

# Acute Generalized Pustular Psoriasis Induced by COVID-19 Vaccine in a Pediatric Patient-Case Report

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## ABSTRACT

To date, several adverse skin reactions following Covid-19 vaccines have been reported. Acute Generalized Pustular Psoriasis (AGPP) is a rare skin disease with potential triggers such as medications, infections and pregnancy. In this report, we present, to our knowledge, the first case of pediatric AGPP following any Covid-19 vaccine.

**Keywords:** Acute Generalized Pustular Psoriasis, Psoriasis, COVID-19, COVID-19 vaccine, Pediatric

## INTRODUCTION

SARS-CoV-2 (COVID-19) virus is a global pandemic that has cost most countries a massive economic losses and overburdened healthcare systems<sup>1</sup>. For that reason, Multiple vaccines were developed against this virus. The Pfizer/ BioNTech (BNT162b2) vaccine is a messenger RNA (mRNA) vaccine which exerts its effect by instructing the body to build a spike protein which is similar to the spike protein present on the surface of the SARS-CoV-2 (COVID-19) virus<sup>2</sup>. Various cutaneous side effects were previously reported after COVID-19 mRNA vaccines such as delayed large local reactions, local injection site reactions, urticaria and others. Most of them are uncommon and non-life threatening<sup>3</sup>. Yet, few papers reported potentially life-threatening conditions like acute generalized pustular psoriasis (AGPP)<sup>4,5</sup>. AGPP is a rare subtype of psoriasis triggered by medications, infections or pregnancy. AGPP presents with flares of widespread sterile pustules on a background of red and tender skin<sup>6</sup>. In this report we present a case of a new onset AGPP after the first dose of Pfizer/ BioNTech (BNT162b2) vaccine in a 12-year-old girl. It is important to be familiar with the cutaneous adverse reactions of COVID-19 vaccines as it is a global pandemic. We aim in our case study to raise physicians' clinical suspicion of AGPP following Pfizer/ BioNTech (BNT162b2) vaccine.

## CASE REPORT

Next day following her first dose of Pfizer vaccine, a previously healthy 12 years old girl started to develop generalized pustular eruption associated with fever and poor general condition (shown in Figure 1). She had no personal or family history of any dermatological diseases like atopic dermatitis or psoriasis. She was rushed for medical care by her family at a governmental hospital in Jeddah where she was admitted as case of severe cutaneous adverse reaction for 2 weeks. She received a course of intravenous steroids for 3 days and topical treatment. Lab

tests were done during admission, but reports were not available. The patient's condition improved and was discharged on topical steroids. Few days after discharge, she started to relapse and develop the same lesions again but this time with fever and generalized fatigue. She was again taken by her family to another hospital where she was admitted for 3 weeks and received ceftazidime and vancomycin due to sepsis. There, she had episodes of hypotension, hypocalcemia, anemia and hypoalbuminemia for which she received corrections. She received only topical steroids and antibiotics by the dermatology team. Due to financial issues and limited improvement, the family decided to discharge her against medical advice.



**Figure 1:** Numerous non-follicular pustules over areas of erythema that developed next day following vaccination

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She presented to our ER the following day complaining of fever, vomiting and skin rash. Physical examination revealed large areas of erythema (more than 70% BSA) with numerous non-follicular pustules over the face, trunk and most parts of the extremities. The oral and genital mucosa were not involved. Significant lower limb edema was observed with no lymphadenopathy. Labs at presentation showed leukocytosis, elevated ESR, hypocalcemia and hypoalbuminemia. Based on history and physical examination, she was initially diagnosed as a case of Acute generalized exanthematous pustulosis (AGEP) by the medical team. She was admitted and received a course of intravenous methylprednisolone (5mg/kg twice daily) for three days. Her condition markedly improved with clearing of most of the skin lesions and was discharged on topical treatment with follow-up with dermatology clinics. She was seen in the dermatology clinic two weeks later. Her condition was starting to relapse again, and she started to re-develop the same generalized pustular eruption (shown in Figure 2A). Skin biopsy was taken and histopathology of the skin lesions showed subcorneal neutrophils with no eosinophils. Since relapses following discontinuation of steroids were more consistent with pustular psoriasis and courses over two weeks were rare with AGEP, the patient was diagnosed as pustular psoriasis and was started on ixekizumab. The patient's weight was 72kg, so she was given 160mg initially, then 80 mg every four weeks by subcutaneous injection. One week following treatment, the patient experienced remarkable improvement with clearing of most skin lesions. She achieved complete remission three weeks after the initiation of the drug with no signs of recurrence at follow up 6 weeks later (shown in Figure 2B). Following this incident, she didn't receive any other vaccines of any type.



**Figure 2A:** Numerous pustules forming pus lakes and scales over large areas of erythema



**Figure 2B:** One month following starting the patient on ixekizumab

## DISCUSSION

AGPP is considered an unusual manifestation of psoriasis with triggering factors that include infections, pregnancy, hypocalcemia, and rapid tapering of steroids. Viral and bacterial infections are common exacerbating factors<sup>7</sup>. During the pandemic, few papers have reported psoriasis flares following severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)<sup>8</sup>. There have been three reported cases in the literature of adults developing AGPP following the first dose of COVID-19 vaccine. A case has been reported of a 72 years old male in Turkey following CoronaVac (also known as Sinovac vaccine) administration<sup>9</sup>. Furthermore, another paper has been reported of also an old woman who developed AGPP following Oxford–AstraZeneca COVID-19 vaccine<sup>4</sup>. Lastly, Danielle et al. reported the first case of pustular psoriasis in a man in his 40s following Pfizer vaccine<sup>5</sup>. To our knowledge, our patient is the first reported case of pediatric pustular psoriasis following any COVID-19 vaccine.

Currently, psoriasis is being understood as an autoimmune disease with no definite autoantigen or immunogen has been identified responsible for the inflammation<sup>10</sup>. Although the exact mechanism responsible for the development of pustular psoriasis following vaccination is not fully understood, several papers have yielded some insights into the pathogenesis. Some studies have suggested that acute stress such as vaccination can enhance the immune system to prepare the body for possible infections. Thus, increasing the risk for triggering autoimmune diseases such as psoriasis<sup>11</sup>.

Case reports and case series suggest that the withdrawal or the initiation of certain medications can stimulate the development AGPP. Among these medications, steroids were the most commonly associated<sup>12</sup>. Our patient had experienced worsening of her condition two weeks following discharge and stopping steroids. This finding favored the diagnosis of AGPP over AGEP alongside with the fact that patients with AGEP usually experience shorter duration (usually less than two weeks after stopping the offending agent) and more rapid improvement after drug withdrawal<sup>13</sup>.

## CONCLUSION

**Since vaccines to prevent COVID-19 are the most promising approach, we believe it's important that dermatologists become familiar with all the cutaneous side effects of COVID-19 vaccination including the rare ones. Besides, it's also crucial to ask about recent vaccinations with any patient presenting with flare or new dermatological diseases.**

**Statement of Ethics:** The paper is exempt from ethical committee approval since this is a single case report without identifying information about the patient. Written informed consent was obtained from the parent/legal guardian of the patient for publication of the details of their medical case and any accompanying images. Ethical approval was not required for this study in accordance with local/national guidelines.

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