



Sinonasal manifestations in Covid 19; A cross-sectional study

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Abstract

Background: Coronavirus disease 2019 (COVID-19) is caused by novel coronavirus which is now referred to as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Nasal cavity, which is the most common site of viral entry is the seat of vigorous viral replication. Over a period of time, it was observed that sudden onset of olfactory dysfunction (OD) manifesting as hyposmia and/ or anosmia occurred in many COVID-19 patients. It has also been observed that anosmia coincide with the occurrence of taste dysfunction (TD) manifesting as ageusia or hypogeusia. The time taken to recover from anosmia or hyposmia is not very clear at this point of time.

Aim: 1) To find the occurrence of sinonasal symptoms in patients with COVID-19 2) To find the occurrence of olfactory and taste dysfunction in patients with COVID-19

Materials and Methods: All the 100 patients will be investigated and treated as per local (Department of health and family welfare, Government of Karnataka) or national (Ministry of health and family welfare, Government of India) COVID-19 treatment protocol. All the 100 patients admitted will be screened for sino-nasal symptoms, olfactory dysfunction and taste dysfunction at the time of admission after obtaining the written informed consent.

Results: In this study of 100 patients, 65 patients are male and 35 patients are female. Age of 34 patients is more than 50 years, 5 patients lie between 5-20 years and rest lie between 21-50 years. Around 72 patients had sinonasal symptoms. Total patients with olfactory dysfunction is found to be 37. Among them 27 patients presented at admission. Rest of them developed in 3-4 days. Total patients with gustatory dysfunction is found to be 45. Among them 23 patients presented at admission. Patients with both olfactory and gustatory dysfunction is found to be 15.

Conclusion: Olfactory dysfunction is most common sinonasal symptom of presentation in COVID 19 patients. Olfactory dysfunction is almost coexist with taste dysfunction. Both olfactory and taste dysfunction are earliest and most commonly reported indicator of COVID 19. We can suspect COVID 19, if presented with olfactory and taste dysfunction even if COVID 19 tests are negative.

Keywords: COVID 19, olfactory dysfunction, taste dysfunction

Introduction

Coronavirus disease 2019 (COVID-19) is caused by novel coronavirus which is now referred to as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).^[1] The disease was first detected in December 2019 in Wuhan seafood market, China. SARS-CoV-2 is highly infectious.^[2] It has a reproduction number (R0) of 2 to 3, which means that an infected individual can transmit the infection to 2 to 3 individuals^[2]. This is the reason for the current pandemic leading to millions of individuals being infected and has killed lakhs of people across the globe. COVID-19 is characterized by fever, cough and breathlessness along with constitutional symptoms like fever and myalgia^[3, 4, 5]. Nasal cavity, which is the most common site of viral entry is the seat of vigorous viral replication^[6]. Nasal epithelium contains angiotensin converting enzyme 2 (ACE2) receptor which acts as a receptor for viral entry^[7]. In spite of this fact, nasal symptoms are reported by less than 10 % of infected patients^[8, 9]. The reason for this paucity of symptoms is not known. Over a period of time, it was observed that sudden onset of olfactory dysfunction (OD) manifesting as hyposmia and/ or anosmia occurred in many COVID-19 patients, with a prevalence of 85.6%.^[10, 11, 12]

Interestingly, patients with anosmia did not have accompanying nasal obstruction or other rhinitis symptoms^[10].

Therefore, insult to olfactory receptors by the virus is the likely logical explanation of the mechanism of OD. This mechanism has also been proposed earlier for other upper respiratory viral infections^[13]. Understanding the mechanism of sensorineural olfactory loss may provide novel information on the pathogenesis of novel coronavirus. The olfactory epithelium which lines the roof of the nasal cavity contains olfactory neurons which are in direct contact with the environment.^[6] The total surface area of the nasal cavity is 150 cm², of which 9 cm² is formed by the olfactory epithelium^[14].

The olfactory epithelium which contains ACE2 receptors may act as the portal of viral entry into central nervous system leading to encephalitis. This has been confirmed by intranasal inoculation of SARS-CoV-1 in mice^[15, 16].

The time taken to recover from anosmia or hyposmia is not very clear at this point of time. It is believed that it may follow the pattern of other post viral syndrome^[17]. It is expected that the complete recovery may take several months^[18].

Materials and Methods

This will be a cross-sectional study involving all patients with COVID-19 admitted in KVG Medical College and Hospital, Sullia. The diagnosis of COVID-19 is made by either of the following:

- Presence of SARS-CoV-2 RNA detected by reverse transcription polymerase chain reaction (RT-PCR) in the nasopharyngeal or oropharyngeal swab specimens.
- Positive Rapid Antigen Test for SARS-CoV-2.

All patients admitted will be screened for sino-nasal symptoms, olfactory dysfunction and taste dysfunction at the time of admission after obtaining the written informed consent. The duration of each symptoms will be recorded. Patients will be followed up until their discharge from the hospital or until death due to COVID-19 related health issues.

