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ORIGINAL RESEARCH

RT - Shoulder Pain after Covid Vaccination The Incidence of Shoulder Pain: An Observational Study on Covid Vaccination

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ABSTRACT

Background: The COVID-19 vaccination is essential for returning the world to normal following the pandemic. On the other hand, untrained staff members and unclear instructions might result in incorrect injection techniques, which can cause problems like shoulder injury linked to vaccination administration (SIRVA), which limits mobility and causes shoulder pain. Proper administration is essential for both patient safety and vaccination efficacy. The purpose of this study was to ascertain the prevalence of shoulder pain in the general population after receiving the COVID-19 immunization. **Material & Methods:** This observational study was carried out from july 2022 to October 2023 at BPS Govt. Medical College, KhanpurKalan, Sonipat, in the departments of anesthesia, analgesia, and intensive care medicine. The study focused on Shoulder Injury Related to Vaccine Administration (SIRVA) following COVID-19 vaccination and involved 120 patients, both male and female. Using a checklist to collect data, cases assessed by physicians were examined to reduce diagnostic errors as much as possible. **Results:** Patients (29.2%) with ages 63-72 years received 80% of their immunizations from Pfizer and Moderna. Adhesive capsulitis (44%) and bursitis (36%) were frequent symptoms. It varied; 35.2% of respondents reported symptoms at the outset, and 40.8% within 24 hours. 92% of people reported being in pain. MRI (36.8%) and X-ray (63.2%) were utilized for diagnosis. NSAIDs (24%) and physical therapy (16%) were used as treatments in addition to oral steroids (56%). **Conclusions:** The importance of correctly administering vaccines to prevent side effects such as SIRVA. To ensure both efficacy and individual well-being, the COVID-19 vaccination campaign needs to be run with clear protocols and staffed by trained professionals.

Keywords: COVID-19, Vaccine, Shoulder Pain, SIRVA.

INTRODUCTION

Globally, the COVID-19 pandemic has had a major influence on day-to-day living. One of the main factors supporting the restoration to normal life activities has been the COVID-19 vaccinations, which have been administered widely since the beginning of 2021.[1] COVID-19 vaccines and boosters are being administered worldwide at a rate and scope that has never been seen before. This large global immunization drive has led to the creation of transient vaccination clinics and the widespread hiring of personnel, many of whom are not qualified to administer the deltoid immunization (IM). Such mass vaccination clinic procedures provide few guidelines for correct injection technique. In this regard, the BNT162b2 (Pfizer "the vaccine should be injected into the deltoid muscle, preferably in the non-dominant arm, by a suitably qualified individual with training in Good Clinical Practice (GCP) and experience in administering vaccines (such as physicians, nurses, physician assistants, nurse practitioners, pharmacists, or medical assistants)."[2] Likewise, the Moderna SARS-CoV-2 m-RNA-1273 vaccine stipulates that administering both doses in the same arm is not recommended. Conversely, the Ad26.COV2.S vaccine (Janssen) only specifies that intramuscular injections should be used to administer the vaccination.[3,4] The danger of an incorrect intramuscular injection can be considerably increased by unclear instructions, insufficient training, and the exponential increase in the number of untrained personnel administering the immunization. In order to ensure that the vaccine is correctly injected into the well-supplied muscle and not into the less vascularized subcutaneous tissue or nearby structures such as bursae, tendons, and nerves, proper injection

