



POST COVID-19 VACCINATION SYMPTOMS IN THE ORAL CAVITY: A SURVEY-BASED STUDY

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ABSTRACT **Background:** In late December 2019, an outbreak of an unknown disease called pneumonia of unknown cause occurred in Wuhan, Hubei province, China. The unfurling of the outbreak infected 9720 people in China with 213 deaths and to infect 106 people in 19 other countries up to 31 January 2020. The world wide count of corona cases is 123,877,740; the need of a vaccine for corona arises at this juncture. The vaccine drive in India started in the month of January, 2021. Corona vaccine exhibits mild general and oral side effects. **Aims:** The aim of the present study was to determine the symptoms experienced in the oral cavity by the persons those who were vaccinated. **Materials & Methods:** A survey based study was done to determine manifestations of the oral symptoms of COVID vaccine. 1000 participants were included in the study. The participants were asked to fill up a questionnaire for the study purpose. **Results:** Out of 1000 patients, the most common reported symptoms manifested in the oral cavity were burning sensation in the mouth, bitter taste in the mouth and altered taste sensation; whereas the common general symptoms were fever, body ache and pain at the injection site. **Conclusion:** within the limit of the present study, we have found that the overall side effects of the corona vaccine are mild in nature and they are self-limiting. Similar study with larger sample size is needed for better outcome.

KEYWORDS : Corona vaccine, burning sensation in the mouth, bitter taste in the mouth, altered taste sensation.

INTRODUCTION:

Corona virus is a zoonotic ribonucleic acid virus, which was first discovered in Wuhan, China in persons exposed to a sea food or wet market. For the third time in many decades, a corona virus has crossed species to infect human populations. This virus is provisionally called as 2019-nCoV. First reports indicated that human-to-human transmission was limited or nonexistent, but we now know that such transmission occurs.⁽¹⁾

The organization of the particles of the corona virus is by long ribonucleic acid polymers. The center of the virus particle consists of these RNA polymers. The whole structure of the virus is secured by a capsid. A capsid is a lattice of repeated protein molecules, which are referred to as coat or capsid proteins. This virus is closely related to the viruses causing the earlier SARS and MERS outbreaks.

Developing a vaccine requires growing large amounts of virus, often in animals, or in tissue culture at large scale. The viruses are inactivated by radiation, heat or chemicals or are derived from genetically weakened strains. An alternative to this is the segregation of the viral proteins. This method is safer and easier to perform. But the response of the body's immune system to the isolated viral proteins is not as strong as it is to the organized lattice of the intact virus particles. A more recent strategy involves injecting individuals with ribonucleic acid or deoxyribonucleic acid encoding for viral proteins. These nucleic acids can be administered alone or through man-made vectors that help deliver material into the body. Although in any strategy, enough material is needed to inject reasonable doses into millions of people.

In India, the COVID vaccine was launched on 16th January, 2021, which was first administered to the health care and front-line workers. The current survey based study was done to assess the oral manifestations of vaccinated persons.

AIM OF THE STUDY:

The aim of the present study was to determine the oral symptoms experienced by the persons those who were vaccinated partially or fully.

MATERIALS AND METHODS:

A survey based study was conducted in the department of oral medicine and radiology of a dental college & hospital in Raichur, Karnataka, on 1000 individuals those who have got the COVID vaccination done either single dose or both the doses. Sample size estimation was done by using the formula $n = \frac{z_{1-\alpha/2}^2 p(1-p)}{d^2}$, Where, p = previous expected values = 1.4, d = desired Margin of error = 0.05, $Z_{1-\alpha/2}$ confidence interval of 95%, $z = 1.96$ & n = sample size. A simple random sampling was done to select 1000 individuals for the study. Institutional ethical clearance (Ref no: AME/DC/260/2020-21; Approval date: 17/02/2021) was acquired from the review committee of AME'S Dental College and Hospital, before the study was started. The study was done in accordance to the 1975 Helsinki declaration. Written informed consent was taken from all the participants.

The study was undertaken to learn about the oral manifestations experienced after being vaccinated.

