

# COVID-19 olfactory dysfunction, evaluation of onset, and persistence

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## ABSTRACT

Olfactory dysfunction (OD) is a common feature of COVID-19. The goal of the study was to define the modes of onset of OD in the clinical course of the disease and to follow the cases for 12–18 months in order to estimate the differences in the recovery time from OD over the course of the disease. We managed to follow a total of 325 patients (females: 198, males: 127) in the Babylon governorate in Iraq. All were COVID-19 patients who should have OD during the course of the disease. COVID-19 infection was established in all patients by swab test, i.e. polymerase chain reaction (PCR) and/or chest computed tomography findings of pneumonia compatible with COVID-19. Detailed medical records were obtained directly from the patients or their relatives. The patients were then followed up by telephone and questioned with structured questionnaires concentrating upon general clinical features and the sense of olfaction. Information about the presence of olfactory disorders, their occurrence, and development was recorded. Based on the onset of OD, the patients were categorized into three groups. Olfactory functions were assessed primarily by face-to-face interview and then (if necessary) by a telephone questionnaire assessing self-reported olfactory function and olfactory-related quality of life, which measures the subjective olfactory capability (SOC). In the first 2 weeks, 148 (45.5%) patients reported complete recovery from OD, of which 90 (73.2%) patients joined at the end of the 1<sup>st</sup> month. OD persistence was observed in 11 (3.3%) patients toward the end of the 1<sup>st</sup> year, in 5 (1.5%) patients at the end of the 15<sup>th</sup> month, and only in two (0.6%) patients at the end of the 18<sup>th</sup> month. We found no significant correlation between the type of onset of OD and the duration and persistence of OD. Most sufferers of COVID-associated OD recover their sense of smell within the 1<sup>st</sup> month.

**Key words:** COVID-19, olfactory dysfunction, recover

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## INTRODUCTION

While olfactory dysfunction (OD) is not uncommon among the population.<sup>[1-3]</sup> The 2019 (COVID-19) pandemic in 2020 made OD well known to every person. There is a high recognition of OD in patients with proven coronavirus disease.<sup>[4-6]</sup> Although, pathogenesis in the context of SARS-CoV-2 has not been well understood.<sup>[4]</sup> Although OD incidence has been registered in up to > 80%

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of COVID-19 sufferers in some studies, 11.8%–35.5% of patients can show pure OD without further symptoms.<sup>[5,6]</sup> Most patients have no symptoms of rhinorrhea or nasal obstruction, and OD usually occurs without nasal or sinus disease, distinguishing COVID-19-related OD from the remaining postviral OD.<sup>[4,5]</sup> The pervasiveness of OD in patients with COVID-19 differs, which could be owing to the survey technique (anamnesic/subjective OD: 5%<sup>[7]</sup> and 58.8%<sup>[8]</sup> and psychophysical tests: 70%<sup>[9]</sup> and 98%<sup>[10]</sup> or geographical region (10% in Australia, 31% in Asia, 51% in North America, and 54% in Europe).<sup>[11]</sup> It has been reported that, in many cases, odor disorders recover rapidly in the first few weeks of illness.<sup>[12-14]</sup> Other patients, however, take longer to recover, and 10%–60% of those patients with slight or no recuperation in the initial few months.<sup>[15-18]</sup> Therefore, prolonged OD (i.e. more than 3 months following the onset of coronavirus disease) that cannot be interpreted by other possible diverse etiologies should be considered features of the post-COVID-19 disease.<sup>[19]</sup> Since OD is correlated with a variety of adverse ailments, including obesity and depression, the pervasiveness of OD associated with COVID-19 and whether it is temporary or permanent is an important question faced by public health. Specific features of OD in COVID-19 patients remain uncertain, and further study to determine its relationship to other clinical features, time course, and possible pathogenesis would assist better in identifying and understanding the illness. The current prospective investigation intended to ascertain the variability in OD onset detected in COVID-19 patients and to follow such patients for 12–18 months to estimate the differences in OD recovery time during the course of the ailment.

