

RESEARCH NOTE

Parosmia in patients with COVID-19 and olfactory dysfunction

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KEYWORDS

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INTRODUCTION

Smell and taste disorders have been associated with coronavirus-2019 (COVID-19).¹ Olfactory disorders are divided into quantitative (hyposmia and anosmia) and qualitative, which is subdivided into parosmia (distorted odor perception) and phantosmia (odor perception in the absence of odorant).² Most patients with COVID-19-associated olfactory dysfunction will improve with time. Nonetheless, considering the high incidence of COVID-19, significant numbers of patients with olfactory disorders are expected during this pandemic. There are limited data on the outcome of qualitative olfactory dysfunction due to other etiologies,³ and data on parosmia secondary to COVID-19 are scarce. In this study, we aimed to assess the prevalence, characteristics, and quality of life in patients with parosmia due to COVID-19.

METHODS

We published an online questionnaire about smell dysfunction on a national platform (<https://survey.porsline.ir/s/yhfYb7W/ref=wh>), collecting data from November 1, 2020 until December 26, 2020. Inclusion criteria were

age at least 15 years and new-onset olfactory dysfunction during the COVID-19 pandemic (ie, since February 2020; the questionnaire is included in the [supplementary material](#)). Participants with COVID-19 confirmed by polymerase chain reaction (PCR) assay were included in the analysis.

To assess the impact of parosmia on quality of life, we used a modified version of the Questionnaire of Olfactory Disorders—Negative Statements (QOD-NS)⁴ ([supplementary material](#)). We selected a cutoff score of 12.5 for distinction between normal vs abnormal quality of life.⁴ The study was approved by the institutional review board at our hospital.

RESULTS

Demographics and clinical characteristics

Of the 1531 individuals who participated, 1299 completed the entire questionnaire. Of these participants, 140 (10.8%) had parosmia and COVID-19 confirmed by PCR. Demographic and clinical characteristics of the participants with parosmia are summarized in Table 1.

TABLE 1 Demographics and clinical characteristics of participants with parosmia

Demographics and clinical characteristics	Number (%)
Age, years	
15-20	7 (5%)
21-30	52 (37.1%)
31-40	57 (40.8%)
41-50	22 (15.7%)
51-60	2 (1.4%)
>60	0 (0.0%)
Sex	
Male	37 (26.4%)
Female	103 (73.6%)
Past medical history	
Allergy	29 (20.7%)
Asthma or COPD	4 (2.9%)
Diabetes	3 (2.10%)
Hypertension	6 (4.30%)
Cardiac disease	1 (0.70%)
Thyroid disease	21 (15%)
Current sinonasal symptoms	
Nasal obstruction	39 (27.9%)
Nasal discharge	16 (11.4%)
Postnasal discharge	46 (32.9%)
Itchy nose	10 (7.1%)
Facial pain	19 (13.6%)
Headache	42 (30%)
Previous symptoms related to COVID-19	
Fever	34 (24.3%)
Headache	54 (38.6%)
Myalgia	41 (29.3%)
Cough	28 (20%)
Dyspnea	22 (15.7%)
Vertigo	22 (15.7%)
Gastrointestinal symptoms	31 (22.1%)

COPD = chronic obstructive pulmonary disease; COVID-19 = coronavirus-2019.

Self-reported parosmia in 70 (50%) of the participants was of sudden onset. In 32 (22.9%) participants, parosmia lasted less than 1 month, in 37 (26.4%) 1 to 3 months, and in 71 (50.7%) longer than 3 months. There was no difference in parosmia perceived through either nostril in most participants (130 [93%]). Fifty-seven participants (40.7%) had a history of self-reported anosmia or hyposmia (Table 2).

Most participants (77 [55%]) did not have any changes in the severity of parosmia during the day. Types of food that were associated with parosmia were chicken and meat

TABLE 2 Characteristics of parosmia and gustatory dysfunction in patients with COVID-19

