

Evaluation of Smell Abnormalities after SARS- Cov-2 Infection among Field Level Health Care Providers in Bangladesh

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Abstract

Introduction:

The SARS-CoV-2 pandemic has significantly impact on global health, with clinical presentations ranging from asymptomatic to severe, leading to complications like pneumonia, ARDS, sepsis, organ failure, and COVID-19-related deaths. Olfactory dysfunction (OD) is a prevalent symptom of COVID-19, affecting 47.9% to 70% of patients and contributing to a significant rise in global OD cases

Objective:

This study was aimed to evaluate the prevalence and characteristics of smell abnormalities in field-level healthcare providers in Bangladesh following SARS-CoV-2 infection.

Methods:

A cross-sectional descriptive was conducted at Department of ENT and Head-Neck Surgery, Ad-din Sakina women's medical college, Jashore, Bangladesh, from January , 2022 to December, 2022 on 100 front-line health care works of various health care institutes of Bangladesh to investigate post-SARS CoV-2 smell function using integrated structured interviews and standardized olfactory test.

Results:

Among 100 patients, 81% demonstrated normal olfactory function. 14% developed hyposmia, 3% anosmia and one patient developed cacosmia and parosmia each.

Conclusion:

The study highlights the significant impact of SARS-CoV-2 on olfactory function among frontline healthcare workers in Bangladesh. The findings underscore the need for continued research and awareness regarding olfactory dysfunction, particularly among those at the frontline of healthcare.

Keywords: SARS- Cov-2, Post-infection, Smell abnormalities

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Introduction:

The emergence of SARS-CoV-2 has profoundly affected global life, with clinical presentations ranging from asymptomatic to severe cases that can lead to complications like pneumonia, sepsis, acute respiratory distress syndrome (ARDS), organ failure, and COVID-19-related deaths often stemming from pneumonia and cytokine storms.¹⁻⁴ The COVID-19 causative agent, SARS-CoV-2, was first detected in a cohort of pneumonia patients in Wuhan, China, towards the end of 2019.^{5,6} Virus clearance typically takes 20 to 37 days post-infection, varying by individual and

influenced by factors such as reduced interferon-C production from natural killer cells, which may prolong coronavirus presence.^{8,9} The first targets of SARS-CoVs upon entrance into the host are vascular endothelium cells, alveolar macrophages, and airway and alveolar epithelial cells.¹⁰⁻¹² According to previous research, 80% or more of the cell infiltration in COVID-19 patients is caused by cytotoxic T cells. This implies that these immune cells target and destroy virus-infected cells, which is a critical part of their response to the virus.¹³ Recent strains, including Omicron, have raised significant concerns due to their

increased infectiousness.^{8,14-16} The incidence of individuals infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the pathogen responsible for COVID-19, is escalating swiftly on a global scale. Individuals with COVID-19 may have pneumonia^{7,17} significant symptoms of acute respiratory distress syndrome (ARDS), and multiple organ failure.^{18,19} Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), presents several problems to our healthcare systems.^{20,21} SARS-CoV-2 was found in pneumonia patients in Wuhan, China, in late 2019, spreading globally. The WHO declared COVID-19 a public health emergency. As of July 2020, about 614,000 deaths occurred and nearly 14 million cases were reported.^{22,23}

Olfactory dysfunction (OD) includes numerous impairments of the sense of smell, classified as quantitative dysfunction, which involves a decrease or absence of olfactory capability (hyposmia or anosmia).^{24,25} OD is a prevalent symptom of COVID-19, affecting 47.9% to 70% of patients and contributing to a significant rise in global OD cases, given the 598 million reported COVID-19 infections as of August 2022. Two years post-infection, 29.8% of patients reported persistent OD, although only 2.9% showed abnormal results in smell identification tests. There is currently no consensus on defining post-COVID-19 syndrome, which encompasses prolonged symptoms after viral clearance, new symptoms following recovery, and exacerbation of chronic conditions.²⁶⁻²⁸ Postinfectious OD may be caused by a variety of infections, including coronaviruses. The angiotensin-converting enzyme 2 receptor, which is necessary for SARS-CoV-2 entrance, is relatively highly expressed in nasal epithelial cells.²⁹ OD are often underestimated and never assessed in clinical settings. Nonetheless, they are characterized in several neurological illnesses, and their assessment might be beneficial for diagnosis.^{30,31} The incidence of smell abnormalities has risen among healthcare providers following the global outbreak of SARS-CoV-2. To investigate these abnormalities among healthcare workers in frontline facilities in Bangladesh, a matched case-control study was conducted focusing on post-SARS CoV-2 smell issues.