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technique (IM) is essential. The problem here is twofold: administering the vaccine in a region with inadequate blood flow may result in decreased immunogenicity, which would decrease the vaccine's effectiveness; also, it may cause discomfort and possibly even problems like Shoulder Injury Related to Vaccine Administration (SIRVA).[5] Shoulder pain and a decrease in range of motion after an injection of a vaccination intended to be administered intramuscularly in the upper arm are the hallmarks of SIRVA. This disease, which is most commonly associated with the administration of influenza vaccines, is becoming more widely recognized as a potential adverse event linked to vaccinations.[6,7] The accidental injection into the subdeltoid bursa, which can cause bursitis, tendinitis, and/or capsulitis, is one possible reason for SIRVA.[6] Shoulder pain and limited range of motion are the main symptoms of Shoulder Injury Related to Vaccine Administration (SIRVA), a complication that appears 48 hours after vaccination. Although the exact cause of SIRVA is still unknown, a commonly accepted theory states that administering the vaccination to the subdeltoid bursa causes a prolonged inflammatory response.[8,9,10] Eating, washing, and dressing are just a few of the daily tasks that are greatly impacted by this problem. Inadequate vaccination administration techniques, such as using an erroneous injection landmark or placing the needle incorrectly, are frequently the main cause of this problem [11].

Objectives

The study's goal was to ascertain the prevalence of shoulder pain in the general population after receiving the COVID-19 immunization.

MATERIALANDMETHODS

Included in the study were 270 individuals, both male and female. In this investigation, SIRVA was defined as bursitis, unilateral shoulder pain, stiffness in the joint, or weakness on the injection side that developed after ipsilateral deltoid IM COVID-19 immunization and persisted for at least 48 hours after the symptoms started, due to the significantly higher number of self-entered cases in the VAERS database than in previous years, as well as the massive rise in information regarding SIRVA during the COVID-19 epidemic. An attempt was made to decrease diagnostic error by include only cases that have been evaluated by a doctor. Data were manually reviewed and eliminated if there was a history of trauma or dysfunction before to immunization, if the injury or dysfunction was systemic or in a joint other than the shoulder, or if the symptoms resolved in less than two days. A subset of data that underwent confirmed testing using a diagnostic method was assessed independently. The search terms "nerve" and "weakness" were originally added in an effort to gather information about nerve injuries connected to SIRVA, but they were later removed because they produced thousands of reports unrelated to the study and unverifiable by a doctor, tests, or imaging. To ensure that crucial details from the history sheet and associated medical records were recorded, a checklist was also developed. After conducting the interview and reviewing the relevant investigative reports, the data were assessed right away. Only COVID-19 vaccination recipients and individuals with a verified diagnosis of shoulder pain were included in the study. Vaccines administered concurrently were not included.

Statistical Analysis

Quantitative data was expressed as mean and standard deviation, while qualitative data was described as frequency distribution and percentage. All data were methodically documented in pre-made data collection forms. The statistical analysis was performed using SPSS (Statistical Package for Social Science) Version 26 for Windows 10 was used to do the statistical analysis. A P value of less than 0.05 was deemed statistically significant. The Institutional Review Board (IRB) of BSMMU granted ethical approval for the current study.

RESULTS

The type of vaccination and symptoms of the respondents. We found that the majority of individuals received Pfizer & Modern avaccines, constituting 80% of the respondents, followed by Astra Zeneca at 18%, and Sinovac at 2%. In terms of symptoms, 36% of individuals reported experiencing bursitis, while adhesive capsulitis was noted by 44% of the population. Additionally, 20% of individuals reported SIRVA(Shoulder Injury Related to Vaccine Administration). Table 1

Table 1: Type of Vaccination and symptoms of the respondents

Variables		Frequency	Percentage
Type of Vaccine	Pfizer & Moderna	207	76.6
	Astra Zeneca	52	19.2
	Sinovac	11	4
	Bursitis	97	35.9
Symptoms	Adhesive capsulitis	117	43.3
	SIRVA	56	20.7

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The onset of pain of the respondents. The onset of their symptoms in relation to vaccine administration, with 34.4% patients reporting immediate onset, 39.6% patients reporting onset within 24 h, 5.5% patients reporting onset between 24 and 72h, and 20.3% patients reporting onset over days to weeks. Table 2

Table 2: Diagnosis of Onset of pain of the respondents

Onset of pain	Frequency	Percentage
Immediate	93	34.4
<24hr	107	39.6
24-72hr	15	5.5
>72	55	20.3