Study design: Cross-sectional study

Study population: Patients with COVID-19 admitted to KVG medical college and hospital.

Sample size: All patients with COVID-19 admitted during the study period will be included.

Sampling technique: Universal sampling

Inclusion criteria

All patients with COVID-19 aged between 18 to 100 years admitted to KVG medical college and hospital.

Exclusion criteria

- Patients who do not give consent to participate in the study
- Patients with pre-existing olfactory abnormality (due to any etiology)

Assessment of sino-nasal symptoms

- Running nose/nasal discharge
- Nose block
- Headache/facial pain
- Excessive sneezing
- Nasal itching
- Post-nasal drip

Assessment of olfactory dysfunction (OD)

Type of OD

- Anosmia: absence of sense of smell
- Hyposmia: reduced sense of smell
- Hyperosmia: increased sense of smell
- Parosmia: alteration in the quality of smell

Onset: Sudden/Gradual

Duration

Fluctuation

Loss of specific smell or global loss

Severity: Periodic (daily) subjective assessment will be done using a scale of 0 to 5.

- Scale 0: total loss of smell
- Scale 1: 75% loss of smell
- Scale 2: 50% loss of smell
- Scale 3: 25% loss of smell
- Scale 4: near normal smell
- Scale 5: normal sense of smell

Assessment of taste dysfunction (TD):

Type of TD:

- Ageusia: absence of taste

- Hypogeusia: reduced taste

- Parageusia: altered taste

Onset: Sudden/Gradual

Duration

Fluctuation

Loss of specific smell or global loss

Severity: Periodic (daily) subjective assessment will be done using a scale of 0 to 5.

- Scale 0: total loss of taste
- Scale 1: 75% loss of taste
- Scale 2: 50% loss of taste
- Scale 3: 25% loss of taste
- Scale 4: near normal taste
- Scale 5: normal taste

Results

Table 1: Distribution of cases according to sinonasal symptoms

Sino nasal symptoms	No .of patients	percentage
Running nose/nasal discharge	11	11.0
Nasal block	6	6.0
Headache	19	19.0
Other sino nasal symptoms	36	36.0
Other symptoms	28	28.0
Total	100	100

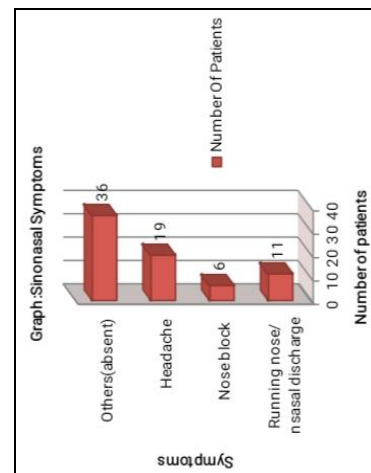


Fig 1: Distribution of cases according to sinonasal symptoms

Total patients with sinonasal symptoms found to be 72. Among them, headache is the most common symptom.

Table 2: Distribution of cases according to olfactory dys function

Olfactory dysfunction (Percentage of loss)	Number Of Patients	Percentage (%)
scale 0(total loss)	13	35.13
scale 1 (75-99% loss)	12	32.43
scale 2 (50-74% loss)	10	27.02
scale 3 (25-49% loss)	0	0.0
scale 4 (<25% loss)	2	5.40
Total	37	100.0

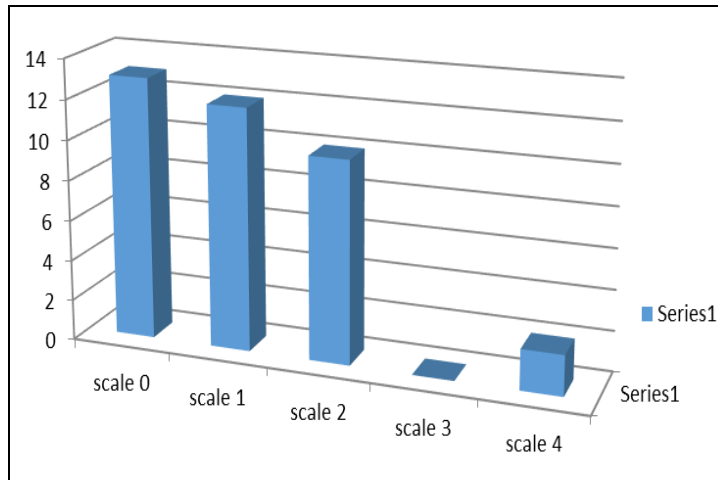


Fig 2: Distribution of cases according to olfactory dysfunction

Total patients with olfactory dysfunction is found to be 37. Among them 27 patients were presented at admission. Rest of them developed in 3-4 days. 35 patients were recovered 5-7 days.

