

A cross-sectional study to assess the prevalence of anosmia and ageusia and its association with disease severity among COVID-19 affected patients in Salem, Tamil Nadu

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Abstract

Introduction: An epidemic of the severe acute respiratory syndrome was started in 2019 in Wuhan city, China. Due to international trade and travel, this disease has become a pandemic across the world. The agent causing this disease was named Coronavirus Disease 2019 by (COVID-19) by the World Health Organization (WHO). The following study was done with the objective of estimating the prevalence of anosmia and ageusia and its association with disease severity among COVID-19 affected individuals.

Materials and Methods: A cross-sectional analytical study was conducted among COVID-19 patients in a tertiary hospital in Salem, Tamil Nadu. The data were collected using a semi-structured questionnaire, which consisted of demographic details such as age, gender, and place, clinical symptoms, and signs such as fever, loss of taste, breathing difficulty, loss of smell, sore throat, and fatigue, vital signs, and co-morbidities. Results: In this study, we found that the severity of the disease (according to CT chest scores) among the study participants had a statistically significant association with breathlessness and headache. Conclusion: The symptoms of headache and breathlessness have statistically significant associations with disease severity that can be used in any setting to classify the COVID-19 case as who is eligible for home isolation, and who is eligible for admission or to be referred.

Keywords: Ageusia, anosmia, COVID-19, CT scores

Introduction

An epidemic of the severe acute respiratory syndrome was started in 2019 in Wuhan city, China. Due to international trade and travel, this disease has become a pandemic across the world. The agent causing this disease was named coronavirus disease-2019 (COVID-19) by the World Health Organization (WHO).[1] Around the world, until 13th January 2021, there are about 90 million people affected by the disease with 1.9 million deaths.[2] The mean incubation period of this disease is around 7 days, the main symptom in symptomatic patients is cough and cold with fever. And those who with symptoms progress to severe disease (with pneumonia) in almost 75 percent of cases which usually occurs around the third week of infection.[3]

The spread of the disease is difficult to control as the disease follows the iceberg phenomenon.[4] As similar to difficulty in

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diagnosing the case, diagnosing the severity of the disease among the affected individual also becomes difficult. Thus, there is a lag in admission and starting appropriate treatment. Once the severity of the disease among those who are infected can be assessed, and starting appropriate treatment (Inj. remdesivir is proven effective in the recovery of lower respiratory tract infected COVID-19 patients), the mortality due to this contagious disease can be prevented.[3]

Even though the symptoms and signs of COVID-19 closely resemble common flu, there are certain specific symptoms pertaining to the disease like loss of taste (ageusia) and loss of smell (anosmia).[8] The incidence of the symptom of anosmia among COVID-19 patients is ranging from 33 to 68 percent, of which females have predominance.[7] Among those who have anosmia symptom, about 27 percent have anosmia as an initial presenting symptom.[3] Anosmia in COVID-19 may be due to intranasal inoculation of coronavirus into the olfactory neural system, though the clinical course is not yet clear.[8] As the COVID-19 patients have typical lung imaging characteristics, many countries incorporated CT chest as a screening tool, and also to classify the patient according to the severity of the disease.[10] Though CT chest with severity score can effectively classify the severity of the patient, it is expensive and time-consuming (the sensitivity of CT chest in finding COVID-19 is 92 percent).[11] The sensitivity and specificity of CT chest severity scores were 80 and 82 percent in identifying the disease severity.[12]

COVID-19 is a novel disease that has various clinical features according to wave patterns. In order to classify disease severity according to symptoms, the symptoms anosmia and ageusia have low disease severity in accordance with CT chest severity scores in this and other relevant studies. So, these symptoms cannot be taken into consideration to classify disease according to clinical symptom severity, and there is a need for primary care physicians to decide and classify patients who are eligible for home isolation, and those in need of hospital admission.

So, there is a need to find an easy way to diagnose the severity of the disease which may be applicable at any facility with cost-effectiveness. With this view, the following study was done with the objective of estimating the prevalence of anosmia and ageusia and its association with disease severity among COVID-19 affected individuals.

**Materials and Methods**

A cross-sectional analytical study was conducted among COVID-19 patients who were appearing at Vinayaka Mission's Kirupananda Variyar (VMKV) Medical College and Hospital, Salem during the period of 1st September 2020 to 31st October 2020. All lab-confirmed cases (by RT-PCR) who were admitted with or without co-morbidities of all age groups and either sex during this period were included in the study. Those who were terminally ill at the time of admission and those who have psychological disturbance were excluded from the study.

The data were collected using a semi-structured questionnaire, which consists of demographic details such as age, gender, and place, clinical symptoms, and signs such as fever, loss of taste, breathing difficulty, loss of smell, sore throat, and fatigability, vital signs, and co-morbidities.

The severity of the disease was obtained from CT chest severity scores (0–25). In all subjects, the CT severity scoring (semi-quantitative) was calculated by visualizing the extent of structural involvement of each 5 lobes, the classification as follows: Zero meant no involvement; One meant <5% involvement; Two meant 5%–25% involvement; Three meant 26%–50% involvement; Four meant 51%–75% involvement; and Five meant >75% involvement. The final global CT score was obtained by summing each score (0 to 25).

