ORIGINAL RESEARCH ARTICLE

CLINICAL PROFILE, SEVERITY, AND RECOVERY PATTERNS OF OLFACTORY DYSFUNCTION FOLLOWING POST-VIRAL UPPER RESPIRATORY INFECTIONS: A HOSPITAL-BASED OBSERVATIONAL STUDY FROM WEST BENGAL

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ABSTRACT

Background: Olfactory dysfunction is a frequently overlooked complication of post-viral upper respiratory infections (URIs), with significant implications on quality of life and daily functioning. Despite its clinical importance, there is limited data from West Bengal regarding its pattern, severity, and recovery.

Objectives: To evaluate the clinical profile, severity, and recovery patterns of olfactory dysfunction in patients with post-viral upper respiratory infections, and to identify associated clinical factors.

Methods: A hospital-based cross-sectional study was conducted in the Department of Otorhinolaryngology of a tertiary care hospital in West Bengal from January 2020 to September 2020. A total of 70 adult patients with recent history of upper respiratory infection and complaints of olfactory dysfunction were included using consecutive sampling. Data were collected using a semi-structured questionnaire, clinical examination, and olfactory assessment tests. Statistical analysis was performed using SPSS version 22.0, with $p<0.05$ considered statistically significant.

Results: Hyposmia was the most common form of olfactory dysfunction (51.4%), followed by anosmia (31.4%) and qualitative disturbances (17.2%). Moderate severity was observed in 42.9% of patients. The majority of participants experienced symptoms for 2–4 weeks (40.0%). Complete recovery was observed in 45.7% of patients, while 34.3% had partial recovery and 20.0% showed no recovery. Nasal obstruction ($p=0.041$) and longer duration of symptoms (>2 weeks) ($p=0.032$) were significantly associated with increased severity of olfactory dysfunction.

Conclusion: Olfactory dysfunction is a common and clinically significant consequence of post-viral URIs, with variable recovery outcomes. Early identification and evaluation are essential for appropriate management. Incorporating routine olfactory assessment in clinical practice and promoting awareness can improve patient care and outcomes.

Keywords: Olfactory dysfunction; Hyposmia; Anosmia; Upper respiratory infection; Post-viral; ENT

INTRODUCTION

Olfactory dysfunction is a common yet often under-recognized clinical condition that significantly affects quality of life, nutrition, and safety. Globally, disorders of smell are estimated to affect approximately 5–20% of the general population, with higher prevalence among older individuals and those with respiratory illnesses [1]. The sense of smell plays a critical role not only in food perception but also in detecting environmental hazards, and its impairment may lead to psychological consequences such as anxiety and depression [2]. Among the various etiologies, post-viral upper respiratory infections (URIs) represent one of the most frequent causes of acquired olfactory dysfunction [3].

Viral infections are known to damage the olfactory neuroepithelium either directly or indirectly through inflammatory mechanisms. Common respiratory viruses such as rhinovirus, influenza virus, parainfluenza, and coronaviruses have been implicated in post-viral olfactory loss [4]. The pathophysiology involves epithelial destruction, neuronal apoptosis, and impaired regeneration of olfactory receptor neurons, leading to transient or permanent dysfunction [5]. Clinical manifestations may range from hyposmia (reduced smell) to anosmia (complete loss), often accompanied by qualitative disturbances such as parosmia or phantosmia [6].

In recent years, especially during viral outbreaks, there has been an increased awareness of olfactory disturbances as a key symptom of respiratory infections. Studies have demonstrated that olfactory dysfunction can persist beyond the acute phase of infection, thereby contributing to long-term morbidity [7]. While a proportion of patients recover spontaneously within weeks, a significant subset continues to experience persistent symptoms, necessitating clinical evaluation and management [8].

In the Indian context, upper respiratory infections constitute a major burden on healthcare systems, particularly in tertiary care settings where complicated or persistent cases are referred. Despite this high burden, there is limited data from West Bengal evaluating the prevalence, severity, and pattern of olfactory dysfunction following viral URIs. Most existing studies have focused either on specific viral outbreaks or have been conducted in Western populations, limiting generalizability [9].

Additionally, variations in healthcare-seeking behavior, environmental exposures, and comorbidities in the Indian population may influence the presentation and outcomes of olfactory dysfunction.
Furthermore, the lack of standardized assessment tools and variability in clinical evaluation contribute to underdiagnosis and inconsistent reporting. Objective olfactory testing is not routinely performed in many clinical settings, and patient-reported symptoms may not accurately reflect the severity of dysfunction [10]. This highlights a critical gap in the systematic evaluation of olfactory impairment in post-viral cases, particularly in resource-limited settings.

