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Olfactory and Gustatory Dysfunction Post Covid 19 Vaccination (Covishield)

Dr Suchitra N Sheelan*# Dr PR Venkatarajamma* Dr Akshaya Sundari* Dr Ashwini Doddamani* Dr Divyashree M*

**Department of ENT; Sridevi Institute of Medical sciences Sira Road, TCB - NH4 Rd, Lingapura, Tumakuru, Karnataka 572106*

Corresponding author

Abstract:

Introduction: The possible side effects of Covishield Vaccine include reactions at the site of injection (such as pain, swelling, and redness), headache, nausea, vomiting, muscle pain, joint pain, fatigue, malaise (general discomfort), fever, chills, and flu-like symptoms. Most of these side effects are mild and temporary (subside within 2-3 days)

Aim: The aim of this study was to determine if gustatory and olfactory disturbances were a part of this spectrum.

Materials and methods: PROSPECTIVE OBSERVATIONAL STUDY. A study involving all vaccinated individuals who have taken COVISHIELD vaccine in SIMS and RH in the study period, Tumkur consenting to participate in the study. Study included all candidates chosen with strict application of inclusion and exclusion criteria. A sample size of 100 was taken as per convenience sampling. All statistical analyses were performed using commercial software (SPSS Version 26.0 for Windows, SPSS, Inc., Chicago, IL). The associations between reduced olfaction and the sense of taste and its association with Covishield vaccination was investigated. The threshold for statistical significance was set at $P < .05$.

Results: Large number of young patients of age group 18-27 participated. 70% of them were females and students. Post vaccination there was no significant change in the pre and post smell score

Conclusion: We have found that Covishield vaccine did not cause anosmia and dygeusia in our study population, post two doses of the vaccine.

Keywords: Covishield; dygeusia anosmia; covid

INTRODUCTION:

The entire globe experienced the new severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) beginning from December 2019. From its start in Wuhan, China, it has spread worldwide causing the pandemic of coronavirus disease 2019 (COVID-19). This virus primarily involves the respiratory tract causing symptoms such as cough, fever, breathing difficulty etc. Its presentation ranged from mild symptoms to severe pneumonia to multi organfailure. Statistics show in September 2020, SARS-CoV-2 had caused over one million deaths, and 7,71,000 deaths in April 2022. Cough, fever and breathing difficulty are the main features of this virus which targets the respiratory system. Many cases present with mild symptoms whereas few may progress to severe disease like pneumonia and multi-organ failure. Studies have shown ageusia and anosmia as cardinal symptoms associated with Covid-19, as declared by the World Health Organisation with a prevalence of 70% to 90% in some studies. The pathophysiological mechanism for anosmia may include injury to the olfactory bulb, sensory cells , olfactory cleft obstruction and infection of the sustentacular supporting cells. Anosmia appears to be related mainly to damage to the olfactory neuroepithelium rather than due to obstructed olfactory cleft. Two of the above mentioned mechanisms entail viral spike binding to olfactory epithelium cells (olfactory receptor neurons and sustentacular cells). 2 Viral proteins, mainly spike protein, appear to cause indirect tissue injury without actively replicating the virus. The recently developed anti-COVID-19 messenger RNA (mRNA) vaccines encode or bear the spike protein, it is possible that the immune response or the spike protein itself might induce olfactory epithelial damage.

GUSTATORY- aguesia- loss of taste (independent or in association with other manifestations), recent literature presents with anosmia (loss of smell) . Loss of taste is now a distinguishing symptom of COVID-19 with a high predictive value. Angiotensin-converting enzyme 2 (ACE2) receptors have been found in the epithelium of taste buds and salivary glands, not only in rhesus macaques but also in humans.[18] Salivary glands in rhesus macaques have been demonstrated to be an early target for SARS-CoV,[19] and SARS-CoV RNA has been demonstrated to be present in saliva before pulmonary lesions.[20] It is, therefore, plausible that human salivary glands may be affected early on by SARS-CoV-2 infection, resulting in salivary gland dysfunction with subsequent salivary flow impairment, in both quality and quantity, and the resultant dysgeusia as an early symptom in asymptomatic patients with COVID-19.

It has been has been suggested as neurologic nature as a possible mechanism for dysgeusia.[21] Indeed, gustatory and olfactory functions are closely linked[22]: Impairment of the olfactory system, resulting from direct damage to non-neuronal cells in the olfactory epithelium wherein ACE2 receptors are highly expressed, via replication and accumulation of SARS-CoV-2 virus,[23] can lead to taste disturbance.[22] The viral lytic pathway could also directly affect the peripheral neuronal trajectory of the gustatory tract in 2 ways: (1) direct damage of ACE2-expressing cells of the taste buds and peripheral taste neurosensory chemoreceptors, (2) direct damage of any of the cranial nerves responsible for gustation (CN VII, IX, or X). Among these, damage to chorda tympani (CN VII) might be the most plausible explanation.S Once the nasopharynx is colonized, SARS-CoV-2 virus could use the eustachian tube as a port of entry and colonize the middle ear, causing subsequent damage to the chorda tympani and the resultant dysgeusia. Involvement of the central nervous system seems less likely because the manifestations of such involvement (e.g., meningitis/encephalitis) in patients with

COVID-19 usually last longer and are less frequent than dysgeusia.

