



Incidence of Sino-Nasal Symptoms in COVID-19 Patients

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Abstract Corona virus disease was first reported in December 2019 in Wuhan, China and is spreading across the world in an alarming fashion. To contain the spread, it is very important to identify the subtle/not readily apparent symptoms of COVID-19 at the earliest. The aim of the study is to determine the incidence duration progress of sino-nasal symptoms in COV 2 positive patients using SNAQ scoring. Patients who tested positive for SARS-COV 2 by RT-PCR and admitted in our hospital under category A (n = 382) were included in the study. A detailed history was collected from all the patients and sino-nasal assessment questionnaire (SNAQ) was provided to the patient with complaints of sinonasal symptoms and they were asked to fill the forms on day 3, 7 and 14. To identify the characteristics of sinonasal symptoms in COVID-19 patients with a history of smoking, smoking history was also collected in detail and patients were classified based on Brinkman's index into mild, moderate and severe smokers. In this study, the incidence of sino-nasal symptoms was 24%. Average SNAQ scoring on day 3 was 30.09 and on day 7 was 12.9 and day 14 is 3.8. There was a decline in score on day 7 compared to day 3 indicating symptoms decrease by day 7. Average SNAQ scoring in non-smokers and mild and moderate smokers was 20.18, 34.11, 57.5 respectively. The SNAQ scoring in smokers was more than that of non-smokers and was also persistent for a longer duration compared to non-smokers.

Sino-nasal symptoms catch our eye because it is an important route for transmission. Viral shedding from sinonasal tract may be an important source for transmission. History and degree of smoking should also be considered while dividing COVID-19 patients into categories.

Keywords Sinonasal assessment questionnaire · SNAQ · COVID-19 · Incidence · Paranasal sinus · Smoker · SARS-Cov-2

Introduction

Over the past few decades, many viral outbreaks caused by Ebola virus, Zika virus, Nipah virus have been reported around the world. Recently, a new viral disease has originated from Wuhan, the middle eastern province of China. It spread rapidly across the globe. Genomic sequences of this virus do not match with previous COVID (CoVs) strains and hence it is declared as a novel CoV strain [1].

Compared to other viruses and previous CoVs strains, novel CoV 19 seems to have decreased pathogenicity but increased transmission competence. To contain the spread, it is very important to identify the subtle/not readily apparent symptoms of COVID 19 at the earliest [2].

Earliest reports from China stated that the viral disease affects the lower respiratory tract causing cough, shortness of breath and difficulty in breathing. But the greatest drawback of these studies is that they were conducted in critically ill patients who were hospitalized [3].

The studies published later in other countries reported a higher incidence of upper respiratory tract infections which result in sore throat, rhinorrhoea, nasal block, anosmia and post nasal drip (PND). These symptoms can easily be misdiagnosed as a simple URI or flu. When these patients

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are not picked aside from the populace it becomes more difficult to break the chain of transmission [4]

Large scale research studies play a vital role in the procurement of in-depth knowledge about the novel strain of CoV 2. This paper studies the incidence and durational progress of sino-nasal symptoms in SARS-COV 2 positive patients.

Aim

To study the incidence of sino-nasal symptoms in Covid-19 positive patients.

Methodology

It was a prospective observational study conducted in a tertiary care hospital for a period of 3 months (May to July 2020). Institutional ethical committee clearance was obtained. The study included 382 patients who tested positive for SARS-COV 2 by RT-PCR and admitted in our hospital under category A. Patients were divided into category A, B, C and treated based on guidelines provided by the institute's infection control committee (Table 1).

Inclusion Criteria

1. Category A patients
2. Covid-19 positivity by RT-PCR
3. Age 18–65 years

Exclusion Criteria

1. History of allergic rhinitis, sinusitis, nasal polyposis
2. Previous nasal surgeries
3. Nasal malignancies
4. Radiation exposure
5. Critically ill patients

Detailed medical history was collected from the subjects and sino-nasal assessment questionnaire (SNAQ) was provided to those having complaints of sinonasal symptoms. The sino-nasal assessment questionnaire involves 11 symptoms and with a grade scale ranging from 0 to 5 with 0 indicating no symptom and 5 indicating the high intensity of the symptom. The sino-nasal assessment questionnaire Scoring has a minimum score of 0 and a maximum score of 80. This stems from the fact that a few key symptoms (nasal block, nasal congestion and facial pain) scores were multiplied by 3 and 2 to account for their relative importance. The sino-nasal assessment questionnaire is added as Table 2 [5].