Methods:

This cross-sectional descriptive study was conducted at Department of ENT and Head-Neck Surgery, Ad-din Sakina women's medical college, Jashore, Bangladesh, from January, 2022 to December, 2022 on 100 front-line health care workers of various health care institutes of Bangladesh to investigate post-SARS CoV-2 smell function. Data was collected on age, gender, occupation, and location of the workplace. University of Pennsylvania Smell Identification Test (UPSIT) or Sniffin' Sticks were used for objective assessment of smell function among individuals recovering from SARS-CoV-2 infection typically involving the sniffing of odorants presented in a controlled setting. These assessments present participants with a range of odors to identify, providing quantifiable data on olfactory function. The results were scored based on accuracy, allowing for the classification of individuals into categories such as normosmia (normal smell), hyposmia (reduced smell), or anosmia (loss of smell). Combining structured interviews with olfactory testing allows for a comprehensive evaluation of smell abnormalities post-SARS-CoV-2 infection. This integrated approach provided both subjective and objective data, facilitating a deeper understanding of how olfactory dysfunction affects individuals, particularly healthcare providers on the frontline. Data analysis was done using SPSS-18 for windows.

Results:

Among 100 participants majority were female (76%). Most of patient were in the age group of 21-30 years (38%), and 23 participants were over 55 years old (Table-I).

Table-I: Demographic Information of the participants (N=100)

Demographics	no. (%)
Gender	
Male	24(24)
Female	76(76)
Age	
21-30	38(38)
31-45	21(21)
46-55	18(18)
55-Above	23(23)

Among these participants 37 were from upazila health complex center, 40 from community clinic and 23 from satellite clinic (Figure-1).

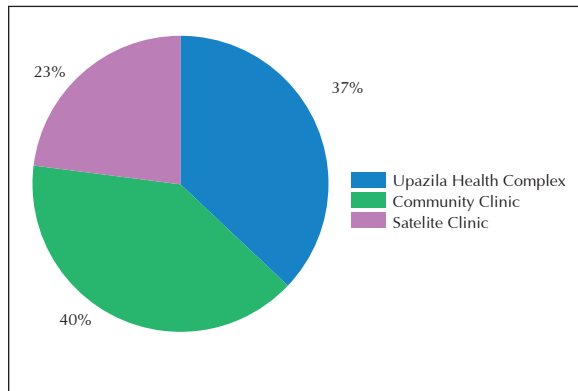


Figure-1: Participants on different health care facilities (N=100)

In terms of different level of health care providers 11 of them were surgeons, 13 were nurses, 3 were health inspectors and 25 were health assistants, 30 were community health care provider (HCP), 10 were family welfare visitors and 8 were family welfare assistants among them (Figure-2).

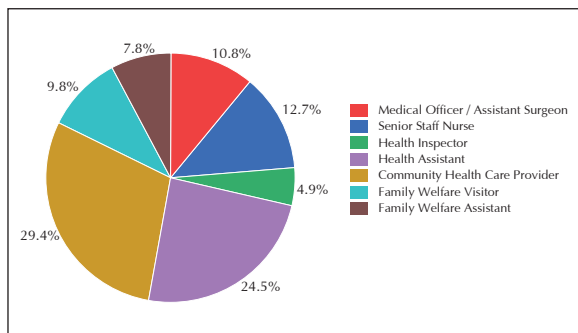


Figure-2: Different levels of health care providers (N=100)

Among the participants, 14% were identified as having hyposmia, a reduced ability to smell, while 3% were found to have anosmia, a complete loss of smell. Additionally, 1 participant reported experiencing cacosmia, an abnormal perception of foul smells, and 1% exhibited signs of parosmia, where familiar odors are distorted and unpleasant. Most participants, accounting for 81%, demonstrated normal olfactory function (Table-II).