Table 3: Distribution of cases according to gustatory dysfunction

Gustatory dysfunction (Percentage of loss)	Number Of Patients	Percentage (%)
Scale 0 (total loss)	8	17.77
Scale 1 (75-99%)	14	31.11
Scale 2(50-74%)	18	40.0
Scale 3 (25-49%)	3	6.66
Scale 4 (<25 % loss)	2	4.44
Total	45	100.0

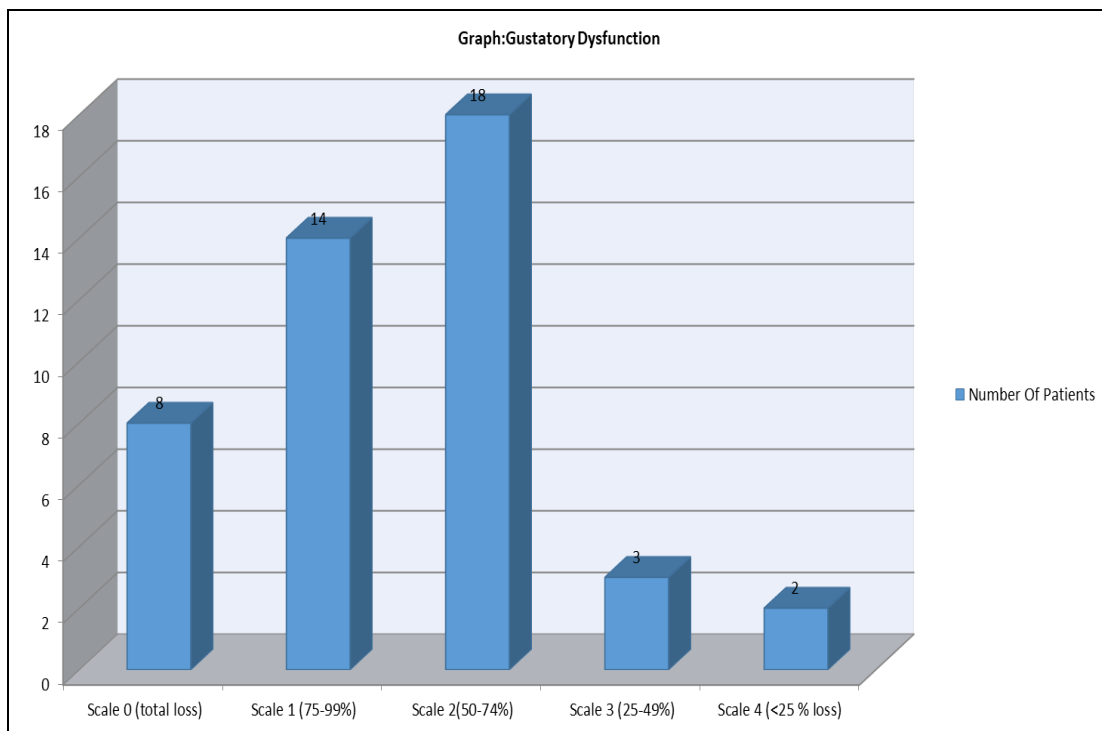


Fig 3: Distribution of cases according to gustatory dysfunction

Total patients with gustatory dysfunction is found to be 45. Among them, 23 patients presented at admission. Most of the patients recovered in 6-7 days of admission.

Discussion

In a prospective cross sectional study conducted by Marlene M Speth *et al.*, it was concluded that olfactory dysfunction is highly prevalent during COVID-19, occurring early and

severely, often in conjunction with loss of taste. Olfactory dysfunction is associated negatively with older age and positively with female sex. Patients with OD may also experience more severe shortness of breath ^[1].

In a study conducted by Whitcroft KL *et al.*, it was concluded that COVID-19 is associated with olfactory dysfunction in many patients. This symptom should prompt self-isolation and testing for SARS-CoV-2 when possible.

Active, collaborative research is required to delineate the natural history and appropriate management of chemosensory impairment in this virulent disease. In the interim, chemosensory assessment and treatments targeting post infectious olfactory dysfunction may be of use in COVID-19–related olfactory dysfunction^[7].

In a study conducted by Andrea Lovato *et al*, it was concluded that Otolaryngologists should know that pharyngodynia, nasal congestion, olfactory, and gustative disorders could be the presenting symptoms of COVID-19. Clinical presentation together with radiological and laboratory findings could help to identify suspected cases^[10]. In a study conducted by C Hopkins *et al*, it was concluded that Anosmia is reported in conjunction with well-reported symptoms of coronas virus, but 1 in 6 patients with recent onset anosmia report this as an isolated symptom. This might help identify asymptomatic carriers of disease and trigger targeted testing. Further study with COVID-19 testing is required to identify the proportion of patients in whom new onset anosmia can be attributed to COVID-19^[12]. In our study we concluded that olfactory dysfunction is the most common sinonasal symptom of presentation. Olfactory dysfunction is almost coexist with the taste dysfunction. Both olfactory and taste dysfunction can be considered as earliest indicator of COVID 19, because it predicts disease better than other well-known symptoms. We can suspect COVID 19 if patients presented with olfactory and taste dysfunction even if COVID 19 tests are negative.

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