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"Moderna Arm": Cutaneous Side Effect of Moderna Vaccine among Healthcare Providers in Secondary Hospital in Jakarta - Tangerang, Indonesia

Muthia Kamal Putri MD[1*], Anna Rumaisyah MD[2], Ruri D. Pamela MD[3] and Prima Kartika Esti MD[1]

[1]*Dr.Sitanala Hospital Tangerang, Indonesia.*

[2]*Diana Medika Health Clinic Bekasi, Indonesia.*

[3]*Dr. Suyoto Hospital Jakarta, Indonesia.*

[*]Correspondence:

Muthia Kamal Putri, Sitanala Hospital, 15148, Tangerang, Indonesia, Phone: +62 81217070196.

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ABSTRACT

Introduction: *Since the emerging Delta variant of COVID-19 in 2021, the World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) have encouraged world citizens to get booster vaccination. Booster vaccination has been used worldwide to prevent severe COVID-19. Healthcare providers were given the priority to be vaccinated, and the Moderna vaccine was given as chosen booster vaccination. Cutaneous side effect related to the Moderna vaccine has been reported in Public Secondary Hospital in both two cities in Indonesia, Jakarta and Tangerang.*

Material & Methods: *The observation for this report took place from August until September 2021. All the patients gave their informed consent to participate in this case report and explicit consent to use their clinical photos. We collected data on 357 cases for 2 months in Dr. Suyoto Hospital (Jakarta) dan Dr. Sitanala Hospital (Tangerang).*
Results: *The total number of healthcare workers who got the booster vaccine was 1370, and the number of experienced Moderna Arm was 350 cases: 321 cases with edema, urtica, and erythematous rash, and 29 cases with ecchymosis in Suyoto Hospital while in Sitanala Hospital 7 cases of urtica & erythematous rash.*

Conclusion: *There were side effects after the Moderna injection, and it was important to inform the recipient about those effects.*

Keywords

Moderna Arm, Booster, COVID-19, Vaccine, Cutaneous Side Effect.

Introduction

SARS-CoV-2 enters the body through mucosal surfaces via droplets, aerosols, and hand contact. The most common clinical manifestations in COVID-19 patients include fever, dry cough, dyspnea, myalgia, fatigue, runny nose, diarrhea, vomiting, anosmia, and ageusia. Bronchopneumonia appearance is found in X-Ray findings or Ground Glass Opacity in Thorax Computed Tomography Scan. Polymerase Chain Reaction (PCR) swab tests were taken from naso-oropharyng to confirm the diagnosis [1].

The COVID-19 pandemic that started in Wuhan, China, has been spread all over the world since the end of 2019. According to the global statistic on 29 December 2021, there have been 281,808,270 confirmed cases of COVID-19, including 5,411,759 deaths, as reported by World Health Organization (WHO) [2].

This beta-coronavirus disease has become a novel pandemic in Indonesia since the first two cases have been positively diagnosed, when two persons were confirmed to have infected by a Japanese citizen on 2 March 2020 in Depok, West Java. On 9 April, the pandemic has spread to 34 provinces in Indonesia. Stated by The COVID-19 National Task Force of Indonesia, there have been 4.263.168 confirmed case of COVID-19, 4.114.689 recovered cases and 144.097 deaths up until 2 January 2022 [3,4].

Scientists throughout the world has been in a race to develop vaccines since the beginning of 2020. Various vaccination types are produced to obtain the immunity, such as inactivated, viral vector, mRNA, and protein subunit. The vaccination booster with Moderna© vaccine - as mRNA type subunit – was programmed by the Indonesian government to give better protection for health care workers, particularly from delta variant from August through September 2021. There are more than 250 projects that have been initiated for this purpose, but only 14 of them have been authorized for use. In Indonesia, the availability of vaccine distribution was coming from various types namely CoronaVac®, Pfizer-BioNTech®, AstraZeneca®, and Moderna®. The CoronaVac® vaccine contains inactivated coronavirus, is manufactured by a private Beijing-based biopharmaceutical company, SinoVac Biotech, in collaboration with the Brazilian research center, Butantan. Meanwhile, some other messenger-RNA vaccines, The Pfizer-BioNTech® vaccine is produced by Pfizer, an American multinational pharmaceutical corporation based in New York, in association with the German company BioNTech. The generic name of this vaccine is tozinameran (Comirnaty). The Oxford-AstraZeneca® is produced by Oxford University in cooperation with the British–Swedish company AstraZeneca®, along with its Indian version, which is called Covishield. A Massachusetts-based company, Moderna, in collaboration with the U.S. National Institute of Health, manufactures The Moderna® Vaccine. This is an mRNA-based vaccine (mRNA- 1273) encapsulated in LNP [12]. This vaccine has an advantage over Pfizer-BioNTech® in that it can be stored at temperatures equivalent to a standard freezer (−20 ◦C), making it easier to ship to remote and rural areas [5].