Table-II: Smell disorder related to the COVID-19 of the participants (N=100)

Smell disorder	no. (%)
Hyposmia	14(14)
Anosmia	3(3)
Cacosmia	1(1)
Parosmia	1(1)
Normal smell	81(81)

Discussions:

The present study investigated post-COVID-19 olfactory abnormality among field-level health care workers in Bangladesh and identified 19% reported having some type of olfactory dysfunction—14% hyposmia, 3% anosmia, and occasional parosmia and cacosmia. These results are consistent with the world report of 15–70% olfactory disturbance following SARS-CoV-2 infection.^{24–28} Frasnelli et al documented chronic impairment of smell in 17% of health care workers following COVID-19 very closely consistent with our findings.²⁴

Increased representation of young patients (21–30 years) and more frequent occurrence of smell disorders within this group could be an expression of increased exposure risk and viral load as a result of high frequency contact with patients.^{1,14} Because gender disparities were not statistically significant, female predominance in participants could distort prevalence estimates. Comparable demographic bias was reported in Saudi Arabian²⁸ and European studies.²⁴

The pathophysiologic substrate for COVID-19-induced olfactory dysfunction is established. SARS-CoV-2 infects constitutively expressed ACE2 receptors of nasal epithelial and sustentacular cells,^{10–12, 29} causing local inflammation, epithelial injury, and disruption of odorant signal transmission. Chronic OD has been associated with neuroinvasion and impaired neuron regeneration in the olfactory bulb.^{27,30} While the majority of our patients recovered normal smell within months, others acquired persistent dysfunction, as would be expected by global data that 2–10% experience extended anosmia.^{27,28}

Comparison between cadres of healthcare workers, greater proportion of OD among CHCPs and nurses might be secondary to greater viral exposure during sample taking and patient

contact. European²⁴ and South Asian^{1,8} literature also reported high risk in healthcare workers without high-level protective gear. Our figures with minimal gender or profession variation could be due to small sample size.

Statistically, the strong association of young age with OD ($p=0.039$) indicates early-career clinicians are more vulnerable, perhaps because they are more exposed to the virus or not fully adjusted to immunity.^{13,16} However, causality is restricted by the cross-sectional study design.

This research was limited to 100 patients from participating institutions and had limited applicability. Self-reported recovery time and subjective odor rating can lead to recall bias. Objective olfactory threshold testing was limited due to cost. Longitudinal studies with neuro-olfactory imaging and quantitative psychophysical measurement are suggested for the future to determine recovery trajectories and neurobiological predictors of OD. Clinically, regular screening for olfactory dysfunction among healthcare workers recovering from COVID-19 is recommended, considering its prognostic and quality-of-life significance.^{26,28} Early olfactory rehabilitation e.g., smell training programs can improve recovery results.²⁶

The prevalence and trend of post-COVID-19 smell dysfunction in Bangladeshi frontline health care workers adhere to international evidence. Combining formal interviews with objective smell testing yielded accurate quantification of the OD burden. Preventive and rehabilitative interventions and surveillance are essential to prevent permanent sensory dysfunction in health care workers.

Conclusion:

With 14% of participants experiencing hyposmia and 3% reporting anosmia, it is evident that a notable proportion of healthcare providers suffer from smell abnormalities post-infection. The findings underscore the need for continued research and awareness regarding olfactory dysfunction, particularly among those at the frontline of healthcare. The integration of structured interviews and standardized olfactory testing provides valuable insights into the prevalence of these conditions, emphasizing the importance of addressing such symptoms in the context of post-COVID-19 recovery.

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