A questionnaire was prepared and distributed to 1000 vaccinated individuals, those who were interested to take part in the study. The questionnaire was designed to find out the general and oral manifestations. The general manifestations listed in the questionnaire were body ache, fever, malaise, lethargy, chest pain, vomiting, allergic reaction, pain at the injection site, burning eyes and loss of appetite; and the listed oral manifestations were burning sensation in the mouth, bitter taste in the mouth, xerostomia, thickened saliva, tingling sensation in the mouth and altered taste sensation. The vaccination period was divided into 0-24 hours, 24-48 hours and 48-72 hours. The participants were asked to tick the symptoms they have experienced in that time period.

The results were collected and represented as bar diagrams and pie charts.

RESULTS:

Out of 1000 participants, 57% individuals have experienced body ache within 0-24 hours, 52.5% within 24-48 hours and 20.5% within 48-72 hours.

58% participants experienced fever within 0-24 hours, 50.5% within

24-48 hours and 11.5% within 48-72 hours.

Malaise was reported by 50.5% participants within 0-24 hours and 49.5% participants within 24-48 hours and 10.5% within 48-72 hours.

41% participants experienced lethargy within 0-24 hours, 50.5% within 24-48 hours and 16% within 48-72 hours.

Only 7.5% participants reported chest pain within 48-72 hours, 3% within 24-48 hours and 1% within 48-72 hours. Vomiting was reported by 5.5% participants within 0-24 hours and 2% within 24-48 hours.

Allergic reaction was experienced by only 2.5% participants 0-24 hours, by 2.5% within 24-48 hours and only by 0.5% within 48-72 hours.

58% participants reported pain at the injection site within 0-24 hours, 44.5% within 24-48 hours and 22.5% within 48-72 hours.

Burning eyes was experienced by 36% participants within 0-24 hours and by 15% within 24-48 hours and 16.5% within 48-72 hours.

14.5% participants experienced loss of appetite within 0-24, 10% within 24-48 hours and 6.5% within 48-72 hours.

Out of 1000 participants, within 0-24 hours, 39.6% participants experienced altered taste sensation, 11.5% experienced tingling sensation in the mouth, 36.1% experienced thickened saliva, 35.5% experienced xerostomia, 49.8% experienced bitter taste in the mouth, and 42.7% experienced burning sensation in the mouth. [Bar diagram 1, Pie chart 1].

Within 24-48 hours, 52.2% participants reported altered taste in sensation in the mouth, 15.5% reported tingling sensation in the mouth, 18.5% reported thickened saliva, 27.5% reported xerostomia, 38.9% reported bitter taste in the mouth, and 37.8% reported burning sensation in the mouth. [Bar diagram 2, Pie chart 2].

Within 48-72 hours, 39.8% participants reported altered taste in the mouth, 11% reported tingling sensation in the mouth, 13.6% reported thickened saliva, 11.5% reported xerostomia, 21.8% reported bitter taste in the mouth, and 21.5% reported burning sensation in the mouth. [Bar diagram 3, Pie chart 3].

Along with above general and oral manifestations, 7.1% participants experienced chills within 0-24 hours, 3.61% participants reported intermittent headache. Some participants also have reported nausea, rashes, diarrhoea, sore throat, ulcers in the mouth and lymph node enlargement.

DISCUSSION:

In early December 2019, the first pneumonia cases of unknown origin were identified in Wuhan, the capital city of Hubei province.^[2] The causative pathogen was identified as novel corona virus (nCoV) by some independent laboratories. Several researches reported that SARS-CoV-2 likely originated in bats, based on the similarity of its genetic sequence to that of other CoVs. The intermediary host of SARS-CoV-2 between a potential bat reservoir and humans remains unknown.

The major route of transmission of COVID-19 is droplet and close contact. The mean incubation period is about 5 days, ranging from 1 to 14 days.^[3]

Clinical manifestations of 2019-nCoV infection and SARS-CoV show resemblance. The most common features include fever, dry cough, dyspnoea, chest pain, fatigue and myalgia. Headache, dizziness, abdominal pain, diarrhoea, nausea, and vomiting are the less common features. Grave complications such as hypoxemia, acute respiratory distress syndrome, arrhythmia, shock, acute cardiac injury, and acute kidney injury have been reported among COVID-19 patients.