Given the clinical and public health importance of olfactory dysfunction, there is a need for focused research to understand its spectrum, associated factors, and recovery patterns in patients with post-viral URIs. Such data would aid in early identification, appropriate counseling, and management strategies, ultimately improving patient outcomes.

Therefore, the present study aims to evaluate the pattern and severity of olfactory dysfunction among patients with post-viral upper respiratory infections attending a tertiary care hospital in West Bengal, and to identify associated clinical factors influencing its occurrence and recovery.

METHODOLOGY

Study Design: A hospital-based observational cross-sectional study was conducted to evaluate olfactory dysfunction among patients with post-viral upper respiratory infections, following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Study Setting: The study was carried out in the Department of Otorhinolaryngology of a tertiary care hospital in West Bengal, catering to both urban and rural populations.

Study Duration: The study was conducted over a period of nine months from January 2020 to September 2020.

Study Population: The study population included patients presenting to the ENT outpatient department with a history of recent upper respiratory infection followed by complaints of olfactory dysfunction.

Inclusion Criteria

- Patients aged ≥18 years
- History of upper respiratory tract infection within the preceding 4 weeks
- Subjective complaint of reduced or altered sense of smell (hyposmia, anosmia, or parosmia)
- Willingness to participate and provide informed consent

Exclusion Criteria

- History of chronic rhinosinusitis or nasal polyposis
- Previous nasal or sinus surgery
- Head trauma or neurological disorders affecting olfaction
- Congenital anosmia
- Current use of medications known to affect olfaction (e.g., intranasal zinc preparations)
- Critically ill patients unable to undergo assessment

Sample Size: The sample size was calculated using the formula for estimating a proportion in a cross-sectional study:

$$n = \frac{Z^2 \times p \times q}{d^2}$$

Where:

- Z = 1.96 (for 95% confidence interval)
- p = anticipated prevalence of olfactory dysfunction in post-viral URIs (assumed 50% due to variability in literature)
- q = 1 – p = 0.5
- d = absolute precision of 12%

$$n = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.12)^2} \approx 67$$

After rounding and accounting for feasibility, a total of 70 participants were included in the study.

Sampling Technique: A consecutive sampling technique was used, wherein all eligible patients presenting during the study period and fulfilling the inclusion criteria were recruited until the desired sample size was achieved.

Data Collection Tools & Procedure: Data were collected using a predesigned, semi-structured questionnaire capturing demographic details, clinical history of upper respiratory infection, onset and duration of olfactory symptoms, and associated nasal or systemic symptoms. A thorough ENT examination, including anterior rhinoscopy, was performed to exclude structural causes. Olfactory function was assessed using a standardized smell identification test (such as commonly available odorants in a clinical setting), and patients were categorized into normosmia, hyposmia, or anosmia based on their responses. Severity grading was done using subjective scoring scales along with objective assessment where feasible. All assessments were conducted by trained ENT specialists to ensure uniformity.

Study Variables: Independent variables included age, gender, duration and severity of upper respiratory infection, presence of nasal symptoms (nasal obstruction, rhinorrhea), comorbidities (e.g., diabetes, smoking status), and duration since onset of olfactory symptoms. The dependent variable was olfactory dysfunction, categorized as normosmia, hyposmia, anosmia, or qualitative disturbances (parosmia/phantosmia), along with severity grading.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 22.0. Descriptive statistics such as mean, standard deviation, frequencies, and percentages were used to summarize data. Inferential statistics, including the Chi-square test or Fisher's exact test, were applied to assess associations between categorical variables. A p-value of <0.05 was considered statistically significant.

Ethical Considerations: Written informed consent was obtained from all participants prior to enrollment. Confidentiality of patient information was strictly maintained throughout the study. The study adhered to the ethical principles outlined in the Declaration of Helsinki.

RESULTS

A total of 70 patients with post-viral upper respiratory infections and olfactory dysfunction were included in the study. The majority of participants belonged to the 18–30 years age group, with a slight male predominance (Table 1).

Table 1: Socio-demographic Characteristics of Study Participants (n = 70)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18–30	24	34.3
	31–45	22	31.4
	46–60	16	22.9
	>60	8	11.4
Gender	Male	38	54.3
	Female	32	45.7
Residence	Urban	40	57.1
	Rural	30	42.9

Most patients reported URI symptoms lasting 8–14 days, with rhinorrhea and nasal obstruction being the most common associated symptoms (Table 2).