The data were collected after obtaining consent from the participants, and institutional ethical committee clearance was obtained before the start of the study. The data obtained were entered into Excel and analyzed by using SPSS version 21. All qualitative data were expressed in frequencies and percentages, and all quantitative variables were described in mean and standard deviation. The relationship between two continuous variables was described by Pearson’s Correlation, and the association between two qualitative variables was described by using the Chi-square test (Fisher Exact test was used appropriately). Statistical significance was considered when the two-sided statistical P-value was less than 0.05.

**Result**

Totally there were 237 study participants. The mean age of the participants was 53 ± 14. About 75 percent (175) of the participants were male. The distribution of clinical features among the study participants is given in table 1. The prevalence of ageusia and anosmia was shown in figure 1. The co-morbidities of the study participants were described in table 2.

Among the variables, the severity of the disease (according to CT chest scores) among the study participants has a statistically significant association with breathlessness and headache [Table 3].

**Figure 1: Prevalence of ageusia and anosmia among the study participants (n = 237)**
Discussion

In our study, the mean age of the study participants was 53 years. Similarly, a study done in Beijing, in April 2020, among 262 COVID-19 patients showed that the median age was 47.5 years. In contrast, secondary data analysis done by Boehmer et al.[14] in the United States in August 2020, concluded that there was a transition in the age pattern of the affected individuals (people aged 20 to 29 years constituted more than 20 percent of confirmed cases). These variations may be due to different rates of admission of patients with varying severity.

The prevalence of ageusia in our study was 21 percent. A similar result was given by Vaira et al.[15] that the prevalence of ageusia alone was about 10.2 to 22.5 percent, and the prevalence of ageusia was high when compared to anosmia among the COVID-19 patients. In our study, the prevalence of anosmia was 8 percent. A study done by Mishra et al.[16] in India among 74 patients concluded that the prevalence was about 14.8 percent. This difference may be due to a difference in the sample size of the above studies. In contrast to this study, a study done by Klopfenstein et al.[17] in August 2020 in France shows the prevalence of anosmia among COVID-19 patients was 47 percent. A study conducted in the USA in April 2020, by Kaye et al.[8] among 273 COVID-19 patients, concluded that the prevalence of anosmia is 73 percent. This difference opens a new path that the geographical pattern over the prevalence of anosmia needs further research.

A study done in Germany, by Hornuss et al.[18], where the COVID-19 patients were tested for anosmia objectively by using Sniffin’ stick test, concluded that 44 percent of the patients had anosmia and only 50 percent of the patients were able to tell it as a symptom. This questions the usage of anosmia symptoms as a tool to describe the severity of the disease. A case series done in China, by Mak et al. concluded the presence of ageusia as a symptom in children and adolescent patients. This indicates ageusia is a reliable symptom in all age groups of patients.[19]

Our study showed headache had a statistically significant association with the severity of the disease. A study conducted in Brazil in September 2020, among 73 patients, found that COVID-19 patients who have symptoms of anosmia and ageusia have high odds (odds ratio = 5.39 (1.66–17.45)) of developing headache as a symptom.[20] This indicates the possibility of using the symptom of headache in COVID-19 patients as a severity screening tool.

The prevalence of co-morbidities in our study was 39 and 27 percent for diabetes and hypertension, respectively. Of which comorbidity of diabetes among COVID-19 patients was higher than hypertension. In contrast to this study, a study done by Tambe et al.[21] in Maharashtra in April 2020, concluded that there is a high prevalence of hypertension (55 percent) than diabetes (48 percent). Though there is a difference between the two studies, both studies confirmed the high prevalence of COVID-19 diseases among people with comorbidities.

To summarize, in this study, we found that the severity of the disease (according to CT chest scores) among the study

Table 1: Distribution of clinical features of the study participants (n=237)

| Clinical features | Frequency | Percentage |
|-------------------|-----------|------------|
| Fever             | 152       | 64         |
| Cough and Cold    | 132       | 56         |
| Throat pain       | 7         | 3          |
| Body pain         | 86        | 36         |
| Breathlessness    | 106       | 45         |
| Loose Stools      | 18        | 8          |
| Headache          | 45        | 19         |
| Loss of taste     | 49        | 21         |
| Loss of smell     | 19        | 8          |
| Loss of appetite  | 7         | 3          |

Table 2: Distribution of study participants according to their co-morbidities (n=237)

| Co-morbidities     | Frequency | Percentage |
|--------------------|-----------|------------|
| Diabetes Mellitus  | 92        | 39         |
| Hypertension       | 63        | 27         |
| Asthma             | 8         | 3          |
| Hypothyroid        | 10        | 4          |
| Cardiovascular Disease | 21   | 9          |


participants has a statistically significant association with breathlessness and headache, and the symptoms of headache and breathlessness have a statistical significant association with disease severity that can be used in any setting to classify the COVID-19 case as who is eligible for home isolation, and who is eligible for admission or to be referred.

**Strength and limitations**

This study was conducted with the patients admitted as COVID-19 lab-confirmed cases, and the prevalence of anosmia and ageusia may not be a true prevalence of the community. As COVID-19 follows the iceberg phenomenon, the generalization of the results needs more study participants. Despite this, our study collected data from a direct interview of the patients, and the data were rechecked with available medical records, which increases the validity of the study.

**Conclusion and Recommendations**

The prevalence of anosmia and ageusia among the COVID-19 patients is low (8% and 21% respectively). There is no statistically significant association for anosmia and ageusia with the severity of the disease classified with CT chest severity scores. The symptoms headache and breathlessness have a statistical significant association with disease severity that can be used in any setting to classify the COVID-19 case as who is eligible for home isolation, and who is eligible for admission or to be referred.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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