Characteristics of parosmia	Number (%)
Onset of parosmia	
Sudden	70 (50%)
Gradual	70 (50%)
Duration of parosmia	
<1 month	32 (22.9%)
1-3 months	37 (26.4%)
>3 months	71 (50.7%)
History of hyposmia or anosmia associated with COVID-19	
Yes	57 (40.7%)
No	83 (59.3%)
Duration of hyposmia or anosmia associated with COVID-19	
<2 weeks	15 (26.3%)
2 weeks to 3 months	33 (58%)
>3 months	9 (15.7%)
Types of food that were associated with parosmia	
Chicken and meat	84 (60%)
Onion	71 (50.7%)
Egg	70 (50%)
Garlic	49 (35%)
Rice	45 (32.1%)
Cucumber and tomato	43 (30.7%)
Fish	41 (29.3%)
Vegetables	36 (25.7%)
Nuts	33 (23.6%)
Dairy	32 (22.9%)
Pasta	23 (16.4%)
Soy	16 (11.4%)
Concurrent gustatory dysfunction	Number (%)
Pattern of gustatory dysfunction	
No taste perception (ageusia)	15 (13.7%)
Diminished taste perception (hypogeusia)	55 (50.5%)
Perceiving an unpleasant taste with food stimulus (parageusia)	39 (35.8%)
Hyogeusia/ageusia and parageusia overlap	10 (10.1%)
Disturbance in the main tastes	
Sweet	69 (69.7%)
Sour	68 (68.7%)
Salt	65 (65.7%)
Bitter	64 (64.6%)

COVID-19 = coronavirus-2019.

(60%), onion (50.7%), egg (50%), garlic (35%), rice (32.1%), cucumber and tomato (30.7%), fish (29.3%), vegetables (25.7%), nuts (23.6%), dairy (22.9%), pasta (16.4%), and soy (11.4%). Forty (28.5%) participants received olfactory rehabilitation, with a degree of improvement reported in 20 (50%).

Gustatory dysfunction associated with parosmia

Of the participants with parosmia, 99 (70.7%) had concurrent self-reported gustatory dysfunction; 15 (13.7%) with ageusia, 55 (50.5%) with hypogeusia, 39 (35.8%) with parageusia, and 10 (10.1%) with an overlap of both hypogeusia/ageusia and parageusia. Disturbance in the main flavors were reported in 69 (69.7%) participants for sweetness, 68 (68.7%) for sourness, 65 (65.7%) for saltiness, and 64 (64.6%) for bitterness (Table 2).

Olfactory-specific quality-of-life assessment

The mean QOD-NS score was 26.9 ± 10.47 . Questions about eating (Questions 3 and 7), anxiety of not getting used to the olfactory problem (Question 4), and permanent awareness of the olfactory impairment (Question 2) had the highest scores (supplementary material). A score less than 12.5 (ie, good quality of life) was only observed in 26 (18.6%) participants.

DISCUSSION

Parosmia was reported in about 7% of patients with olfactory dysfunction and suspected/confirmed COVID-19 in a previous study.⁵ The relatively higher rate of self-reported parosmia (11%) in the present study may be due to the short course of viral illness included in the previous report (within 2 weeks of a respiratory illness), whereas qualitative olfactory dysfunctions usually occur late in the course of postviral olfactory disorders.⁶

Qualitative olfactory dysfunction may occur during olfactory neuronal death or regeneration.⁷ In the present study, self-reported quantitative olfactory dysfunction lasted more than 2 weeks in most participants. Therefore, parosmia may be a sequel of hyposmia/anosmia, and its occurrence in individuals with prolonged hyposmia/anosmia in the present study may suggest parosmia occurring in the neural regenerative phase.

Olfactory dysfunction has major impacts on quality of life, with negative effects on mood, enjoyment of food,

personal safety, hygiene, social interaction, and sex life.⁸ Patients with parosmia have more complaints regarding quality of life compared to patients with quantitative olfactory dysfunction.⁹ Hyposmic/anosmic patients do not enjoy food due to impaired retronasal olfaction, whereas patients with parosmia feel “disgusted” by the unpleasant smell of food. Indeed, we observed that the greatest problem in parosmic participants was in enjoyment of food, particularly with parosmia triggered by chicken/meat, onion, and egg. Social interactions were not affected in most patients, which may be due to the social distancing that is observed/mandated during the current pandemic.

Consistent with a previous study,² about half of the patients who had received olfactory rehabilitation reported a degree of improvement in parosmia associated with COVID-19 in the present study. Olfactory training recovers cognitive processing of incomplete olfactory sensory information, especially in postinfectious parosmia compared with other causes.² Early initiation of olfactory training therapy for patients with olfactory dysfunction of COVID-19 may thus be useful.

Our study has several limitations. This was an online survey with potential inherent biases in the design, including selection bias. We collected the data based on the subjective statements by the participants and did not objectively verify the data, including by performing objective olfactory tests (eg, psychophysical tests). The data were collected at a specific time-point for each participant and follow-up was not feasible with the study design. We used the QOD-NS, which is a validated questionnaire in chronic rhinosinusitis, and not in other olfactory disorders.

Further studies are needed to evaluate the underlying mechanisms, clinical course, management, and prognosis of parosmia in COVID-19.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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