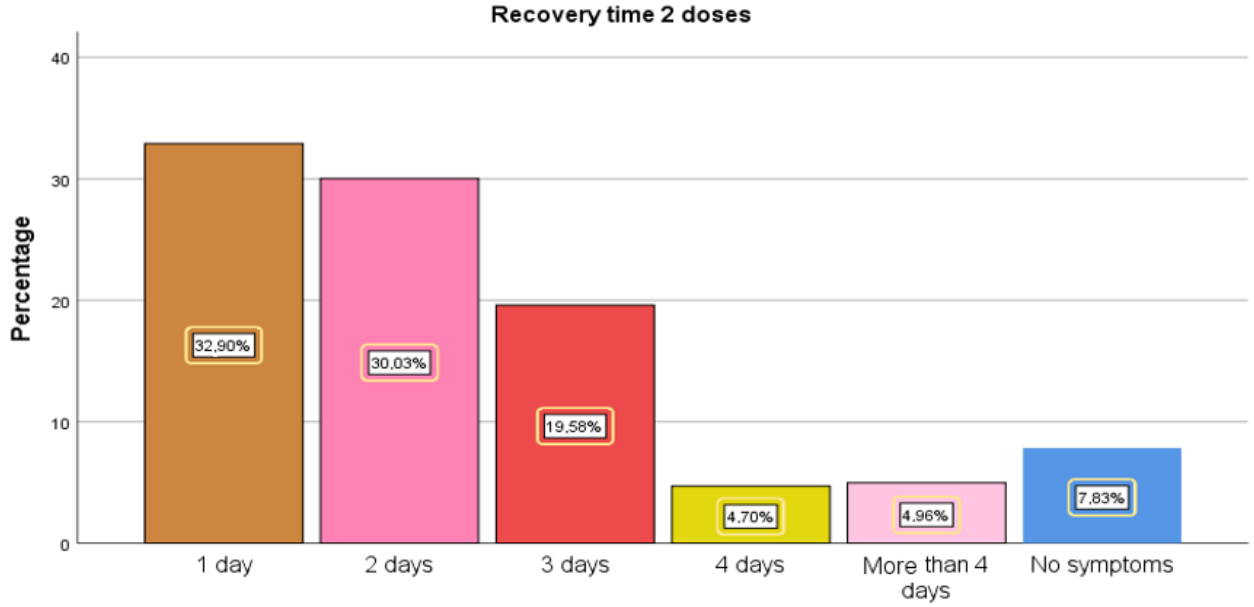

Figure 4. Duration of events supposedly attributable to the vaccination and immunization of COVID-19 in residents of Tacna, Peru; from February to August 2022 (second dose).

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Regarding the third dose administered, within the sample analyzed, the Pfizer vaccine was the most used (55.1%) followed by AstraZeneca (16.2%) and Sinopharm (9.7%) (see Table 6).

Table 6. Vaccines applied (third dose).

Vaccines	Frequency	Percentage
AstraZeneca	62	16.2
Pfizer	211	55.1
Sinopharm	37	9.7
Not applied	73	19.1
Total	383	100

In relation to adverse events after the third dose, the most common local symptom was pain at the injection site 45.2% followed by local pruritus 8.9%. 3.66% was recorded to a lesser extent. Regarding systemic reactions, the predominant symptom was 8.90% followed by temporary fever with 7.30% and fatigue with 2.3%. Swelling of lymph nodes was the least frequent with 0.50% (see Table 7).

Table 7. Events supposedly attributable to the vaccination and immunization of COVID-19 in residents of Tacna, Peru from February to August 2022 (third dose).

Adverse events	Frequency	Percentage
Local		
Pain where the injection is given	173	45.20
Muscle pain	14	3.70
Local redness	0	0
Swelling	0	0
Local pruritus	16	4.20
Systemic		
Temporary fever	28	7.30
Diarrhea	0	0
Headache	3.4	8.90
Fatigue	9	2.30
General discomfort	0	0
Dizziness	0	0
Nausea	0	0
Drowsiness	3	0.80
Inflammation of axillary nodes	2	0.50
Total	383	100

