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## Myofascial Pain and Treatment

## Effect of gentle exercises on injection site reaction after Covid-19 vaccination. A case report



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## ABSTRACT

**Introduction:** A series of atypical acute respiratory diseases were caused in Wuhan, China, in December 2019 by a novel coronavirus (COVID-19). Over six million confirmed COVID-19 cases had been reported worldwide, and total deaths in the USA from March 1 to May 30, 2020, were approximately 7,81,000. Worldwide, scientists are developing many potential COVID-19 vaccines. Few of the companies got success in the development of a vaccine for COVID-19, but most of the recipients reported injection site reactions like pain, redness, or erythema after vaccination. The present study aimed to evaluate the effect of gentle upper limb exercises to reduce injection site reactions, and here we present a case with post vaccination site reaction that reported pre-assessment score 7 for visual analog scale for pain and score 2 for redness and erythema with Investigator-reported and rated injection site reactions. Then he performed gentle upper limb exercises after 8 and 24 hours of vaccination.

**Result:** The study reported a beneficial effect of these exercises to reduce pain and redness or erythema after Covid-19 vaccination.

**Discussion:** The potential benefit of gentle exercises may be due to their blood flow boost-up and anti-inflammatory effects. However, high-quality controlled trials are warranted further to evaluate the potential benefit of upper limb gentle exercises for the reduction of injection site reactions after the Covid-19 vaccination injection.

**Conclusion:** The clinical experience with the subject shows that gentle exercises for upper limb may reduce the injection site reaction after COVID-19 vaccination.

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## 1. Introduction

A series of atypical acute respiratory diseases were caused in Wuhan, China in December 2019 by a novel coronavirus called SARS-CoV-2. The disease caused by this virus is termed Corona Virus (COVID-19). The virus is transmittable among humans by droplets and contact routes and has caused pandemics worldwide (Yuki et al., 2020). Over six million confirmed COVID-19 cases had been reported worldwide, and total deaths in the USA from March 1 to May 30, 2020, were approximately 7,81,000 (Weinberger et al., 2020), whereas, in India, case positivity rate and a fatality rate were reported 6.5 and 2.8 percent respectively on July 3, 2020 (Samaddar et al., 2020).

Worldwide, scientists are developing many potential COVID-19 vaccines. These vaccines are intended to train the human immune system to safely identify and block the COVID-19 virus. Few of the

companies got success in the development of a vaccine for COVID-19 like Pfizer, Moderna, Johnson & Johnson, and AstraZeneca's. In a clinical trial, Pfizer reported 95% effectiveness of the vaccine in preventing COVID-19 cases with symptoms (Mahase, 2020a), Moderna reported similar results with 94.5% efficacy (Mahase, 2020b), Johnson & Johnson reported 72% effectiveness overall and 86% effective in preventing severe disease whereas AstraZeneca's vaccine reported 79% effectiveness to prevent symptomatic COVID-19 cases and 100% effective in stopping severe cases and hospitalization (Martichoux, 2021). Worldwide, 4.19% and 1.63% population have been taken at least first dose and fully vaccinated respectively, and in India, 3.95% of the population received at least the first dose, and 0.66% of population got fully vaccinated till 30<sup>th</sup> March 2021. Whereas post-vaccination responses of the human body reported in the literature like pain, redness, or erythema at the site of injection (Calina et al., 2020), and the present study reported the effects of gentle upper limb exercises to reduce injection pain and redness or erythema after COVID-19 vaccination.

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## 2. Case presentation

A 34-year-old male subject who is right-handed received a vaccination injection against COVID-19 on March 31, 2021, and at the time of vaccination, he was free from any symptom of COVID-19. Additionally, he was not having any pain or inflammation in his body.

### 2.1. Subject history

The subject received his first vaccination dose of “Covishield” on March 31, 2021, in his left deltoid muscle, and after an hour, he reported pain, redness, and erythema at the site of injection and during pre-assessment, the pain score was on a visual analog scale (VAS) as 7 (VAS; 0 [no pain] to 10 [maximum pain]) and redness and erythema with Investigator-reported and rated injection site reactions (Kern Sliwa et al., 2018) as score 2 (Moderate erythema and redness). He performed gentle upper limb exercises after 8 and 24 hours of vaccination.

### 2.2. Exercise protocol

The subject performed the following gentle upper limb exercises: (a) Shoulder Circle: He abducts his left arm at 90° with palm facing forward and then slowly rotate the arm in backward circles 20 times and then repeated with forwarding circles 20 times. (b) Shoulder Press: He abducts his left arm at shoulder height with palm facing forward, and then he flexed the elbow to 90°. Then he slowly moves the arm toward the ceiling and extends the elbow completely. Finally, come back to the starting position. He repeated this exercise 10 times. (c) Sideways overhead sweep: He stands straight with palms facing forwards, and then he slowly abducts his left shoulder up to 180° while maintaining elbow in extension and hold this position for 5 seconds and then slowly come back to starting position and repeats this exercise 10 times. (d) Forward overhead sweep: He stood straight with the left palm facing forward, and then he slowly flexed his left shoulder up to 180° while maintaining elbow in extension and held this position for 5 seconds and then slowly came back to starting position and he repeated this exercise for 10 times. (e) Side to front reach: He stands straight with the arms on his side, and then he abducts his shoulders up to 90° with palms facing downwards; then he adducts the shoulder and touches his both thumbs with each other in front of the chest and hold this position for 5 seconds then he squeezed his shoulder blades and move his shoulders in the abduction and then come back to starting position and he repeated this exercise for 10 times (Triffin, 2021).