As of 27 December 2021, 8,687,201,202 vaccine doses have been globally administered. Based on updated vaccination data of the COVID-19 National Task Force of Indonesia on 2 January 2022, there have been 165.900.887 vaccine doses administered as first dose vaccination, 114.103.362 administered as second dose vaccination, and 1.288.890 as third dose vaccination [2,3,6].

Healthcare providers in Indonesia have been priority vaccinated, with around 700 thousand consisting of 164 thousand doctors, 36 thousand dentists, and 350 thousand nurses, midwives, and community health workers [7]. According to the Indonesia Ministry of Health, in January 2022 data for COVID-19 vaccines are 165.938.279 (79.68%) for the first vaccine dose and the second dose is 114.113.046 (54.79%) consisting of 2.047.311 healthcare providers have been vaccinated in the first dose, 1.962.630 is the second dose and 1.288.786 is the third dose. Public Workers 23.507.588 first dose; 21.158.294 is the second dose, Children age 12-17 years old 22.772.613 is the first dose; 17.147.064 is the second dose, and Citizen 98.026.927 is the first dose; 63.533.743 is the second dose [8].

The COVID-19 vaccines can cause many effects such as myalgia, pain, swelling at the injection site, fever, fatigue, itching, vomiting, and muscle pain after the first and second dose vaccine and can cause anaphylactic shock but it is rarely caused [9]. One of the various vaccinations is Moderna® also has adverse effects and develops after the first and second dose. One of the adverse effects that rarely occurs in Moderna® vaccination, known as “Moderna® arm”, are erythematous reactions around the site of the injection site, pruritic and non-pruritic rash, and also edematous [10,11].

Patients usually experienced uncomfortable symptoms, such as swelling, redness, pain, warmth, and itchiness at the location of vaccine injection. Moderna® arm is used to explain the delayed-type hypersensitivity reaction that occurs approximately a week after the administration of COVID-19 mRNA type vaccines, such as Pfizer-BioNtech® and Moderna®. Participants who used Moderna® reported moderate to severe degrees of erythematous reactions around the injection site: 3.1% after the first dose and 11.9% after the second dose within a week [6].

Material & Methods

A case series study was performed in Dr. Suyoto Hospital and Dr. Sitanala Hospital, Tangerang to assess uncommon clinical side effects of Moderna® injection. The vaccine receivers are healthcare providers who were given Moderna® vaccine booster from August through September 2021 were included. Moderna® vaccination scope in healthcare providers in Dr. Suyoto Hospital is 800 and at Dr. Sitanala Ministry of Health General Hospital is 570 (290 of them are doctors, nurses, laboratory and radiography workers).

Results

We reviewed clinical photographs of 7 out of 357 affected healthcare workers. The number of healthcare workers who experienced Moderna® arm in Suyoto Hospital, reported were 350 cases consisting of 321 cases with edema, urtica & erythematous rash, and 29 cases with ecchymosis. Meanwhile, in Sitanala Hospital, only 7 cases of urtica & erythematous rash were reported.

Most healthcare workers reported consuming paracetamol as analgetic properties alongside applying the cooling patch to relieve the hives. Among our findings, patients commonly experienced a transient, pruritic-urticarial, or a macular erythematous patch in close proximity to the vaccination site 3 to 7 days after Moderna® administration. A few of the healthcare workers' rashes resolved using the cooling patch, mild potency of topical corticosteroid and the others cleared without the intervention of any topical properties.

Discussion

One of the mRNA vaccines is mRNA-1273 or known as the Moderna®vaccine, which teaches our cells to make a spike protein like Coronavirus surface. This vaccine consists of mRNA lipid nanoparticles. When it is administered intramuscularly into the human body, they attach to our cells, especially in our ribosomes, which are taken by antigen-presenting cells (APCs) like dendritic cells. The APCs are driving to lymph nodes where CD4 and CD8 are produced. CD8 produces cytotoxic T lymphocytes to kill infected cells and CD4 activates and produces Th1 cells or T follicular helper (Tfh). Th cells produce the cytokines such as IL-2, IL-4, and Il-5. B-cells turn into plasma cells from those

interleukins to produce amounts of antibodies to fight against the viral spike proteins [11-13].

In our case, the common side effect after the Moderna® vaccine is Moderna® Arm, which is clinically observed as edema, urtica, erythematous rash, and ecchymosis. This effect is known to be not related to patients' medical histories or allergies. Despite the fact that the rash might be attributable to an immunologic response to the mRNA vaccine, it has not been reported as a reaction to other COVID-19 mRNA vaccines like Pfizer-Biotech®. Both Pfizer® and Moderna® vaccines contain polyethylene glycol, a known allergen, as well as other proprietary nonactive ingredients performed as drug vehicles. Nevertheless, the underlying pathophysiological mechanism remains still unknown why Moderna® Arm never occurs after the first dose of vaccination. There also has been no further research about why this reaction has only been observed in recipients of the Moderna® vaccine [6,14].