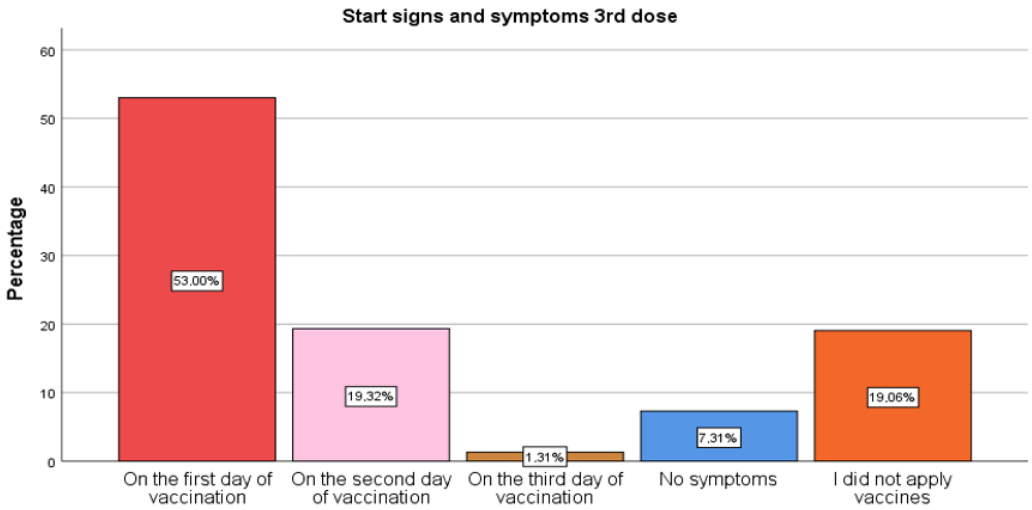

Figure 5. Start of events supposedly attributable to the vaccination and immunization of COVID-19 in residents of Tacna, Peru from February to August 2022, (second dose).

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Participants experienced adverse effects after receiving the third dose which occurred at 53% on the first day, 19.32%, on the second day and 1.31% on the third day (see Figure 5).
The resolution of these effects occurred in two days at 25.85%, the day after its appearance was 24.80% and in four days it was 4.70% (see Figure 6).

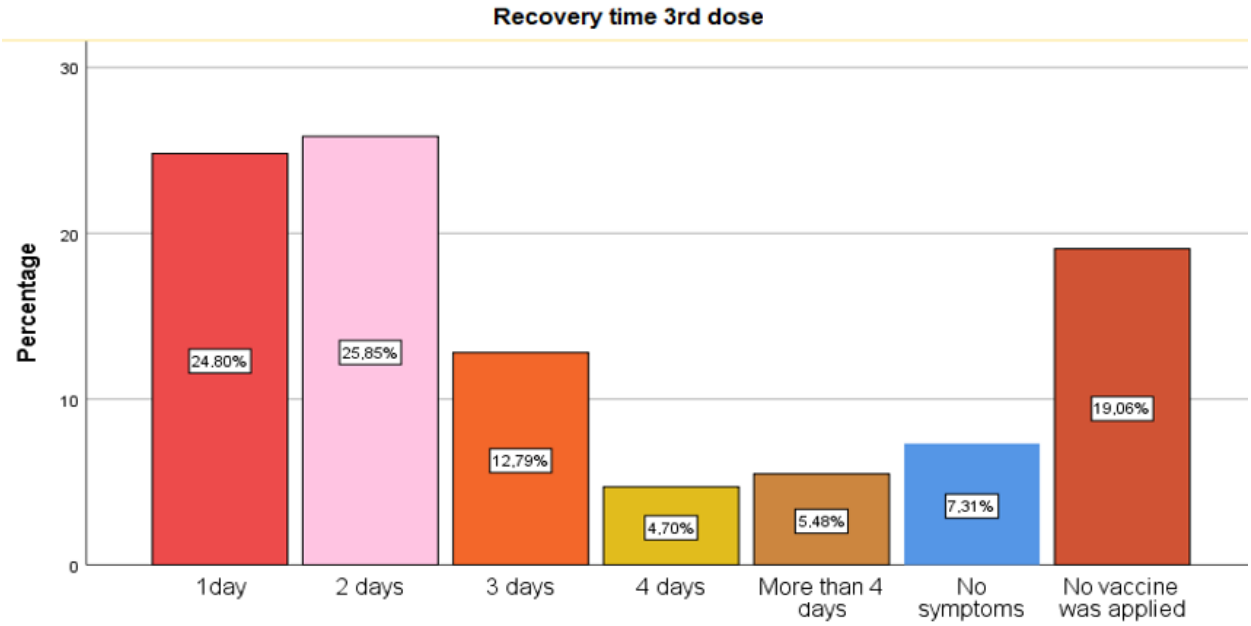

Figure 6. Duration of events supposedly attributable to the vaccination and immunization of COVID-19 in residents of Tacna, Peru; from February to August 2022 (third dose)

5. DISCUSSION

Vaccines have a proven safety profile. However, we need to be aware of the local and systemic reactions they present. The main adverse events manifested post-vaccination were determined from February to August 2022 in the district of Tacna.

