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World Journal of Surgery and Surgical Case Reports

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Vol: 2 & Iss: 1

The Prevalence of Smell Disorders Among Covid-19 Patients in Karbala City

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Citation: Al-Kelabi A. The Prevalence of Smell Disorders Among Covid-19 Patients in Karbala City. *World J Surg Surgical Case Rep*, 2026;2(1):119-123.

Received: 12 July, 2025; **Accepted:** 02 November, 2025; **Published:** 13 March, 2026

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ABSTRACT

Background: Olfactory impairment is one of the frequently reported clinical signs of Covid-19 illness, which is thought to influence multiple systems.

Aim: To evaluate the prevalence of smell disturbance among covid-19 patients.

Materials and Methods: A cross-sectional study was conducted on covid-19 cases among the students in the medical field in Holey Karbala City. The data was collected using an online survey questionnaire, which include general demographic information, medical history, COVID-infection-related questions (exposure, duration, symptoms), and smell alteration.

Results: Total number of cases 282, the prevalence of smell change 79% affecting mainly females (57.7%). The most frequently reported type of smell disturbance was anosmia (47.5%). Most cases of olfactory impairment reported mild to moderate clinical course (32.6% and 34.4%, respectively) with a recovery period of more than 1 week and less than 3 months. The most frequently associated symptoms were fever and cough.

Conclusion: Smell disturbance was highly prevalent among the young, female population and mostly associated with mild clinical course.

Keywords: COVID-19, Smell disorder, Anosmia

1. Introduction

The World Health Organization (WHO) declared the coronavirus disease 2019 (COVID-19), caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-Cov-2), a pandemic three months after it was first discovered in Wuhan, China[1,2]. From that point on, the disease spread rapidly throughout the world as a pandemic, with more than 550 million confirmed cases and more than 6 million fatalities reported until July 2022[1-3].

The glycoprotein surface molecule that the COVID-19 virus used to express its effects uses a spike that it is known to produce when it binds with Angiotensin-Converting Enzyme 2 (ACE2) receptors. Alveolar cells in the lung are where ACE2 is mostly secreted. As a result, the lung is thought to be the human body's organ that is most adversely affected. However, many additional glandular, endothelial, and enterocyte cells also express ACE2, making them vulnerable to covid-19 infection[4].

About 80% of Covid-19 cases are mild and self-limited,

mostly affecting the upper airway with minimal lung involvement[5]. About 80% of Covid-19 cases are mild and self-limited, mostly affecting the upper airway with minimal lung involvement[5]. Covid-19 is characterized by a variety of clinical manifestations. A high fever typically emerges after a dry cough; occasionally, viral pneumonia develops and worsens, leading to breathlessness. Fever, dry cough, dyspnea, muscle ache (myalgia), confusion, headache, sore throat, rhinorrhea, chest pain, diarrhea, nausea/vomiting, conjunctival congestion, nasal congestion, sputum production, fatigue (malaise), hemoptysis, and chills are among the symptoms that COVID-19 patients frequently experience[6,7].

The WHO and many other health authorities have recognized the loss of smell or taste as a new symptom of COVID-19 infection as a result of an increasing number of articles and studies that demonstrate anosmia as a screening symptom and diagnostic tool for SARS-CoV2. A significant proportion of test-positive COVID19 patients experience a new onset of smell or taste disturbance[8].

In the course of normal olfactory physiology, a volatile substance interacts with the chemoreceptors present on the olfactory sensory neurons to produce the sensation of smell. At the apex of the nasal canal, the olfactory sensory neurons are surrounded by supportive cells such as stem cells, Bowman's glands that secrete mucus, sustentacular cells, and microvillar cells[9]. The action potential is sent from the activated olfactory sensory neurons to the olfactory bulb and then to the amygdala, hippocampus, and primary olfactory cortex. Olfactory abnormalities that may be conductive due to excessive mucus production and respiratory epithelium congestion or sensorineural due to neurological damage may emerge from changes at any step in this route[10].

The pathophysiology of anosmia and other small changes in covid-19 has not been determined[5]. However, it may be due to the malfunctioning of olfactory sensory neurons brought on by direct neuronal infection or by infection and death of supporting cells, microvillar cells, and vascular pericytes. But there may also be additional inflammation-related processes, such as localized mucosal edema and airflow obstruction (Figure 1)[5,11].

There are two forms of smell disorders: quantitative (anosmia and hyposmia) and qualitative (parosmia and cacosmia), each with a unique recovery process and outcome[12].