A secondary objective of the study was to identify the characteristics of sinonasal symptoms in COVID patients with a history of smoking. History of smoking was collected in detail and patients were classified based on Brinkman's index into mild, moderate and severe smokers. Categorization is based on the product of the multiplication of the length of smoking in years with the number of cigarettes smoked per day. The results of the multiplication are classified into mild (1–199 points), medium (200–599 points) and heavy degree (> 600 points) [6].

Statistical Analysis

The results were entered in Microsoft Excel and analysed using SPSS 16 software. For normally distributed data one-way ANOVA test followed by post hoc test was used and p -value < 0.05 was considered significant. For not normally distributed data, the Kruskal Wallis test was carried out and for pairwise comparison, Mann Whitney test was done for which p -value < 0.016 was considered significant.

Results

Demographic details of study population is given in Table 3. The mean age group of COVID positive patients was 36 ± 12 and male female ratio was 1.1:1.

Of the 382 patients 24% (95) of patients had sinonasal symptoms. The mean age group of COVID patients with sinonasal symptoms was 33 ± 11 and male is to female ratio is 1.4:1. Demographic details of COVID patients with sinonasal symptoms are given in Table 4

The average SNAQ scoring on day 3 was 30.09 and on day 7 was 12.9 and day 14 is 3.8. There was a decline in score on day 7 compared to day 3 indicating symptoms decrease by day 7 the pattern of recovery from sinonasal symptoms and improvement of symptoms was shown by the decline in SNAQ scoring on day 7 and 14, represented in Fig. 1.

Nasal Obstruction

In our study, the Incidence of nasal obstruction was 86% in COVID patients with sinonasal symptoms and incidence of nasal obstruction in COVID positive patients was 20%. On day 14 only 12 patients (12%) had persistent nasal obstruction, 83 patients (87%) were free of symptoms.

Anosmia

In our study, the Incidence of anosmia in COVID patients with sinonasal symptoms was 69.4% and incidence of

Table 1 Category A, B, C as per guidelines of infection control committee

| Parameter | Pulse | SBP | DBP | RR | SPO2 | Comorbidities | PaO2/ FiO2 | Radiology | Treatment |
|------------|-----------------|-------------------|----------------|---------------|-----------------------------|--|---------------|--|---|
| Category A | 60–100/ min | > 120 mm Hg | > 80 mm Hg | < 18/ min | > 94% | Nil | > 500 | No findings | Tab. azithromycin Tab. celin 500 mg Tab. zinc 50 mg Tab. levocetizine 5 mg Tab. calpolm650 mg Tab. mymi d Ensure plus/ensure diabetes |
| Category B | 100–120/ min | 100–120 mm Hg, | 70–80 mm Hg | 18–24/ min | 88–94% without oxygen | Diabetes, hypertension, TB, COPD | 300–500 | Pneumonitis on CXR/ground glass opacities on CT chest | Tab. azithromycin Tab. celin 500 mg Tab. zinc 50 mg Tab. levocetizine5mg Tab. calpolm650 mg Tab. mymi d Ensure plus/ensure diabetes Inj enoxaparin 40 mg Inj methyl prednisolone 125 mg |
| Category C | > 120/ min | < 100 mm Hg | < 70 mm Hg | > 24/ min | < 94% with oxygen | Diabetes, hypertension, TB, COPD | < 300 | Pneumonitis on CXR/ground glass opacities on CT chest | ICU management of patients |

anosmia in COVID positive patients was 17.2%. On day 14 only 26 patients (27%) had persistent anosmia, 69 patients (73%) were symptom-free. Progress of intensity of anosmia and nasal obstruction in COVID positive patients is shown in Fig. 2.

SNAQ Scoring in Smokers

The average SNAQ scoring in non-smokers and mild and moderate smokers on day 3, 7 and 14 were calculated and the p-value was found to be < 0.001 which was statistically significant. The SNAQ scoring in smokers was more than that of non-smokers and was also persistent for a longer duration compared to non-smokers. It was also directly proportional to the duration of smoking and number of cigarettes smoked per day, its represented in Fig. 3.