5.1. Sociodemographic Aspects

The mean age of survey participants reporting adverse reactions in this study was 39.75 years (±SD 15.30) and the age range was 18-87 years old. These results are similar to those found in the study carried out by Becker, Balbuena, and Samudio (2021) where the average age was 43 years (± SD 11.7) with an age range of 20 to over 60 years.
In our study, it was found that the majority of individuals who experienced adverse effects were women which represented 56.4% of the total. In addition, it was discovered that the age group most frequently involved was 18 to 32 years old (see Table 1). These results are similar to the findings obtained by Salas Taborda et al. (2022) who also observed a majority participation of women representing 87 % of the participants. They also found that the most commonly implicated age range was 19 to 22 years.

5.2. COVID-19 Vaccination

Three types of AstraZeneca, Pfizer and Sinopharm vaccines were used (see Tables 2, 4 and 6). The Pfizer vaccination was the most widely used accounting for 61% of all cases. This finding is comparable to that of Salas Taborda et al. (2022) who also found that the Pfizer vaccine was ground-breaking, accounting for 85% of all cases. It differs from the study of Becker et al. (2021) where the AstraZeneca vaccine was the most popular with 41.5% of people using it.
Three doses were applied and it turned out that of the total vaccinated, 91.6% had adverse reactions in the first and second dose and 72.85% in the third dose. In this regard, only investigations of adverse reactions were found after the first and second doses. (Caillagua Salas & Llerena Ticona, 2022; Cano Luque & Morales Bejarano, 2021; Poma Salinas, Garcia Inga, Martínez Véliz, & Cuadros Ríos, 2021) which are similar to the present study. Few studies

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were found regarding adverse reactions to the third dose. In this investigation, local reactions occurred more frequently than in the first and second doses which is similar to the study by Esteban and Antezana (2022).

In the current study, applying the three doses and using the vaccines from AstraZeneca, Pfizer and Sinopharm, local reactions (see Tables 3, 5, and 7) revealed that the injections caused pain. This was observed in the first dose with 63.4%, the second dose with 60.6% and the third dose with 45.17%.

In this context , Gironzini (2021) found that the most common adverse reaction was pain at the site of the inoculation with a frequency of 42.1% and 43.2% in the first and second doses respectively. Additionally, two doses of the vaccines used in the study conducted by Becker et al. (2021) made by AstraZeneca, Pfizer and Sinopharm were administered. 57.3% patients expressed greater discomfort at the puncture site.

The findings of the current investigation focused on events supposedly related to vaccination which support the effects found in the literature review of numerous authors including Galván-Casas, Català, and Muñoz-Santos (2021) and Villar-Álvarez et al. (2021) who focus on the dermatological side effects. In this study, the effects are specified after receiving the three doses: mild effects, local redness (2.6%) and less frequently, local pruritus (0.5%) are identified with the first dose, local redness (0.8%) and local pruritus (5%) in the second dose and in 4.20% of local pruritus, no local redness was found in the third dose. It is observed that local pruritus is present in all three doses.

In systemic adverse reactions (Tables 3, 5 and 7), in the first dose, fever (7.8%) was found followed by headache (5.2%). In the second dose, most frequently, headache (9.1%) followed by fever (5.7%). In the third dose, the most frequent was headache (8.9%) followed by fever (7.3%). Regarding the first and second doses, we found similarities with the research carried out by Menni et al. (2021) in the UK. In their study, they found that the most frequent systemic side effects were headache and fatigue with an incidence of approximately 30%. Similarly, according to a study by Mezarina-Mendoza et al. (2021), headache was reported in 28% of cases and fatigue in 15.4% of cases in relation to the Pfizer vaccine.

The adverse reactions found in this study have been more frequently local (see Figures 1, 3 and 5) which appeared on the first day after vaccination and resolved within 48-72 hours (see Figures 2 , 4 and 6). Therefore, it coincides with the results of the studies consulted (Álvarez Collado et al., 2021; Public Health Agency of Canada, 2023; Spanish Agency for Medicines and Health Products, 2021). In the investigation carried out, no serious effects were found which is corroborated by the first report from the Spanish agency for medicines and health products which confirms that there have been no serious effects on vaccinated patients. This is very important in the field of vaccination (Public Health Agency of Canada, 2023).

6. CONCLUSION

We proceeded to carry out an analysis of the events due to vaccination based on the findings of this investigation in order to assess the occurrence of negative effects following the administration of three doses of the COVID-19 vaccines. Consequently, the following conclusions are obtained:

The majority of participants were women between the ages of 18 and 32 from a sociodemographic perspective.

The most frequent local symptom of Events Supposedly Attributable to Vaccination (ESAVI) was pain at the injection site whereas headache and fever were the most prominent systemic symptoms. These symptoms began on the first day after vaccination and lasted for 24 to 48 hours.

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INSTITUTIONAL REVIEW BOARD STATEMENT

The Ethical Committee of the Jorge Basadre Grohman National University of Tacna, Peru has granted approval for this study (Ref. No. Res.N°11061-2022-ESPG/UNJBG).

TRANSPARENCY

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

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