Olfactory and Taste Disorders and COVID-19: Our experience in 77 adults in the North East of England.

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Key Points

- There is growing international evidence to support olfactory and taste disorders (OTDs) as symptoms of Coronavirus disease 2019 (COVID-19) but little data is available on the prevalence of this symptom in confirmed UK cases.
- Our survey of patients and staff with confirmed COVID-19 in the North East of England showed a high prevalence of OTDs at 55.8%.
- Outpatients and staff were more likely to report a change in their smell or taste when compared to inpatients.
- New onset OTDs should be considered in patient triage and staff isolation recommendations, especially as elective clinical work resumes.
- Further studies are needed in which those with new onset OTDs are tested for COVID-19 to determine the sensitivity and specificity of self-reported OTDs as a screening tool.

Introduction:

The current coronavirus disease 2019 (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is associated with high mortality and an exponential human-to-human transmission rate. Therefore identifying, testing and isolating possible cases is vital to reducing the disease burden.

Anosmia is often reported with several upper respiratory tract infections (URTI) but unlike these, SARS-COV2 is not associated with nasal blockage and discharge.[1] Vaira et al suggested that chemoreceptor dysfunction occurred in >19% of their 320 COVID-19 cases and that this may be an early symptom or the only manifestation in otherwise asymptomatic patients.[2]However, a European multicentre study of 417 mild-moderate COVID-19 patients showed >85% of patients had olfactory or taste disorders (OTD).[3] Following reports from abroad and anecdotal evidence in the UK, ENT UK recommended that anosmia be recognised as a marker of COVID-19 and as such, patients with this symptom be treated as suspected cases and should self-isolate.[4,5]

Based on Public Health England guidance, our hospital uses 3 cardinal symptoms to test and isolate patients and staff. These are a new dry cough, shortness of breath and fever >37.5?C. The purpose of this study was to identify the prevalence of potential symptoms of COVID-19, including OTDs in a UK-based population with confirmed infection. A better understanding could help identify potential cases and determine whether

the ENT UK recommendation should be adopted locally, with a significant impact on patient triage and the clinical workforce.

2. Materials and Methods:

2.1 Ethical Considerations:

Approval was granted from local clinical governance departments to conduct this quality improvement project assessing local policy for triaging and testing suspected cases of COVID-19, ethical approval was sought but not required.

2.2 Study Participants and Protocol:

A survey was conducted in adult patients and staff with laboratory confirmed COVID-19 infection in a District General Hospital in the North East of England. A questionnaire was used for data collection, comprising of well recognised symptoms of COVID-19 and common URTI symptoms. Verbal interviews were conducted by telephone or face-to-face with informed consent.

All patients with SARS-CoV-2 detected on throat or nasal swab PCR were identified each day for a 7-day period. Those interviewed included 14/65 outpatients (13 uncontactable, 35 unable to consent, 3 readmitted to other inpatient units) and 32/66 inpatients (34 unable to consent). All ward and emergency department staff on shift on 2 consecutive days were asked to voluntarily answer the questionnaire if they had tested positive for COVID-19.

Data was analysed predominantly using Pearson Chi Square tests in SPSS with significance level of $p<0.05$, all tests 2-sided.

3. Results:

Table 1 shows the demographics and frequencies of reported symptoms. Questionnaires were completed for 77 participants; 38 males and 39 females. The mean age was 55 years (25-94). There were 31 (40.3%) staff members, 32 inpatients (41.6%) and 14 outpatients (18.2%). We consider these participants to have mild-moderate disease as the majority of those with more severe disease were excluded as unable to answer the questionnaire reliably or it was deemed inappropriate to ask. The staff predominantly worked on medical wards (39%), surgical wards (23%) and the emergency department (23%); and mainly comprised of nurses (35%), health care assistants (32%) and doctors (22%), as well as catering and administrative staff.

Fatigue was the most commonly reported symptom at 80.5%, followed by fever (70%), cough (68%) and shortness of breath (66%).

Thirty-nine (50.6%) participants reported a change in their smell and 40 (51.9%) a change in taste, with few reporting one without the other. Due to the strong association ($p<0.001$) between taste and smell, further analysis is reported with these combined as OTDs, individual associations are reported in **Table 2** . Participants with a new OTD were significantly younger (mean 48.3, SD=15.1) than those without (mean 62.6, SD=21.2), $t(77)= -3.34$, $p=0.001$. As can be seen by the frequencies cross-tabulated in Table 2, there was a significant relationship ($p<0.05$) between reporting an OTD and a sore throat, sensation of nasal blockage, fatigue and fever. OTDs were also more commonly reported by staff (64.5%) and outpatients (78.6%) than inpatients (37.5%), $p=0.016$. OTDs were not significantly associated with gender, nasal discharge, facial pain, diarrhoea or nausea.