## PATIENTS AND METHODS

In this investigation, our aim was to perform a prolonged follow-up (12–18 months) of the OD presented by patients with COVID-19. Because the same patient may have more than one form of OD (anosmia, hyposmia, and parosmia) at different stages of the disease, in this study, we consider any form of smell disorder to be OD. Inclusion criteria were: COVID-19 patients who should have OD in the course of the disease, a COVID-19 infection was settled in all patients by PCR in a swab test and/or pneumonia detection associated with a COVID-19 in a computed tomography scan of the chest. Exclusion criteria were: Under 18 years of age, pregnant females, patients with previously known olfactory or taste disorders, history of sinonasal surgeries, patients with diagnosed neurological or psychiatric diseases, and in addition to those patients who could not follow with us. We were able to follow-up on a total of 325 patients (women: 198, men: 127) in Babylon Governorate, Iraq. They were either visitors to our outpatient clinic, inpatients at Medical Mirjan City in Hilla, or inpatients at the Almahawil hospital. Detailed medical records were obtained directly from the patients or their relatives. Patients were then followed

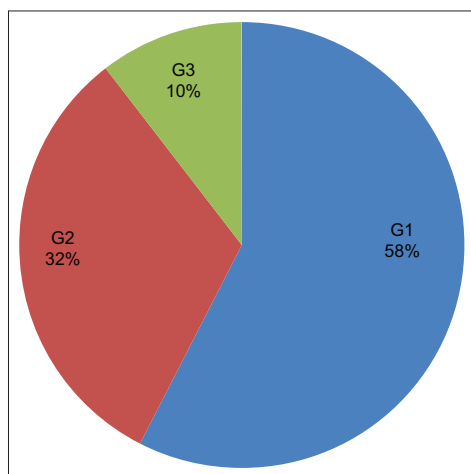
**Table 1: The number of cases in our study, total, Group 1, Group 2, and Group 3 groups with time of recovery of olfactory dysfunction of patients in all groups**

Recovery Time	2W	1M	2M	3M	4M	5M	6M	7M	8M	9M	11M	12M		15 M		18M		Total
												Persist	Persist	Persist	Persist			
Total (n)	148	90	22	18	8	8	6	4	3	4	3	11	5	2	325			
PERCENT	45.50%	27.70%	6.80%	5.50%	2.50%	2.50%	1.80%	1.20%	0.90%	1.20%	0.90%	3.30%	1.50%	0.60%				
G1	87 (46.5%)	49 (26%)	10 (5.3%)	9 (4.9%)	5 (2.7%)	6 (3.2%)	5 (2.7%)	2 (1%)	3 (1.6%)	3 (1.6%)	2 (1%)	6 (3.2%)	3 (1.6%)	1 (0.5%)	187			
G2	46 (44%)	31 (29.8%)	10 (9.6%)	6 (5.7%)	2 (1.9%)	2 (1.9%)	1 (0.96%)	1 (0.96%)	1 (0.96%)	1 (0.96%)	1 (0.96%)	4 (3.8%)	1 (0.96%)	1 (0.96%)	104			
G3	15 (44%)	10 (29.4%)	2 (5.8%)	3 (8.8%)	1 (2.9%)	2 (5.8%)	2 (5.8%)	2 (5.8%)	2 (5.8%)	1 (2.9%)	1 (2.9%)	1 (2.9%)	1 (2.9%)	1 (2.9%)	34			

up with telephone calls and a survey with structured questionnaires that focused on general manifestations and the sense of olfaction. Particulars about the occurrence of an OD, its outset, and its course was recorded, as shown in Table 1. We conducted this study in the period between October 1, 2020, and April 1, 2021, and we followed it prospectively to April 1, 2022. The participants had an average age of 32.5 years (standard deviation 15.0) with a range of 18–78 years. Based on the onset of OD, patients were classified into three categories: Group 1 (G1) comprised patients with primary COVID-19-related symptoms followed by OD; Group 2 (G2) comprised patients with a primary change in odor followed by symptoms related to COVID-19 such as fever, dyspnea, cough, pharyngitis, and diarrhea; Group 3 (G3) comprised patients with pure OD and without another health ailment throughout disease progression or follow-up [Table 1]. Assessment of olfactory function: OD was assessed primarily through face-to-face interviews and then followed up (if necessary) using the telephone questionnaire for the evaluation of self-described olfactory function and olfactory-linked quality of life, which estimates subjective odor capability (SOC).<sup>[20]</sup> Unfortunately, because of unavailability, we were unable to test these patients with objective smell tests like the Sniffin' Sticks test. Participants were requested to rate smell identification of familiar items, like spices (mint, tangerine, ginger, cloves), beverages (tea or coffee), and cleaning products (soap, Clorox). Self-assessment was employed to evaluate the olfactory function. The participants were inquired to grade their olfactory function on a rating from 1 to 10 (10, the best sense of smell; 0, unable to smell).<sup>[20]</sup> OD recovery time during our follow-up was carefully noted for each patient [Table 1].