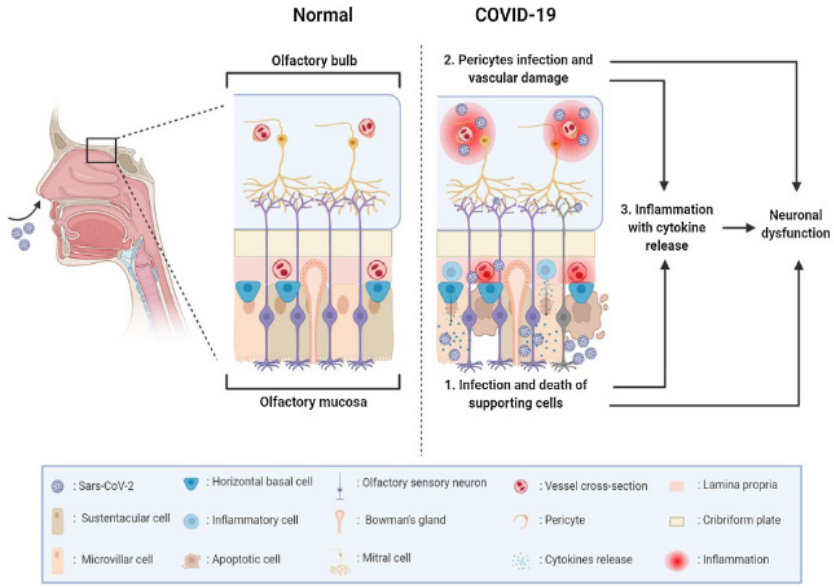

Figure 1: Possible smell difficulty pathophysiology in COVID-19. In COVID-19, olfactory disorders may be caused by: 1) infection and damage to the olfactory epithelium's supporting cells, which results in inflammation and changes to the local homeostasis; or 2) infection- or immune-mediated damage to the endothelial cells and vascular pericytes, which causes hypoperfusion and inflammation. In both situations, the activation of inflammatory cells, the release of cytokines, and the production of neurotoxic substances may indirectly affect neural signaling. Additionally, blockage of the olfactory cleft and potential direct neuronal cell infection could happen[5].

2. Materials and Methods

2.1. Study Design and Sampling Method

This cross-sectional study was conducted among covid-19 cases of the students in the medical field in Holey Karbala, during September and October 2021. The data was collected by an online questionnaire; a Google form link was posted on social network programs (Telegram and WhatsApp) and both male and female students who were infected with the coronavirus were asked to enroll and fill out the questionnaire from various stages. Subjects with incomplete data were excluded from the study.

2.2. Data Collection and Management

The information was obtained through a web-based questionnaire that had 13 questions in 3 categories. 1) Personal information, such as gender and age. 2) Inquiries on smell disturbance (onset, nature, duration, relationship to corona infection progression, and other symptoms). 3) The danger factors and the severity of the infection. The questionnaire's items were created following scientific research, existing questionnaires, and information available from open sources.

2.3. Data Analysis

Microsoft Excel was used to enter the data, and IBM's Statistical Package for Social Science (SPSS), US version 26 was used to analyze it. With an explanation paragraph for each, descriptive statistics and outcomes were displayed as tables with numbers, and percentages.

3. Results

Students that participated in the survey varied in age from 18 to 24, with a mean and SD of 20.36 and 1.820. There were 57.7% of women. 79.4% of covid-19 patients overall experienced smell disturbance, whereas 21% had no change in smell. 20.6% of COVID-19 students reported no change in smell, 47.5% had a total loss of smell (anosmia), 14.2% had a reduction in smell (hyposmia), and 14.9% and 2.8%, respectively, had smell disturbances caused by cacosmia and parosmia. Anosmia began gradually in 93/282 (38.39%) whereas suddenly in 149/282 (61.61%) of cases.

According to the duration of the smell disturbance, the cases were separated into three groups: short, lasting up to one week, intermediate, lasting between one week and three months, and long, lasting longer than three months.

Cases were divided into four groups based on when the smell disturbance first appeared: (1) Before the onset of general symptoms (8.1%), (2) While experiencing general symptoms (36.6%), (3) Following the cessation of general symptoms (43.8%), and (4) As the only symptom (11.6%).

Only 26 out of the 282 students smoked. Taste loss was reported by 47.5% of COVID-19 patients in total (Table 1).

Table 1: Descriptive demographic features of the study participants (N=282).