The study includes 12 patients with a history of moderate smoking of which 2 people had a poor prognosis,

their inflammatory markers were elevated and d-dimer values were elevated and saturation was 92%, these patients were started on steroids IV antibiotics and blood thinners and later improved on day 21.

Discussion

The COVID 19 has spread across the globe in a very rapid fashion infecting millions of people and killing hundreds of thousands of people. Every day newer strategies are developed to contain the disease and the most important of it is to identify the subtle symptoms of COVID 19 [7].

According to this study, the incidence of sinonasal symptoms in COVID positive patients was found to be 24% (95) and the mean age group of COVID patients with sinonasal symptoms was 33 ± 11 years. Male is to female ratio was 1.4:1, indicating slight male preponderance. Incidence of rhinorrhoea and nasal congestion was 19.8%

Table 2 SNAQ questionnaire and scoring

| Symptoms | No. problem | Very mild problem | Mild or slight problem | Moderate problem | Severe problem | Problem as bad as it can be |
|---|-------------|-------------------|------------------------|------------------|----------------|-----------------------------|
| Scores | 0 | 1 | 2 | 3 | 4 | 5 |
| Blocked nose | | | | | | |
| Nasal congestion or stuffy nose | | | | | | |
| Facial pain/pressure | | | | | | |
| Running nose (anterior nasal discharge) | | | | | | |
| Phlegm in back of throat (post nasal discharge) | | | | | | |
| Sneezing | | | | | | |
| Cough | | | | | | |
| Reduced/altered smell | | | | | | |
| Headache | | | | | | |
| Ear ache/fullness | | | | | | |
| Lack of full nights sleep/tiredness/fatigue | | | | | | |

Table 3 Demographic details of study population

| Age group | No. of patients | | | Percentage of total patients (%) |
|-------------------------------|-----------------|--------|-------|----------------------------------|
| | Sex | | Total | |
| | Male | Female | | |
| < 20 | 6 | 2 | 8 | 2 |
| 20–39 | 123 | 89 | 212 | 56 |
| 40–59 | 71 | 82 | 153 | 40 |
| > 60 | 5 | 4 | 9 | 2 |
| Total | 205 | 177 | 382 | 100 |
| Percentage of total cases (%) | 53.6 | 46.3 | | |

Table 4 Demographic details of COVID patients with sino nasal symptoms

| Age group | No. of patients | | | Percentage of total patients with sino-nasal symptoms (%) |
|-------------------------------|-----------------|--------|-------|---|
| | Sex | | Total | |
| | Male | Female | | |
| < 20 | 3 | 1 | 4 | 4 |
| 20–39 | 33 | 24 | 57 | 60 |
| 40–59 | 19 | 14 | 33 | 35 |
| > 60 | 1 | 0 | 1 | 1 |
| Total | 56 | 39 | 95 | 100 |
| Percentage of total cases (%) | 59 | 41 | 100 | |