COVISHIELD Covishield Vaccine has been developed by AstraZeneca with Oxford university in the UK and is being manufactured by the Serum Institute of India (SII) in Pune. Successful clinical trials have been conducted in S.Africa, Brazil, and the UK with bridging study results in the Indian population based on which the approval was granted by DCGI (Drugs Controller General of India). Covishield Vaccine is given as an injection into the muscle of the upper arm. The vaccination course consists of two separate doses. The government of India has extended the gap between the first and the second dose to 12-16 weeks. Taking just a single dose is not enough as it is insufficient to produce a protective level of antibodies in the body to prevent the infection. Initially, the recommended doses were given 4 to 6 weeks apart. However, clinical trials showed that Covishield Vaccine has an average efficacy of 54% when the 2 doses are administered 4 to 6 weeks apart. Furthermore, the efficacy has been reported to increase to around 79% if the gap between 2 doses is increased. Therefore, according to the new directives, the gap between the 2 doses has been raised to 12-16 weeks.

The possible side effects of Covishield Vaccine include reactions at the site of injection (such as pain, swelling, and redness), headache, nausea, vomiting, muscle pain, joint pain, fatigue, malaise (general discomfort), fever, chills, and flu-like symptoms. Most of these side effects are mild and temporary (subside within 2-3 days) The aim of this study was to determine if gustatory and olfactory disturbances were a part of this spectrum.

MATERIALS AND METHODS:

Study design prospective observational study. A study involving all vaccinated individuals who have taken COVISHIELD vaccine in SIMS and RH in the study period, Tumkur consenting to participate in the study. StudyConducted from January 2021 to June 2021. Inclusion Criteria is all individuals taking COVISHIELD and consenting for study and Individuals in age group of 18-75 years and Those who developed COVID-19 Disease in the last 16 weeks. Exclusion Criteria are Individuals with preexisting smell and taste disturbances secondary to preexisting, underlying conditions and Individuals who refused consent to participate in study. Study included all candidates chosen with strict application of inclusion and exclusion criteria. A sample size of 100 was taken as per convenience sampling

All included patients were interviewed using a standardized 2-section questionnaire following collection of demographic data and general information, including the dates of vaccination. Section 1included a questionnaire for smell assessment wherein the candidates post each dose of Covishield vaccine were subjected to a smell and taste assessmentirst. Here they were blinded and presented with 10 stimuli in an opaque jar to each nostril.. Patients are given a list of 4 possible answers and asked to choose the answer from the list. The patient is required to choose an answer even if he or she does not recognize the odorant. The test supervised by primary investigator and took about 5 minutes to complete one test. The score was calculated from the number of correctly identified stimuli entered systematically and analysed.

Taste function in various areas of the tongue and oral cavity was measured using a prepared test kit which included test solutions pertaining to each bitter, sweet, salty, sour, or umami. Cotton-tipped swabs were used as applicators, soaked with a strong concentration of the basic tastes were placed randomly on the four quadrants of the tongue and both sides of the soft palate. Patients were asked to rinse their mouth with water in between each taste presentation. They were given the second questionnaire with five options for each test solution and asked to choose the answer from the list. The score is calculated from the number of correctly identified stimuli, entered systematically and analysed. This was also supervised by primary investigator and took about 5 minutes to complete one test.

All statistical analyses were performed using commercial software (SPSS Version 26.0 for Windows, SPSS, Inc., Chicago, IL). The associations between reduced olfaction and the sense of taste and its association with Covishield vaccination was investigated. The threshold for statistical significance was set at $P < .05$.

METHODOLOGY

All included patients were interviewed using a standardized 2-section questionnaire following collection of demographic data and general information, including the dates of vaccination. Section 1included a questionnaire for smell assessment wherein the candidates post each dose of Covishield vaccine were subjected to a smell and taste assessmentirst. Here they were blinded and presented with 10 stimuli in an opaque jar to each nostril.. Patients are given a list of 4 possible answers and asked to choose the answer from the list. The patient is required to choose an answer even if he or she does not recognize the odorant. The test supervised by primary investigator and took about 5 minutes to complete one test. The score was calculated from the number of correctly identified stimuli entered systematically and analysed.

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All statistical analyses were performed using commercial software (SPSS Version 26.0 for Windows, SPSS, Inc., Chicago, IL). The associations between reduced olfaction and the sense of taste and its association with Covishield vaccination was investigated. The threshold for statistical significance was set at $P < .05$.

RESULTS:

About 88% of the participants beloged to age group of 18-22 years (Table No 1). And other participants were five or less than five. Most of the participants(about 75%) were female (table No 2). About 87% of the participants were students (Table 3). The smell score was done prior to and after vaccination. The smell score didn't show statistical significant difference between pre and post vaccination (Table No 4). The taste score was done prior to and after vaccination. The taste score didn't show statistical significant difference between pre and post vaccination (Table No 5)

Table No 1: Table showing age wise distribution of participants

Age group	No. of patients
18-27	88
28-37	3
38-47	5
38-47	5
58-67	3
Total	100

Table No 2: Table showing Gender wise patients details

Gender	No. of patients
Female	74
Male	26
Total	100

Table No 3: Table showing occupation of the participants

Occupation	No. of patients
CLERK	1
DOCTOR	6
DRIVER	1
HOUSEMAID	2
HOUSEWIFE	1
MAID	1
STUDENT	87
TAILOR	1
Total	100

Table No 4: Table showing Pre and post vaccination smell score

	Pre-vaccine smell score	*Post vaccine smell score*
Mean	10.260	10.200
Variance	1.245	1.313
t Stat	2.514	
P-value	0.007	

Table No 5: Table showing Pre and post vaccination taste score

	Pre-vaccine taste score	*Post vaccine taste score*
Mean	4.949	4.949
Variance	0.048	0.048
t Stat	0.130	
P-value	0.500	

CONCLUSION

We have found that Covishield vaccine did not cause anosmia and dygeusia in our study population, post two doses of the vaccine. The patients were examined pre-vaccination and four weeks post vaccination. The data was analysed and a p value of .007 for smell scores and .005 for taste scores was found and these values were not significant, thereby showing that Covishield vaccine is a safe vaccine to administer with respect to smell and taste disturbances.

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