CASE REPORT
SMELL AND TASTE DISORDERS
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Olfactory Dysfunction Following CoronaVac Coronavirus Disease 2019 Vaccination: A Case Report

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ABSTRACT

Global vaccination programs are essential in order to achieve herd immunity and to minimize the risks of severe acute respiratory syndrome coronavirus-2 infection. The side effects of the CoronoVac coronavirus disease 2019 (COVID-19) vaccine have not yet been fully reported. Olfactory dysfunction is a characteristic finding of COVID-19 infection. To the best of our knowledge, olfactory dysfunction following CoronoVac COVID-19 vaccination has not previously been observed. We report a case of such dysfunction developing following CoronaVac COVID-19 vaccination.

Keywords: CoronaVac vaccination coronavirus COVID-19 olfactory dysfunction side effects

Introduction

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) infection resulted in a global pandemic and significant mortality. Global vaccination programs are essential in order to achieve herd immunity and to minimize the risks of the disease.[1] CoronaVac (Sinovac Biotech, Beijing, China) is an inactive vaccine developed against coronavirus disease 2019 (COVID-19) by Sinovac Life Sciences (Beijing, China).[2] A randomized, double-blind, placebo-controlled phase 1/2 study showed the reliability, tolerability, and immunogenicity of the CoronoVac COVID-19 vaccine in healthy individuals aged over 18 years. Turkey also took part in the phase 3 study of this vaccine. The COVID-19 vaccination process in Turkey commenced on January 13, 2021, among health workers, following approval for emergency use by the Ministry of Health Medicines and Medical Devices Agency. The side effects of the CoronoVac COVID-19 vaccine have not yet been fully reported.[3] To the best of our knowledge, olfactory dysfunction following CoronoVac COVID-19 vaccination has not previously been observed. We report a case of this dysfunction developing following CoronaVac COVID-19 vaccination. Written informed consent was obtained from the patient in this case.

Case Presentation

A 43-year-old female health worker presented to our ear, nose, and throat clinic due to olfactory and gustatory disorder. The patient's history revealed a positive SARS-CoV-2 polymerase chain reaction (PCR) test performed following symptoms such as malaise, headache, and cough on December 16, 2020. No change in the patient's sense of smell and taste had occurred at that time. A few days after CoronaVac vaccination on January 20, 2021, the patient reported a mild stinging sensation on the tip of the tongue and a metallic taste and that the SARS-CoV-2 PCR test performed on suspicion of COVID-19 had resulted negative. Similar symptoms developed a few days after the second CoronaVac COVID-19 vaccination performed 4 weeks after the first dose, and the SARS-CoV-2 PCR test performed on suspicion of COVID-19 again resulted negative. This time the symptoms resolved entirely after 2 weeks. However, gustatory–olfactory dysfunction developed approximately 2 months after the second dose. The patient began perceiving all pleasant and unpleasant smells as identical and as sufficiently unpleasant to cause nausea. A decrease in eating and drinking and weight loss then followed. The patient's vaccination chart is shown in Figure 1. Severe acute respiratory syndrome coronavirus-2 PCR tests performed on various

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Figure 1. The patient's vaccination chart.

different days due to suspicion of COVID-19 on the part of the patient all resulted negative. The patient's SARS-CoV-2 PCR tests are shown in Table 1. The patient had no other symptoms following vaccination and no disease or condition capable of causing olfactory dysfunction. She had no history of smoking, or additional disease, and was not regularly using any medication. Physical examination was normal. Laboratory tests and cranial magnetic resonance imaging were also normal. The patient was started on olfactory training and intranasal steroid (beclomethasone dipropionate) therapy. Her symptoms decreased by half following a 1-month treatment.

Table 1. The Patient's SARS-CoV-2 PCR Tests

Date	COVID-19 PCR
26.12.2020	Negative
30.12.2020	Negative
19.01.2021	Negative
03.02.2021	Negative
23.02.2021	Negative
12.03.2021	Negative
11.04.2021	Negative

COVID-19, coronavirus disease 2019; PCR, polymerase chain reaction; SARS-CoV-2, severe acute respiratory syndrome coronavirus-2.

Main Points

- It is important for clinicians to be aware of vaccine side effects associated with continuing global vaccination campaigns.
- The side effects of the CoronoVac coronavirus disease 2019 (COVID-19) vaccine have not yet been fully reported.
- To the best of our knowledge, olfactory dysfunction following CoronoVac COVID-19 vaccination has not previously been observed.
- To the best of our knowledge, our patient represents the first case of olfactory disorder following the CoronaVac COVID-19 vaccine.