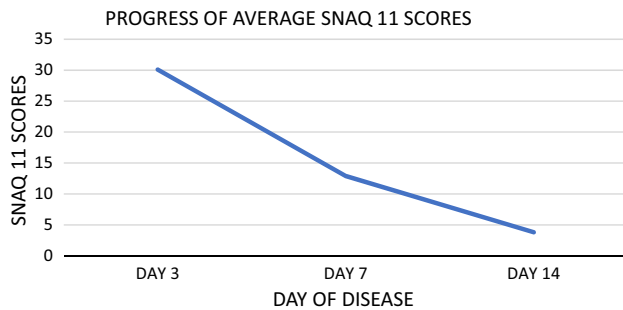


Fig. 1 Progress of average SNAQ 11 scores

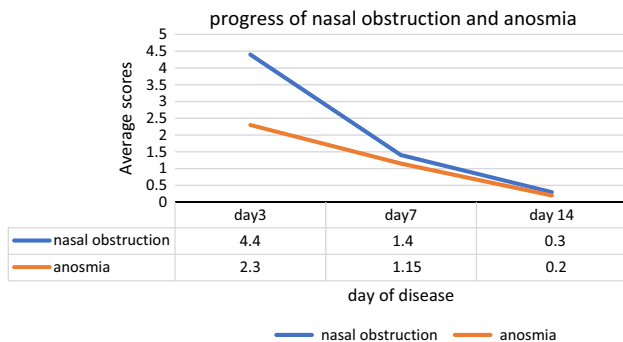


Fig. 2 Progress of nasal obstruction and anosmia

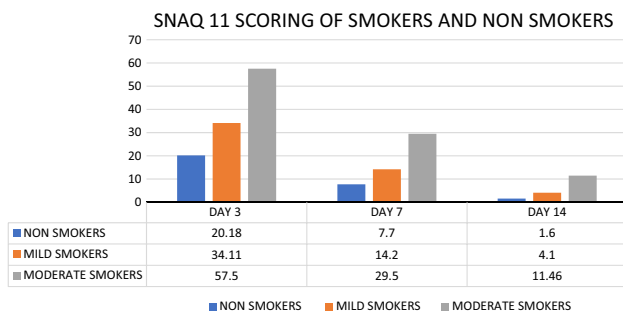


Fig. 3 SNAQ 11 scores of smokers and non-smokers

and 18.7% respectively. In this study, the incidence of anosmia in patients with sinonasal symptoms was 69.4% and incidence of anosmia in COVID positive patients was 17.2%. On day 7, 43% (41) of patients reported complete recovery of smell and on day 14, only 26 patients (27%) had persistent anosmia, 69 patients (73%) were symptom-free. This study also reports a Average SNAQ scoring on day 3 was 30.09 and on day 7 was 12.9 and day 14 was 3.8. There was a decline in score on day 7 compared to day 3 indicating symptoms decrease by day 7.

Incidence of sinonasal symptoms in COVID patients in a study conducted by mitra et al. was 42% which is slightly higher than this study [8]. According to study conducted by salepci et al. the prevalence of ENT symptoms such as nasal congestion and rhinorrhoea was found to be 16.6%

and 11.7% respectively which is in accordance with our study [9, 10]. Incidence of anosmia in COVID patients was 79.6% in a study conducted by leichen et al. which is much higher than our study. The study by leichen et al. also reported that 72.6% of COVID patients with anosmia recover by day 8 [11].

Further analysis of this study led to the fact that the sinonasal symptoms in patients with a history of smoking were more in intensity, persistent for a prolonged duration (> 14 days) and were directly proportional to the duration and no of cigarettes smoked per day (pack-years). There are no previous research studies conducted in this aspect.

In previous studies conducted, SNAQ scoring was used to identify the significant improvement of sinonasal symptoms post-Sino nasal surgery. The COVID virus pandemic required the need to identify subtle symptoms such as sinonasal symptoms and their characteristics. So, the SNAQ scoring was used in this study to identify the prevalence, duration, intensity and prognosis of sinonasal symptoms. SNAQ 11 is a validated questionnaire and is better than SNOT 20 in assessment of patients with sinonasal symptoms, so SNAQ score was preferred over SNOT 20.

Limitations

The study included 12 patients with a history of moderate smoking of which 2 patients were associated with poor prognosis and shifted to category B. The study indicates that history of prolonged smoking (pack-years > 600) may be associated with poorer prognosis. Since the study included a very small sample size of patients with a history of moderate smoking, this cannot be statistically proven thus far. Further elaborate studies with larger sample sizes should be carried out to probe this line of aspect.

Another limitation of the study was short follow up period of patients.

Conclusion

There are increased case studies reporting the incidence of sinonasal symptoms in COVID 19 patients. Sinonasal cavity may be an important route for transmission and viral shedding from sinonasal tract may be an important source for transmission [12]. Hence it is important to study the prevalence and characteristics of sinonasal symptoms, so they could be picked up earlier in op basis making containment of disease spread easier. History and degree of smoking should also be considered while dividing COVID patients into categories.

Authors Contribution All authors contributed to the study's conception and design. Material preparation, data collection and analysis were performed by all the authors. The first draft of the manuscript was written by first author and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Code Availability Microsoft excel, SPSS 16.

Declarations

Conflict of interest The authors declared that they have no conflict of interest.

Ethical Approval Approval was obtained from the institutional ethics committee. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

Informed Consent Informed written consent was obtained from all patients.

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