Clinical data shows the prevalence of signs and symptoms, diagnostic tests, and treatment modalities with in a studied population. Pain emerges as a predominant symptom, reported by a substantial 88.8% of individuals, indicating its wide spread occurrence. Stiffness is noted in 22.2% of cases, while weakness is a less common manifestation at 4%. Diagnostic procedures reveal a prevalent use of X-ray, conducted in 62.2% of cases, while MRI is employed in 37.7% of cases, suggesting a balanced utilization of imaging modalities. In terms of treatment, oral Steroids is a predominant intervention, being administered to 54.4% of individuals, underlining its significance in managing the condition. Physical Therapy and NSAIDs are utilizedin17.4% and 24.4% of cases, respectively, providing insights into the pharmacological approaches adopted. Table 3

Table 3: Clinical data of the respondents

Variables		Number	Percentage
Signs and Symptoms	Pain	240	88.8
	Stiffness	60	22.2
	Weakness	20	7.4
Diagnostic Tests	X-ray	168	62.2
	MRI	102	37.7
Treatment	Oral Steroids	147	54.4
	Physical Therapy	47	17.4
	NSAIDs	66	24.4

DISCUSSION

Most SIRVA patients see orthopedic surgeons and musculoskeletal specialists for treatment.[12] Therefore, it is crucial for the doctor to be aware of a clinical description of shoulder damage and ongoing discomfort after receiving the COVID-19 vaccination. Regarding the COVID-19 vaccination, Shoulder Injury Related to Vaccine Administration (SIRVA) showed a similar gender distribution, with a median age of 51.5 and roughly 76% of cases being female and 24% male. This distribution was similar to a previous study that found a median age of 51 and 73% of the participants were female and 24% were male.[13] Prior to getting the immunization in this instance, the patient complained of a slight cold and cough. A week after the immunization, there was a significant cough and fever. The patient then showed up with no ability to move his or her shoulders at all for two days. It is proposed that the pathology seen is an illustration of antibody-dependent enhancement. Pre-existing antibodies from a previous infection or exposure to a different coronavirus strain may have interacted with the accidentally injected antigen in the bursa, causing pre-existing cold and cough symptoms. By increasing the likelihood for viral replication, this cross-reaction may have intensified symptoms by triggering an antigen-antibody interaction.[14] Pre-existing supraspinatus calcification was visible on radiographs, which may have occurred before the immunization. It's possible that the vaccination antigen caused an inflammatory response in the bursae covering it. For accurate administration of the deltoid muscle vaccination, it is recommended that exact landmarking techniques be followed. Specifically, the needle should be inserted into the triangle created by the insertion of the deltoid muscle and the acromion.[15] It is possible to damage the underlying bursa, bone, or nerve when injecting at a higher spot. An injection that is administered too posteriorly may damage the axillary nerve. A needle that is too long could damage the underlying bursa, whereas a needle that is too short could result in the injection of antigen into the subcutaneous tissue. A 16-mm (5/8-inch) needle is advised for patients under 60 kg (132 lbs.), while a 25-mm (1-inch) needle can be used for patients between 60 and 70 kg (132 and 154 lbs.). For those over 70 kg (154 lbs.), a 25-mm (1-inch) or 38-mm (1.5-inch) needle can be used. It has been reported that using incorrect vaccination practices can lead to Shoulder Injury Related to Vaccine Administration (SIRVA).[16, 17, 18, 19, 19] Therefore, rather than being caused by intrinsic vaccine characteristics, it is proposed that