## RESULTS

The onset of OD within COVID-19 disease symptoms varied among patients, so we divided patients into three groups:



**Figure 1:** Distribution of cases according to onset of OD: OD: Olfactory dysfunction

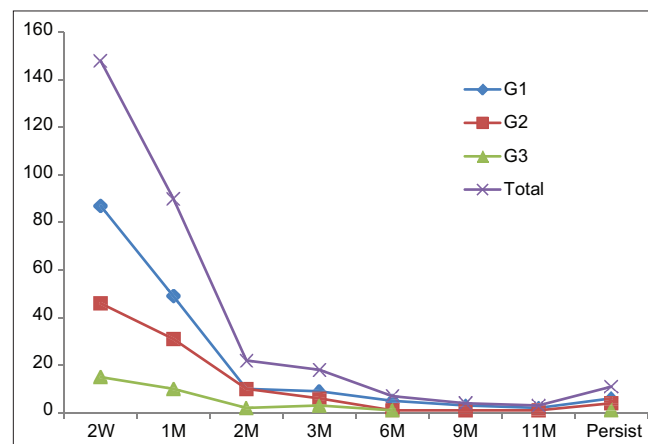
G1 included participants with primary COVID-19-related symptoms and then followed by OD that formed (N: 187, 57.5%); G2 included participants with initial OD followed by established COVID-19-related symptoms (N: 104, 32%); G3 included participants with pure OD and without other complaints during the course of disease or follow-up, formed (N: 34, 10.5%), as shown in Figure 1.

The patient-reported OD recovery time was carefully recorded [Table 1].

Our result: Within the first 2 weeks, 148 (45.5%) patients reported full recovery from OD, which was joined by 90 (73.2%) patients by month-end. By the end of the 3<sup>rd</sup> month, 40 (85.5%) patients were enrolled, whereas by the end of half a year, 24 (93%) patients were enrolled. The persistence of DO was observed in 11 (3.3%) patients toward year-end, 5 (1.5%) patients by the 15<sup>th</sup> month and only two (0.6%) patients by the 18<sup>th</sup> month, as presented in Table 1 as total cases, G1, G2, and G3 groups.

## DISCUSSION

Although widely noticed in clinical work and presented in foreign studies.<sup>[18,21,22]</sup> OD is a COVID-19-related condition that has been underreported in Iraqi literature. The pervasiveness of OD associated with COVID-19 ranges from 0% to 98% in the literature.<sup>[23]</sup> Many of these studies are based on subjective OD ratings. The differentiating characteristic of our analysis was the enrollment of only COVID-19 patients with OD, we assessed their duration through long follow-ups of up to 18 months. During the investigation, we noticed three distinct patterns of onset of OD in COVID-19 patients, as shown in Figure 1. This study did not prove a significant relation between the type of onset of OD and the duration and persistence of OD as patients belonging to all groups, G1, G2, and G3, were present at all follow-up levels, as illustrated in Figure 2. Of our 325 patients, 148 (45.5%) regained normosmia



**Figure 2:** The time of recovery of OD, in Total cases, G1, G2, and G3 groups. OD: Olfactory dysfunction

within the first 2 weeks of illness, while by the end of the 1<sup>st</sup> month 238 (73.2%), which fits with the first reports of the pandemic.<sup>[24-26]</sup> The majority of studies in the early pandemic indicate that many patients recover normal olfactory function within a short time. Reiter *et al.* pointed out that 72% of OD regained their function within 1 month based on historical analysis.<sup>[27]</sup> Others have pointed to comparable findings: 63% after 1–4 weeks,<sup>[25]</sup> 62% after 5 weeks<sup>[24]</sup> and 75% after 2 months.<sup>[26]</sup> Niklassen *et al.* pointed out that most sufferers regained their function in 28 days.<sup>[14]</sup> Our study provides additional proof that a sizeable number of sufferers with COVID-19-related OD do not recover quickly, 27.8% and 14.5% at the end of the first or 3<sup>rd</sup> month. Long-term follow-up of our patients showed that OD persistence was recorded in 11 (3.3%) patients toward year-end, in 5 (1.5%) patients at the end of month 15, and only in two patients (0.6%) at the end of the 18<sup>th</sup> month [Table 1].

## CONCLUSION

In summary, our study shows that most patients with COVID-related OD regain their sense of smell within the 1<sup>st</sup> month, consistent with previous studies. However, 27% of patients showed OD of longer duration, while 11 (3.3%) patients had OD lasting longer than 12 months and only two patients had OD lasting longer than 18 months.

Although the onset of OD was variable, there was no significant correlation with the duration or persistence of OD. Patients with long-standing OD should be referred to specialized olfactory clinics for rehabilitation.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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