None of the 43 who reported an OTD had occupational exposure to chemicals and two were smokers. A sudden onset was reported in 28 of these 43 (65.1%). Of those who reported a change in smell, 26 (66.7%) reported total anosmia, 9 (23.1%) hyposmia, and the rest reported dysosmia (10.3%). Four participants reported a change in taste only: 3 described hypogeusia and 1 dysgeusia.

OTDs were reported to have developed before the cardinal symptoms in 5 cases (11.6%), after in 21 participants (48.8%), at around the same time in 14 (32.6%) and 3 participants were unsure of timing (6.9%).

Twenty-three participants (53.5%) had complete resolution of OTDs at the time of interview: 4 (17.4%) within several days, 6 (26.1%) at approximately 1 week and 13 (56.5%) longer than a week.

4. Discussion:

4.1 Key outcomes and comparisons with recent literature:

We chose to look at OTDs combined due to their close relationship and smell dysfunction being the predominant cause of most taste complaints.[6] OTDs were common in our cohort at 55.8% and were associated with fever, but not cough or shortness of breath. As study participants were identified from a database of SARS-COV2 positive results, and criteria for a test to be performed was restricted to those with at least one of the three core symptoms, we are unable to comment on isolated anosmia.

OTD prevalence was not as high as the 85% reported in a European multicentre study.[3] However, the mean age of participants in that study was lower at 36 years, and criteria for testing may have been less restrictive but was not reported. Hopkins et al conducted a survey on 2428 patients with new onset anosmia during the pandemic. Although 51% had other symptoms related to COVID-19, only 80 participants had been tested for COVID-19 and therefore we are unable to quantify what proportion are attributable to the virus.[7]

It has been suggested that, unlike other related viruses, the anosmia is not associated with nasal blockage.[1,3] Interestingly, in our cohort loss of smell was significantly associated with nasal blockage but not with other sinus symptoms, such as nasal discharge, facial pain or ear fullness. COVID-19 related anosmia has been associated with being female and although 59% of those with OTDs in our population were female, this was not statistically significant.[2]

Sense of smell declines with advancing age and therefore it is perhaps unsurprising that a change in smell and taste is associated with younger age in our sample[6]. An Italian cross-sectional study of 59 inpatients reported a prevalence of OTD at 33%, similar to our inpatient rate at 37%, and significantly lower than those reported by staff and outpatients.[8] Moein et al identified 59 of 60 COVID-19 inpatients with objective smell dysfunction using UPSIT and found no correlation with sex, disease severity or comorbidities.[9] Therefore, it is possible that differences in the self-reporting of OTDs may exist as opposed to differences in objective rates between inpatients and outpatients. Reasons for this could include staff and outpatients average younger age and likely better baseline sense of smell and that inpatients are more unwell and perhaps less likely to notice the more minor symptoms such as OTD and a sore throat.

Anosmia has been identified as a potential early indicator of disease, however, OTDs in this sample were more commonly reported as starting after or at the same time as core symptoms, similar to Lechien et al's European cohort.[2,3] High early recovery rates of anosmia of over 50% support that of recent studies.[7,10]

4.2. Limitations:

There was a potential for recall bias as some staff had tested positive up to 5 weeks prior to interview. Unfortunately, our sample size was limited due to many patients being unable to give informed consent owing to dementia, delirium or being critically unwell. Despite a small sample size, the preliminary data was large enough to conduct basic statistical analysis to advise an early change in local policy. Symptoms of OTDs were self-reported, and no objective testing was carried out to confirm or quantify these. Due to the sample size and cardinal symptoms needed for participants to have been tested, symptom associations although statistically significant need to be interpreted with caution.

5. Conclusion:

This survey gives insight into the symptoms experienced in a UK population with mild to moderate confirmed COVID-19. We found a high incidence of both smell and taste disturbances in COVID-19 patients. This was more common in younger patients and often associated with sore throats or nasal blockage. This should be considered in triaging patients especially in elective outpatient clinics and when making staff isolation recommendations, particularly as countries start to consider resuming clinical activity. Further studies where

patients with new onset OTDs are tested for COVID-19 will assist to determine the sensitivity and specificity of self-reported OTDs as a screening tool for COVID-19.

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`Table 1. Overall Participant demographics and frequencies of symptoms .docx` available at https://authorea.com/users/322802/articles/451722-olfactory-and-taste-disorders-and-covid-19-our-experience-in-77-adults-in-the-north-east-of-england

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`Table 2. Association between Olfactory and Taste Disorders and other symptoms. .docx` available at https://authorea.com/users/322802/articles/451722-olfactory-and-taste-disorders-and-covid-19-our-experience-in-77-adults-in-the-north-east-of-england