A possible mechanism of cutaneous side effects of Moderna® vaccine has proposed that m-RNA vaccines cause endothelial damage to microcirculation, occurring blood extravasation, and purpuric lesions. In several studies, it has been reported that activation of T-lymphocytes after m-RNA vaccine is the main cause of endothelial damage. This can be concluded that "Moderna® arm" is a benign cutaneous side effect that resolves in a few weeks and does not represent a contraindication to the second dose of the vaccine; however, further studies are necessary to confirm our hypothesis [14].

All affected healthcare workers in this series were classified as Fitzpatrick's photo-type II-III (consider as lighter skin in Indonesia), based on Indonesia's streamlined skin type. The reason for the predominantly affected lighter skin tone is that erythema may be misrecognized or not as obvious on darker photo-type skin. Among the affected healthcare workers in Figure 1-6, most of them (5 out of 6) were also women. Women may also be more prone to developing Moderna ® arm, just as women are more likely to develop anaphylaxis, immediate hypersensitivity, and injection-site reactions to other vaccines. Finally, it is possible that women may be more likely to report symptoms; because of their concern about the skin lesion, it is also temporarily unpleasant for aesthetic reasons among women [14].

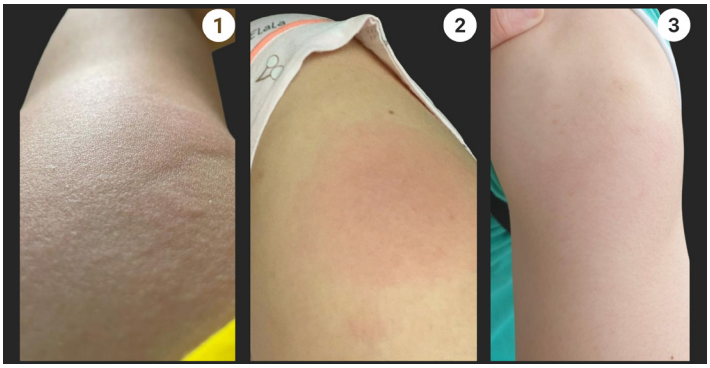

Figure 1-5: Clinical manifestation of Moderna® Arm: erythematous patch, erythematous macules, and annular pink plaques.

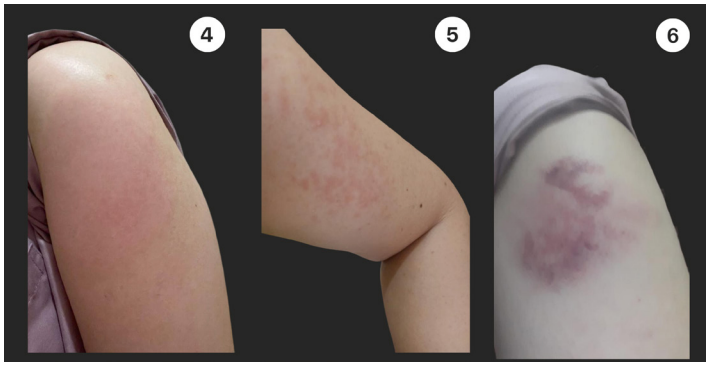

Figure 6: Clinical manifestation of Moderna® Arm: ecchymosis.
*Informed consent: The patient gave consent for photo acquisition and publication.

As COVID-19 vaccine administration increases in today's nation since the emerging new variant named Omicron, clinicians and the public should be aware of Moderna® arm as a cutaneous side effect. It is critical that healthcare professionals distinguish these delayed-type reactions from other differential diagnoses such as immediate-type hypersensitivity reactions and from cellulitis [14]. For drugs-induced injection site reactions, symptomatic treatment such as H1 antihistamines and/or topical glucocorticoids might be given and systemic glucocorticoids can be administered if the lesions persist.14 Wei et al. reported that topical steroids and oral antihistamines are beneficial at eliminating the rash and reducing symptoms, but mostly resolve spontaneously [10].

According to Center Disease of Control Prevention (CDC), applying a cold compress such as a clean, cool, wet wash cold to the injection site can also reduce the symptom of cutaneous side effects after vaccination [13].

CDC recommends still getting another dose injection in the future if a second, additional, or booster shot is recommended. On the next vaccine occasion, medical professionals should ask whether someone ever experienced 'Covid Arm'/ 'Moderna® Arm' from the previous vaccination and consider recommending injection in the opposite arm [10,13].

Conclusion

Despite the fact that booster vaccination is a mandatory health program established by World Health Organization, it is necessary for medical professionals to educate vaccine receivers about this potential cutaneous side effect and monitor conscientiously the possible 'Moderna® Arm' occurrence as a rare cutaneous side effect that might disturb daily activities after getting Moderna® injection. We need to increase awareness of this cutaneous side effect by the ability to examine and treat the illness immediately.

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