individuals may have Shoulder Injury Related to Vaccine Administration (SIRVA) as a result of subpar immunization procedures. In this instance, the patient's MRI results had led to the diagnosis of bursitis. Shoulder pain that starts 48 hours after vaccination injection and lasts longer than 7 days is the hallmark of (SIRVA). It is most frequently reported after receiving a tetanus and influenza immunization.[18] The National Vaccine Injury Compensation Program (VICP) has received a continuous rise in SIRVA-related complaints over the past ten years.[16] This increase in instances started when Atanasoff et al. published the first series, which included 13 individuals, in 2010.18 The authors of a 2020 study noted that most patients' symptoms were still present at their final clinic visit. It's possible that many patients were under pressure to completely report the extent and nature of their pain because they were looking for reimbursement.[16] Following COVID-19 vaccinations, case reports of subacromial bursitis have been recorded. Bursitis was reported to occur eight weeks after COVID-19 injection (Oxford-AstraZeneca COVID-19 injection - Serum Institute of India, India) and three days after immunization (Sinovac vaccination - Sinovac Biotech, China) in two different papers.[17] According to a different case report (Serum Institute of India, India), discomfort started to appear three hours after the Oxford-AstraZeneca vaccination (19). Two occurrences of subacromial-subdeltoid bursitis following the administration of the Moderna mRNA 1273 and Pfizer-BioNTech BNT162b2 vaccines were documented by Honarmand et al.[21] The study's symptoms, which were primarily discomfort and restricted range of motion, were in line with earlier studies. According to earlier research on different immunizations, onset usually happens during the first 48 hours.[18, 22, 23, 24,] More than 75% of the individuals in this trial began to suffer symptoms within the first 24 hours. Interestingly, in contrast, a much larger group of patients reported a subtle beginning of shoulder pain between 72 hours and 2 weeks. Previous studies have shown that bursa injury and rotator cuff tendinopathy are the most common indicators of SIRVA. But adhesive capsulitis was the most common finding in our research, followed by bursitis, tendinopathy, infection, and nerve injury.[23, 24] It may be easier to detect the relative delay in the start of symptoms and increase in adhesive capsulitis in. [First Table] During the data collecting process, just one participant made a comment regarding their COVID-19 status and confirmed that they possessed it. Following an intra-bursal injection, a 52-year-old female patient who had received the Moderna vaccination was diagnosed with shoulder bursitis. The scattered tales are by no means scientific, but they do point to a critical knowledge vacuum regarding the immunogenicity of mRNA vaccines in the setting of inadequate IM penetration. A blood-rich area can receive the necessary vaccine antigen exposure while avoiding harm when the IM immunization is administered properly. The most important factor in the formation of SIRVA has been found to be overpenetration, but appropriate technique is also very important.[22] A standard 1-inch (25 mm) needle can readily reach the subdeltoid bursa, which is situated between 0.8 and 1.6 cm below the skin's surface.[25] The literature makes it very evident that adult deltoid IM vaccinations should not be administered according to a one-size-fits-all approach.[26,27, 28] When selecting needle length, it's crucial to take into account a person's age, weight, and sex because women are more likely to be injured than men because they have less muscle mass and a thicker delta fat pad.[27] Due to the influenza vaccine, some writers have suggested utilizing steroid injections in the subacromial region after SIRVA[29], whereas others have voiced doubts regarding its effectiveness.[18] Subacromial steroids, however, might help with pain complaints if an MRI reveals subacromial bursitis. Although MRI has not been helpful in identifying the pathology in SIRVA,[29] it might be a reasonable course of action if the patient's symptoms persist even after taking NSAIDs for a few weeks. This study aims to increase physician awareness, provide preventive measures, and discuss SIRVA in relation to the COVID-19 vaccine.

CONCLUSIONS

To sum up, mistakes in the administration of vaccines might cause subacromial bursitis and localized inflammatory reactions. It is imperative to prevent such complications by using appropriate approaches, especially in persons who have pre-existing symptoms of cold and cough. Conservative treatment options for patients who experience an abrupt increase in discomfort and loss of shoulder mobility following vaccination include rest and NSAIDs. It is critical to identify and treat shoulder pain and dysfunction as soon as possible, using oral steroids and nonsteroidal anti-inflammatory drugs (NSAIDs) to address the local inflammatory pathology in the bursa.

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