Variables	Descriptive statistics	
Age Mean (SD)	N = 282	20.4 (1.8)
Female sex	N = 209	57.7%
Smell disturbance		
No	N = 58	20.6%
Yes	N = 224	79.4%
Anosmia	N = 134	47.5%
Cacosmia	N = 42	14.9%
Hyposmia	N = 40	14.2%
Parosmia	N = 8	2.8%
Onset of anosmia		
Gradual	N = 8	38.39%
Sudden	N = 8	61.61%
Severity of anosmia		
Mild	N = 92	(32.6%)
Moderate	N = 97	(34.3%)
Severe	N = 31	(10.9%)
Critical	N = 4	(1.4%)
Duration of anosmia		
Short	N = 68	(24.2%)
Intermediate	N = 156	(55.2%)
Long	N = 58	(20.6%)
Starting time of anosmia		
Before general symptoms		(8.1%)
With general symptoms		(36.6%)
After general symptoms		(43.8%)
The only symptom		(11.6%)
Smoking	N = 26	(9.2%)
Taste loss	N = 134	(47.5%)

Women made up 57.7% of patients who experienced smell changes, while men made up 21.6%. Female patients made up 16% of those patients who had no smell change, whereas male patients made up 4.6% (Table 2).

Table 2: Gender and prevalence of smell disturbance.

Gender	Smell Disturbance				Total
	Yes		No		
Male	61	21.60%	13	4.60%	74 (26.2%)
Female	163	57.70%	45	16%	208 (73.8%)
Total	224	79.40%	58	20.56%	282

In terms of the severity of the presentation, 35 (12.3%) had a severe anosmia, 121 (42.8%) had a moderate anosmia, and 5 (1.8%) had a critical anosmia. According to the frequency of smell disturbance, 32.6% of all cases had a mild disease, 34.3% had a moderate disease, 10.9% had a severe disease, and only 1.4% had a critical condition that required hospitalization (Table 3).

Table 3: Severity of smell disturbance.

Smell Disturbance	Severity				Total
	Mild	Moderate	Severe	Critical	
No	29 (10.2%)	24 (8.5%)	4 (1.4%)	1 (0.4%)	58 (20.6%)
Yes	92 (32.6%)	97 (34.3%)	31 (10.9%)	4 (1.4%)	224 (79.4%)
Total	121 (42.8%)	121 (42.8%)	35 (12.3%)	5 (1.8%)	282 (100%)

There were 26 smokers out of the total 282 cases, 19 (73.08%) of whom report smell disturbances whereas 7 (26.92%) did not experience smell alteration. 51 (20%) of the remaining nonsmokers did not experience smell change, while 205 (80%) of them experienced smell disruption (Table 4).

Table 4: Smell disturbance with smoking.

Smoking	Smell Disturbance		Total
	No smell change	Smell change	
No	51 (20%)	205 (80%)	256
Yes	7 (26.92%)	19 (73.08%)	26
Total	58 (20.56%)	224 (79.4%)	282 (100%)

A total of 224 out of the 282 cases had smell disturbances during the illness, of which 120 (42.5%) had both smell and taste changes, 104 (36.8%) only had smell changes without taste changes, 14 (4.9%) had taste changes without smell changes, and 44 (15.6%) had neither, as shown in (Table 5).

Table 5: Relation of smell disturbance with loss or decrease taste.

Taste loss	Smell Disturbance		Total
	No smell change	Smell change	
No	44 (15.6%)	104 (36.8%)	148
Yes	14 (4.9%)	120 (42.5%)	134
Total	58 (20.56%)	224 (79.4%)	282 (100%)

In total, 282 cases resulted in 224 cases of smell disturbance, of which 163 (73%) also experienced respiratory symptoms and 60 (27%) didn't. Coughing, sneezing, rhinorrhea, nasal blockage, congestion, and SOB are examples of respiratory symptoms. 210 (94%) of the 224 individuals with smell disturbance also had general symptoms, while 14 (6%) did not. (Fever, headache, malaise, weariness, decreased appetite, nausea) are examples of general symptoms. Only 56 (25%) of the 224 individuals with smell disturbance also experienced GIT symptoms (diarrhea and

stomach discomfort), while 168 (75%) did not (Table 6).

Table 6: Relation between smell change and other symptoms.

Other Symptoms / Smell change		Smell Disturbance: No smell change		Total
Respiratory symptoms	No	61 (27%)	13 (22%)	73
	Yes	163 (73%)	45 (78%)	208
General	No	14 (6%)	4 (7%)	18
	Yes	210 (94%)	54 (93%)	264
GIT symptoms	No	168 (75%)	41(71%)	209
	Yes	56 (25%)	17 (29%)	73

4. Discussion

In the city of Holey Karbala, this cross-sectional study was undertaken among covid-19 cases of medical students. 79% of covid-19 patients reported having a smell disruption overall, with females accounting for the majority of cases (57.7%), whereas the remaining 21% reported having no change in smell while unwell.