Table 2: Clinical Profile of Upper Respiratory Infection (n = 70)

Variable	Category	Frequency (n)	Percentage (%)
Duration of URI symptoms	≤7 days	28	40.0
	8–14 days	30	42.9
	>14 days	12	17.1
Nasal obstruction	Present	46	65.7
	Absent	24	34.3
Rhinorrhea	Present	50	71.4
	Absent	20	28.6
Fever	Present	38	54.3
	Absent	32	45.7

Hyposmia was the most frequently observed olfactory disturbance, followed by anosmia and qualitative dysfunctions such as parosmia (Table 3).

Table 3: Pattern and Severity of Olfactory Dysfunction (n = 70)

Variable	Category	Frequency (n)	Percentage (%)
Type of dysfunction	Hyposmia	36	51.4
	Anosmia	22	31.4
	Parosmia/Phantosmia	12	17.2

Severity (subjective)	Mild	20	28.6
	Moderate	30	42.9
	Severe	20	28.6

Regarding duration, the majority of patients experienced olfactory dysfunction for 2–4 weeks. At follow-up, complete recovery was observed in less than half of the participants, while a considerable proportion had partial or no recovery (Table 4).

Table 4: Duration of Olfactory Dysfunction and Recovery Status (n = 70)

Variable	Category	Frequency (n)	Percentage (%)
Duration of symptoms	≤2 weeks	26	37.1
	2–4 weeks	28	40.0
	>4 weeks	16	22.9
Recovery status at follow-up	Complete recovery	32	45.7
	Partial recovery	24	34.3
	No recovery	14	20.0

Statistical analysis revealed a significant association between the severity of olfactory dysfunction and the presence of nasal obstruction as well as prolonged duration of symptoms (>2 weeks). However, rhinorrhea and fever did not show statistically significant associations (Table 5).

Table 5: Association between Clinical Factors and Severity of Olfactory Dysfunction (n = 70)

Variable	Mild/Moderate (n=50)	Severe (n=20)	p-value
Nasal obstruction	30	16	0.041*
Rhinorrhea	34	16	0.089
Fever	24	14	0.118
Duration >2 weeks	26	18	0.032*

*Statistically significant ($p < 0.05$)

DISCUSSION

The present study evaluated the pattern, severity, and associated clinical factors of olfactory dysfunction among patients with post-viral upper respiratory infections (URIs) in a tertiary care setting in West Bengal. The findings demonstrated that hyposmia was the most common presentation, followed by anosmia and qualitative disturbances. A substantial proportion of patients experienced moderate to severe dysfunction, and recovery was incomplete in many cases. Notably, nasal obstruction and longer duration of symptoms were significantly associated with greater severity of olfactory impairment.

Olfactory dysfunction following viral infections is well-documented, with post-viral etiology being one of the leading causes of acquired smell disorders [3]. The predominance of hyposmia observed in the present study is consistent with earlier findings, where partial loss of smell is reported more frequently than complete anosmia [6]. This may be explained by the variable extent of damage to the olfactory neuroepithelium and differences in individual regenerative capacity [5]. Furthermore, qualitative disturbances such as parosmia, though less common, indicate aberrant regeneration of olfactory neurons, a phenomenon supported by neurobiological studies [5].

The age distribution in the current study showed a higher proportion of younger adults, which aligns with some recent observations that post-viral olfactory dysfunction is not limited to older populations but can significantly affect younger individuals as well [7]. This may reflect increased healthcare-seeking behavior or heightened awareness of olfactory symptoms in recent years. Male predominance observed in this study is comparable to findings from certain Indian studies, although global data on gender differences remain inconsistent [9].

The association between nasal obstruction and severity of olfactory dysfunction found in this study highlights the role of conductive olfactory loss, wherein airflow limitation prevents odorants from reaching the olfactory epithelium. This finding is supported by previous literature, which emphasizes that both conductive and sensorineural mechanisms contribute to olfactory impairment in URIs [10]. However, the persistence of dysfunction even after resolution of nasal symptoms in some patients suggests an additional neuroepithelial component.

Another key finding was the significant association between prolonged duration of symptoms and severe olfactory dysfunction. This observation is consistent with earlier studies indicating that delayed recovery is often associated with more extensive epithelial damage and slower neuronal regeneration [8]. In the present study, only 45.7% of patients showed complete recovery at follow-up, which is comparable to reports suggesting that spontaneous recovery occurs in approximately one-third to one-half of cases [8]. This underscores the need for timely evaluation and possible therapeutic interventions in patients with persistent symptoms.

Interestingly, symptoms such as rhinorrhea and fever did not show a statistically significant association with severity, suggesting that systemic or inflammatory manifestations of URI may not directly correlate with the extent of olfactory damage. This aligns with the understanding that olfactory dysfunction is more specifically related to localized effects on the olfactory mucosa rather than general systemic illness [4].