Discussion

Olfactory function is an important part of the chemosensorial system and plays an important role in digestive behavior. The sense of smell is highly important in perceiving the flavors of foods, in the awareness of surrounding dangers, and in social communication. Post-viral anosmia accounts for 40% of all cases of anosmia in adults. Well-known causes of post-viral anosmia include the common cold and upper respiratory tract infections.[4]

The most widespread symptoms observed after vaccination are headache, fatigue, muscle pain, fever, and arthralgia. Olfactory impairment after vaccination is a rare complication, the pathophysiology of which is still unclear. However, the development of an inflammatory reaction in the olfactory neuroepithelium or the presence of the virus on the neuroepithelium or olfactory bulb may account for post-vaccination olfactory disturbance.[5]

Olfactory dysfunction is a characteristic finding of COVID-19 infection. A prevalence ranging between 70% and 90% has been reported in some studies.[6,7] It may emerge as the only finding of the disease in some patients, while in others it may accompany other COVID-19 symptoms, such as fever, cough, and shortness of breath. The pathogenesis of COVID-19-related olfactory dysfunction is still not fully understood.[4] Severe acute respiratory syndrome coronavirus-2 has been shown to bind to angiotensin-converting enzyme 2 (ACE2) and to cause systemic impacts on the lungs and other organs. Angiotensin-converting enzyme 2 receptors are widely present in different regions of the body and in the nasal mucosa.[3] Coronavirus disease 2019-related olfactory dysfunction may be associated with olfactory cleft obstruction, infection of sustentacular supporting cells that express ACE2 receptors, neuropilin-1 receptor-mediated olfactory sensory cell damage, and olfactory bulb damage.[6,7]

Although there are no proven methods in the treatment of olfactory dysfunction developing following COVID-19, olfactory training has been shown to be more beneficial than topical corticosteroid use and has been recommended in treatment.[4] Olfactory training (in the form of smelling rose, clove, and lemon for 20 seconds twice daily) and topical corticosteroid were also employed as treatment in our case. A significant decrease was observed in the patient's symptoms.

Vaccination campaigns against COVID-19 infection are being conducted across the world, and the number of vaccinated individuals is rising rapidly. It is therefore also likely that the number of individuals with vaccine-related side effects will also increase, and our understanding of the subject will improve accordingly. Lechien et al[5] reported 6 cases of olfactory and gustatory impairment developing after the use of AstraZeneca and Pfizer vaccines. Konstantinidis et al[8] reported development of hyposmia in 2 healthy women following the second dose of the Pfizer–BioNTech vaccine. Partial improvement was observed in 1 case after olfactory training (lemon, rose, eucalyptus, and cloves) and complete resolution in the other. Zamzami et al[9] reported that a 38-year-old male patient developed sudden parosmia 1 week after the second dose of the AstraZeneca vaccine. Fantin et al[10] reported hyposmia that developed 2 days after the first dose of the AstraZeneca vaccine in a 76-year-old male patient and that partially resolved after treatment. Keir et al[11] reported that a 57-year-old female patient developed "smelling smoke" phantosmia after the Pfizer–BioNTech vaccine.

A limited number of cases with CoronaVac COVID-19 vaccine side effects have been reported. Akdaş et al[2] reported the development of pityriasis rosea 4 days after both doses of the CoronaVac COVID-19 vaccine in a 45-year-old female health worker. The lesions resolved following medical treatment. Onsun et al[12] reported a case of a 72-year-old male patient who developed generalized pustular psoriasis 4 days after the first dose of the CoronaVac COVID-19 vaccine. That patient's lesions also resolved entirely following medical treatment. To the best of our knowledge, our patient represents the first case of olfactory disorder following the CoronaVac COVID-19 vaccine. Our patient's symptoms decreased after treatment, but complete response was not achieved.

It is important for clinicians to be aware of vaccine side effects associated with continuing global vaccination campaigns. The benefits of vaccination against COVID-19 infection, which has caused millions of deaths to date, also far outweigh the potential risks. We therefore support the World Health Organization's recommendations concerning COVID-19 vaccination.

Informed Consent: Written informed consent was obtained from the patient who agreed to take part in this study.

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