The commonly found laboratory abnormalities among COVID-19 patients are lymphopenia, prolonged prothrombin time, and elevated lactate dehydrogenase. ICU-admitted patients have more laboratory abnormalities compared to non-ICU patients. Elevated aspartate aminotransferase, creatine kinase, creatinine, and C-reactive protein have been found in the blood serum of several COVID patients. Many patients have shown normal serum procalcitonin levels. COVID-19

patients have excessive level of Interleukin1 β , Interferon- γ , and Monocyte chemoattractant protein-1. ICU-admitted patients have elevated concentration of granulocyte-colony stimulating factor, monocyte chemoattractant protein-1A, macrophage inflammatory protein-1A, and tumour necrosis factor- α .^[4]

At the present time, no established therapies for this virus exist in the world. The rapidly expanding knowledge concerning corona virus provides a considerable number of potential drug targets. Worldwide scientists are working to find and develop treatments for COVID-19. Oxygen is the quintessential supportive care for ailing patients and for those who are vulnerable for severe disease. There is the use of more advanced respiratory support such as ventilation for patients who are critically unwell. Dexamethasone lessens the time span on a ventilator and extricates the lives of patients with severe and critical illness.

Vaccination is an effortless, secure, and efficacious way of safeguarding people against detrimental illness. Vaccines have the paramount of important in the fight against COVID-19. Compared to other corona viruses, the infectivity of the SARS-CoV-2 virus is very high; so an efficacious vaccine is the best way to contain the rapidly soaring proliferation of this infection.^[5] The corona vaccine consists of a weakened or inactivated version of the corona virus, or some part of a surface protein or a sequence of RNA or DNA.^[6] The launching of COVID vaccine in India was in the month of January, 2021. As is true for other vaccines, the general side effects of COVID vaccine in some individuals include mild fever, pain at the site of injection, body ache, malaise, lethargy, allergic reaction, burning eyes etc.

Oral adverse effects of COVID 19 vaccine include burning sensation of the mouth, bitter taste in the mouth, xerostomia, thickened saliva, tingling sensation in the mouth, and altered taste sensation.

In the present study, out of 1000 participants, 427 participants experienced burning sensation in the mouth within 0-24 hours, 378 participants experienced the same within 24-48 hours, and 215 persons experienced burning sensation within 48-72 hours.

Bitter taste in the mouth was reported by 498 participants within 0-24 hours, 389 participants reported it within 24-48 hours, and 218 participants reported it within 48-72 hours.

355 participants experienced xerostomia within 0-24 hours, 275 participants reported xerostomia within 24-72 hours and 115 participants experienced the same within 48-72 hours.

Thickened saliva was reported by 361 individuals within 0-24 hours, 185 participants reported thickening of saliva within 24-48 hours and 136 participants reported it within 48-72 hours.

Tingling sensation in the mouth was reported by 115 participants within 0-24 hours, by 155 participants within 24-48 hours and by 110 participants within 48-72 hours.

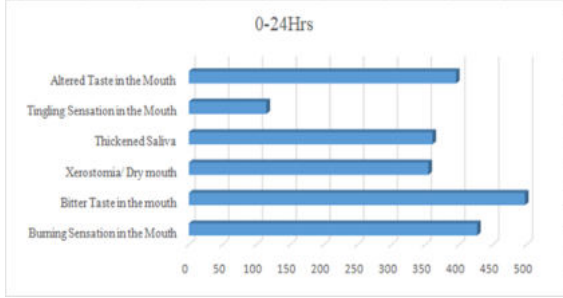
Altered taste sensation in the mouth was experienced by 396 participants within 0-24 hours, by 522 participants within 24-48 hours and by 398 participants within 48-72 hours.

No similar study was found in the literature that reported about oral side effects of COVID 19 vaccine.