From a clinical and public health perspective, these findings highlight the importance of routine assessment of olfactory function in patients presenting with upper respiratory infections. Early identification of olfactory dysfunction can aid in counseling patients regarding prognosis and may prompt consideration of interventions such as olfactory training, which has shown promising results

in improving outcomes [11]. Additionally, given the impact of olfactory loss on nutrition and safety, awareness among clinicians and patients is crucial.

The strengths of this study include its focused evaluation of post-viral olfactory dysfunction in a tertiary care setting and the use of both subjective and objective assessment methods. However, certain limitations must be acknowledged. The relatively small sample size and single-center design may limit generalizability. The follow-up period was also limited, restricting assessment of long-term recovery patterns. Furthermore, advanced objective olfactory testing methods were not uniformly available, which may have introduced measurement variability.

In conclusion, the study reinforces that olfactory dysfunction is a common and clinically significant sequela of post-viral URIs, with variable recovery patterns and identifiable associated factors. Further multicentric studies with larger sample sizes and longer follow-up are needed to better understand prognosis and optimize management strategies.

CONCLUSION

Olfactory dysfunction is a common sequela of post-viral upper respiratory infections, with hyposmia being the most frequent presentation followed by anosmia and qualitative disturbances. The present study highlights that a considerable proportion of patients experience moderate to severe olfactory impairment, with incomplete recovery observed in many cases. Nasal obstruction and prolonged duration of symptoms were identified as significant factors associated with increased severity of dysfunction. These findings emphasize the need for early recognition and systematic evaluation of olfactory disturbances in patients presenting with upper respiratory infections. Routine assessment of olfactory function should be integrated into clinical practice, particularly in tertiary care settings. Given the impact of olfactory dysfunction on quality of life, timely counseling and potential therapeutic interventions such as olfactory training should be considered. Further longitudinal and multicentric studies are recommended to better understand long-term outcomes and optimize management strategies in affected patients.

DECLARATIONS

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Conflict of Interest: The authors declare no conflict of interest.
Consent: Written informed consent was obtained from all participants prior to inclusion in the study.
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REFERENCES

1. Hummel T, Whitcroft KL, Andrews P, Altundag A, Cinghi C, Costanzo RM, Damm M, Frasnelli J, Gudziol H, Gupta N, Haehne A. Position paper on olfactory dysfunction. Rhinology. 2017;54:1-30.
2. Croy I, Nordin S, Hummel T. Olfactory disorders and quality of life—an updated review. Chemical senses. 2014 Mar 1;39(3):185-94.
3. Seiden AM. Postviral olfactory loss. Otolaryngologic Clinics of North America. 2004 Dec 1;37(6):1159-66.
4. Suzuki M, Saito K, Min WP, Vladau C, Toida K, Itoh H, Murakami S. Identification of viruses in patients with postviral olfactory dysfunction. The Laryngoscope. 2007 Feb;117(2):272-7.
5. Schwob JE. Neural regeneration and the peripheral olfactory system. The Anatomical Record: An Official Publication of the American Association of Anatomists. 2002 Feb 15;269(1):33-49.
6. Landis BN, Hummel T. New evidence for high occurrence of olfactory dysfunctions within the population. The American journal of medicine. 2006 Jan 1;119(1):91-2.
7. Boscolo-Rizzo P, Borsetto D, Fabbris C, Spinato G, Frezza D, Menegaldo A, Mularoni F, Gaudioso P, Cazzador D, Marciani S, Frasconi S. Evolution of altered sense of smell or taste in patients with mildly symptomatic COVID-19. JAMA Otolaryngology–Head & Neck Surgery. 2020 Aug;146(8):729-32.
8. Reden J, Mueller A, Mueller C, Konstantinidis I, Frasnelli J, Landis BN, Hummel T. Recovery of olfactory function following closed head injury or infections of the upper respiratory tract. Archives of Otolaryngology–Head & Neck Surgery. 2006 Mar 1;132(3):265-9.
9. Singh AK, Gupta P, Verma N, Khare V, Ahamad A, Verma V, Agarwal SP. Fungal rhinosinusitis: microbiological and histopathological perspective. Journal of clinical and diagnostic research: JCDR. 2017 Jul 1;11(7):DC10.
10. Doty RL. Office procedures for quantitative assessment of olfactory function. American journal of rhinology. 2007 Jul;21(4):460-73.
11. Hummel T, Rissom K, Reden J, Hähner A, Weidenbecher M, Hüttenbrink KB. Effects of olfactory training in patients with olfactory loss. The Laryngoscope. 2009 Mar;119(3):496-9.