## 3. Result

The subject underwent post-treatment assessment and 1st follow up assessment, same as pre-assessment after 24 and 48 hours of injection respectively, and he reported Visual analog scale score as 3 and 0 and Investigator-reported and rated injection site reactions score as 1 (mild) and 0 (absent) at post-treatment and 1st follow-up assessment respectively.

## 4. Discussion

In the whole world, vaccination drive against COVID-19 is going on a large scale and most of the subjects reporting pain and redness or erythema post-vaccination on the injection site. The present case report is reporting the beneficial effect of gentle upper limb exercises to reduce pain and redness or erythema on injection site post-vaccination, and this beneficial effect may be achieved

because injection in deltoid induced microtrauma and results in the production of metabolic byproducts that can produce injection site reactions. Whereas, gentle exercises induce movements in the muscle fibers and increases blood flow to the affected muscle and remove the metabolic byproducts (chemicals) from the affected muscles and reduce pain, redness, or erythema (Triffin, 2021). In addition, Dimitrova et al. (2017) reported that active muscle contractions that occur with gentle movement might potentially disperse localized edema, or swelling, to some extent (Dimitrova et al., 2017). So might be these are the reasons behind the beneficial effect of gentle upper limb exercises to reduce pain, redness, or erythema after COVID-19 vaccination injection. However, it is recommended for a high degree of controlled trials are necessary with the optimal sample size to evaluate the significant role of upper limb gentle exercises for the reduction of injection site reactions after the COVID 19 vaccination injection.

## 5. Conclusion

The clinical experience with the subject shows that gentle exercises for upper limb may reduce the injection site reaction after COVID-19 vaccination.

## CRedit authorship contribution statement

**Varun Kalia:** Conceptualization, Funding acquisition, Formal analysis, Writing – original draft, Writing - original draft, Conception and design of the study, acquisition of data, analysis, and interpretation of data, Drafting the manuscript, revising the manuscript critically for important intellectual content.

## Declaration of competing interest

The authors have no affiliation with any organization with a direct or indirect financial interest in the subject matter discussed in the manuscript.

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## References

- Calina, D., Docea, A.O., Petrakis, D., Egorov, A.M., Ishmukhametov, A.A., Gabibov, A.G., Shtilman, M.L., Kostoff, R., Carvalho, F., Vinceti, M., Spandidos, D.A., Tsatsakis, A., 2020. Towards effective COVID-19 vaccines: updates, perspectives and challenges. *Int. J. Mol. Med.* 46, 3–16. <https://doi.org/10.3892/ijmm.2020.4596>. Review.
- Dimitrova, S., Hultenga, E., Honga, S., 2017. Inflammation and exercise: inhibition of monocytic intracellular TNF production by acute exercise via  $\beta$ 2-adrenergic activation. *Brain Behav. Immun.* 61, 60–68. <https://doi.org/10.1016/j.bbi.2016.12.017>.
- Kern Sliwa, J., Savitz, A., Nuamah, I., Mathews, M., Gopal, S., Elefant, E., Najarian, D., Alphas, L., 2018. An assessment of injection site reaction and injection site pain of 1-month and 3-month long-acting injectable formulations of paliperidone palmitate. *Psychiatr. Care* 54, 530–538. <https://doi.org/10.1111/ppc.12267>.
- Mahase, E., 2020a. Covid-19: Pfizer vaccine efficacy was 52% after first dose and 95% after second dose, paper shows. *BMJ* 371, m4826. <https://doi.org/10.1136/bmj.m4826>.
- Mahase, E., 2020b. Covid-19: Moderna vaccine is nearly 95% effective, trial involving high risk and elderly people shows. *BMJ* 371, m4471. <https://doi.org/10.1136/bmj.m4471>.
- Martichoux, A., 2021. AstraZeneca, pfizer, Moderna, Johnson & Johnson: breaking down the differences between coronavirus vaccines. ABC 7 News [WWW Document]. <https://abc7news.com/best-covid-vaccine-astrazeneca-moderna-most-effective/10441395/>.
- Samaddar, A., Gadepalli, R., Nag, V.L., Misra, S., 2020. The enigma of low COVID-19 fatality rate in India. *Front. Genet.* 11, 854. <https://doi.org/10.3389/fgene.2020.00854>.
- Triffin, M., 2021. 6 gentle exercises to reduce arm soreness from the COVID-19 vaccine [WWW Document]. *livestrong.com*. URL. <https://www.livestrong.com/>

[article/13731885-exercises-reduce-arm-soreness-after-covid-vaccine/](#). accessed 4.4.21.  
Weinberger, D.M., Chen, J., Cohen, T., Crawford, F.W., Mostashari, F., Olson, D., Pitzer, V.E., Reich, N.G., Russi, M., Simonsen, L., Watkins, A., Viboud, C., 2020. Estimation of excess deaths associated with the COVID-19 pandemic in the

United States, March to may 2020. *JAMA Intern. Med.* 180, 1336–1344. <https://doi.org/10.1001/jamainternmed.2020.3391>.  
Yuki, K., Fujiogi, M., Koutsogiannaki, S., 2020. COVID-19 pathophysiology: a review. *Clin. Immunol.* 215, 108427. <https://doi.org/10.1016/j.clim.2020.108427>.