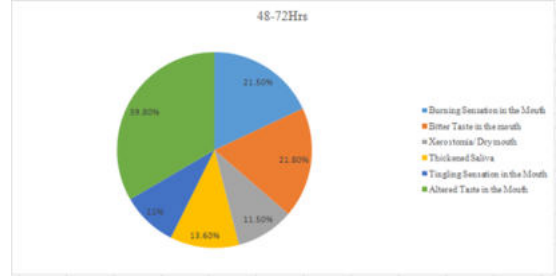
The limitation of the present study was that it was done on a small number of participants in and around the Hyderabad-Karnataka region, whereas the COVID vaccination drive is happening worldwide. Studies alike on a large scale should be conducted by including divergent population to get better results.

CONCLUSION:

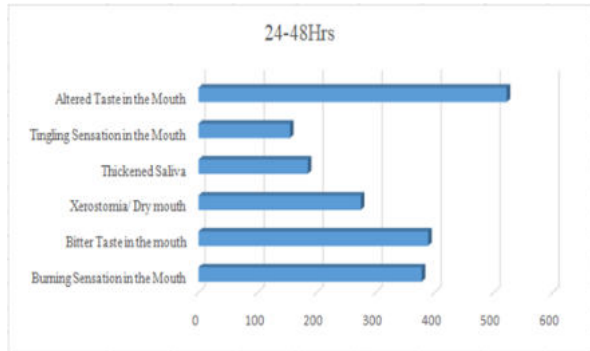
The general and oral symptoms manifested after COVID-19 vaccination are mild in nature, last for three to four days and self-recovering. For some people, vaccine does not exhibit any side effects. In our study, the most common symptoms in the oral cavity reported by the participants were burning sensation in the mouth, bitter taste in the mouth and altered taste sensation. Similar studies including larger samples of different population should be done all over the world to confirm our results and to add newer symptoms.



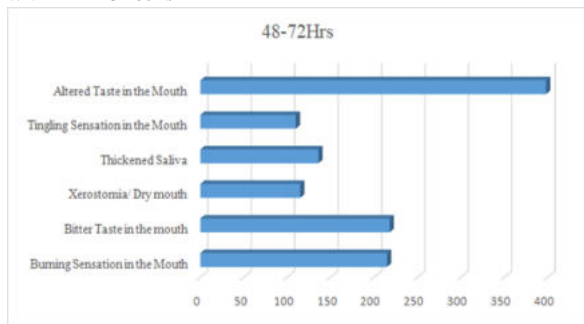
Bar diagram 1: Distribution of oral manifestations of participants within 0-24 hours



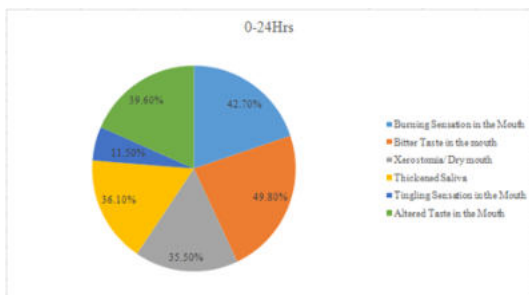
Pie chart 3: Illustration of the percentage of the participants reported oral manifestations within 48-72 hours



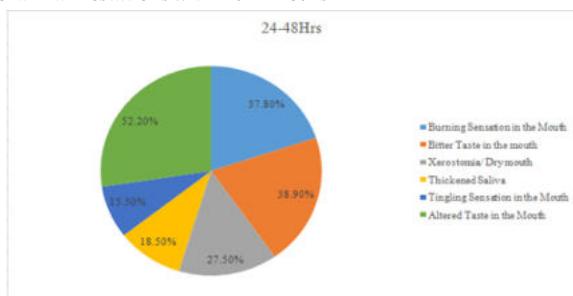
Bar diagram 2: Distribution of oral manifestations of participants within 24-48 hours



Bar diagram 3: Distribution of oral manifestations of participants within 48-72 hours



Pie chart 1: Illustration of the percentage of participants reported oral manifestations within 0-24 hours



Pie chart 2: Illustration of the percentage of the participants reported oral manifestations within 24-48 hours

LIST OF ABBREVIATIONS:

1. COVID 19: Corona virus disease 2019.
2. MERS: Middle east respiratory syndrome.
3. RNA: Ribonucleic acid.
4. SARS: Severe acute respiratory syndrome.

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