When compared to an Italian study, the results were pertinent to us at 66%[13] and similar to those of Yan et al.[14], about a smaller sample of 59 positive patients; the prevalence is (68 %). While in a study conducted in Daegu, Korea, the prevalence was 15.3%, with females affected predominately (68.9%), the results were significantly lower. However, a study conducted in France in 2020 found that the prevalence of smell disturbance was 70%, with young patients showing the disorder most frequently[15].

This may account for our increased prevalence since the study was conducted on a young population (the study sample's age ranged from 18 to 24) and among students studying medicine, the majority of whom were female.

Patients with COVID-19 have either a quantitative (anosmia, which refers to a lack of ability to smell, or a qualitative (cacosmia, parosmia), which refers to "wrong" perception of odors) or qualitative (hyposmia, which refers to a diminished ability to smell) kind of smell disturbance[16]. There were varying percentages of affected participants in the current study, with anosmia accounting for the majority (47.5%), whereas hyposmia (14.2%) and/or other smell disturbances, such as cacosmia (14.95) and parosmia (2.8%), were less common. Patients with smell disturbance reported hyposmia (51.6%) as their main symptom, although anosmia (12.5%) and parosmia (17.2%) were also common[17].

Both studies demonstrate that patients are more affected by quantitative loss than by qualitative defect, although the two investigations demonstrate differing prevalences of smell change types.

Cases were divided into mild, moderate, severe, and critical categories based on how serious they were when they were presented. Critical cases required hospitalization. According to this study, smell disruption predominantly affects moderate and mild cases-34.4% and 32.6%, respectively-while only 10.9% of people who had smell alteration went on to get a severe sickness, and 1.4% developed a critical illness.

A statistically significant correlation between the olfactory and gustatory symptoms and the mildly symptomatic forms of the condition, which are typically treated at home, was also demonstrated in the study by Yan et al.[14], which is consistent with the findings of our investigation. Olfactory or gustatory abnormalities were not linked to severe forms of Covid-19 that required hospitalization. These deficits may therefore be a significant prognostic factor for Covid-19[15].

Based on the current study, smell disturbance typically occurs along with or following the other symptoms. While in the study conducted in Istanbul, Turkey, patients were more likely to report a smell disturbance (53.1%) before the onset of general symptoms[17]. Our findings, however, are consistent with a French study that found the median time for the onset of olfactory deficits was 2 days following the onset of the initial symptoms[15].

For a better and quicker recovery, individuals with mild disease can be identified and isolated based on the beginning of smell disruption and its correlation with milder forms of sickness.

According to the length of the smell disturbance and recovery time, we discovered that the majority of patients (55.16%) recovered within a time frame of more than a week to less than three months, which is consistent with the median recovery period of 15 days obtained in the Chary et al. study[15].

The results of this study indicated that nonsmokers experienced higher rates of smell alteration than smokers, however, this could have been an accident or unreliable result given that the majority of the patients were nonsmokers and female. In contrast, research conducted in Kirkuk, Iraq, found that the majority of patients 72 (61.5%) smoked, and more than half of them 53 (45.3%) had hyposmia[18].

One of the main symptoms associated with smell change is taste impairment. Of the patients included, 42.5% reported both smell and taste changes, whereas 36.8% reported smell impairment solely. This is consistent with a French study that found cases of combined olfactory and gustatory impairment to be more common than cases of only smell alterations[15].

The most common symptoms associated with smell impairment during the period of COVID-19 illness were the general symptoms, which include fever, headache, fatigue, and myalgia in 94% of the cases.

The general symptoms, which in 94% of cases included fever, headache, weariness, and myalgia, were the most prevalent linked to smell impairment during the COVID-19 illness.

The 73% of people reported respiratory symptoms, such as coughing, sneezing, rhinorrhea, nasal blockage, congestion, and shortness of breath, whereas 25% of people complained of GIT symptoms in connection with scent disruption. The percentage of GIT complaints in the studies by Char[15] was 17% and 17.2%,[17] respectively.

5. Conclusion

Smell disturbance was quite common in covid-19 patients, and it was more common in female patients and those with mild and intermediate clinical courses. Anosmia and hyposmia were the most common forms of quantitative smell abnormality in the patients. Patients who have experienced a change in smell typically describe nonspecific symptoms, such as fever, headache, and cough, which begin with or before the change in smell. Olfactory impairment requires an extended recovery period, and the majority of patients also report gustatory impairment.

6. References

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