

Recovery Patterns of Olfactory Disorders in Covid-19 Patients

Yousif Sallama*, Haitham Alnori**

*Department of Surgery, College of Medicine, University of Ninevah , **Department of Surgery, College of Medicine, University of Mosul, Mosul, Iraq
Correspondence: yousif.jumaah@uoninevah.edu.iq

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ABSTRACT

Background: Increasing authentication suggests that olfactory disorder is a prominent symptom of COVID-19 with the inadequacy of data on its recovery patterns in the Middle East.

Aim of the study: The primary aim is to identify the different recovery patterns in patients with olfactory dysfunction due to the COVID-19 pandemic in Iraq. While in the second aim, we assess the correlation of olfactory dysfunction to age, gender, and comorbidities.

Patients and methods: This online cross-sectional study was conducted at Al-Jumhory teaching hospital, Mosul, Iraq, for a period from January/2021 up to January/2022. This study was done by answering responses using the website online questionnaire and not directly from the patients. After the exclusion of incomplete responses, this study involved 637 patients who were older than 18 years. We included patients with COVID-19 infection which was proved by positive polymerase chain reaction associated with the new-onset olfactory disorder.

Results: The current study portrays that 50.9% have a complete recovery, 35.9% with partial recovery, and 13.2% of patients did not recover olfactory function. Earlier recovery (less than 3 weeks) is associated with complete recovery, while later recovery is associated with partial recovery. In the first three weeks, 75.3% and 45.9% of complete and partial recovery occurred respectively.

Conclusions: This study declares that most of the participants documented complete recovery of olfactory disorders in the first three weeks following infection. The recovery was not related to age, gender, and comorbidities.

Keywords: COVID-19; Recovery patterns; Olfactory disorders; Anosmia.

أنماط التعافي من اضطرابات الشم لدى مرضى كوفيد-١٩

يوسف سلامة جمعة* ، هيثم عبد الملك النوري**
*فرع الجراحة ، كلية الطب ، جامعة نينوى ، **فرع الجراحة ، كلية الطب ، جامعة الموصل ،
الموصل ، العراق

الخلاصة

الخلفية: تشير الدلالات إلى أن اضطراب حاسة الشم هو أحد الأعراض البارزة لكوفيد-١٩ مع عدم كفاية البيانات المتعلقة بأنماط التعافي في الشرق الأوسط.

هدف الدراسة: الهدف الأساسي هو تحديد أنماط الشفاء المختلفة لدى المرضى الذين يعانون من ضعف حاسة الشم بسبب جائحة كوفيد-١٩. بينما في الهدف الثاني ، نقوم بتقييم ارتباط الخلل الوظيفي الشمي بالعمر والجنس والأمراض المصاحبة.

المرضى والطريقة: سجلت هذه الدراسة المقطعية عبر الإنترنت في مستشفى الجمهورى التعليمى ، الموصل ، العراق ، للفترة من كانون الثانى / يناير / ٢٠٢١ إلى كانون الثانى / يناير / ٢٠٢٢. تم إجراء هذه الدراسة من خلال الإجابة على الردود باستخدام استبيان الموقع الإلكتروني. وبعد استبعاد الردود غير المكتملة ، شملت هذه الدراسة ٦٣٧ مريضاً تزيد أعمارهم عن ١٨ عامًا. قمنا بتضمين المرضى الذين يعانون من عدوى كوفيد-١٩ والتي تم إثباتها من خلال تفاعل البلعمة المتسلسل الإيجابي المرتبط باضطراب الشم الجديد.

النتائج: أظهرت الدراسة الحالية أن ٥٠.٩٪ قد تعافوا تمامًا ، و ٣٥.٩٪ تعافوا جزئيًا ، و ١٣.٢٪ من المرضى لم يستعيدوا وظيفة الشم. يرتبط التعافي المبكر (أقل من ٣ أسابيع) بالشفاء التام ، بينما يرتبط الشفاء المتأخر بالشفاء الجزئي. في الأسابيع الثلاثة الأولى ، حدث ٧٥.٣٪ و ٤٥.٩٪ من الشفاء الكامل والجزئي على التوالي.

الاستنتاج: تؤكد هذه الدراسة أن معظم المشاركين وثقوا الشفاء التام من اضطرابات حاسة الشم في الأسابيع الثلاثة الأولى بعد الإصابة. لم يكن الانتعاش مرتبطًا بالعمر والجنس والأمراض المصاحبة.

الكلمات المفتاحية: كوفيد-١٩ ؛ أنماط التعافي، اضطرابات الشم، فقدان حاسة الشم.

INTRODUCTION

In otolaryngology, olfactory disorders following viral infection are not uncommon. In contrast to other acute viral smell impairments, COVID-19-associated olfactory disorder (CAOD) is rarely accompanied by a severely blocked nose. While olfactory disorders are common in COVID-19, limited data are available on the clinical course of olfactory recovery or association with disease severity^{1,2}. However, olfactory disorders have been identified as a symptom of COVID-19 that may have significance in identifying asymptomatic carriers or those with mild symptoms that would otherwise not raise suspicion for COVID-19³. The primary aim of this study is to identify the different recovery patterns in patients with olfactory dysfunction due to the COVID-19 pandemic. While in the second aim, we assess the correlation of olfactory dysfunction to age, gender, systemic comorbidities, and nasal allergy.

PATIENTS AND METHODS

This cross-sectional online study was conducted at Al-Jumhory teaching hospital, Mosul, Iraq, for one year starting in January 2021. This study involved 637 patients who were older than 18 years. We included patients with COVID-19 infection which was proved by positive polymerase chain reaction associated with the new-onset olfactory disorder. Patients with pre-existing olfactory disorders were excluded. Those with nasal obstruction and chronic rhino-sinusitis also were eliminated. Incomplete responses were omitted as well. Targeted patients were involved in a self-assessment visual analog scale for their olfactory disorders and recovery patterns through an online questionnaire. The reason why the study was online is that the start of the study was consistent with the fourth wave of Covid-19 in Iraq. This questionnaire was shared with a spectrum of society, but most of them are young people, especially university students. We designed 10 items of personal, demographic, general, and specific questions; about 5-6 questions for each item. A scale from 0-10 was used; with 0 being the worst olfactory function and 10 representing the

best smell. A score from 0-2 was considered a complete loss, while a score of 8-10 was considered normal smell, and in between was counted as partial loss of smell. After covid-19 infection, a score of 0-2 was considered as no recovery, whereas 8-10 was considered complete recovery, and between 3-7 was considered as partial or incomplete recovery. Starting time of COVID-associated olfactory disorders and recovery time was mentioned with no upper limit for the timing of recovery. Past medical history as hypertension (HT), diabetes mellitus (DM), and bronchial asthma were also evaluated in this study.

Statistical Analysis

The statistical analysis was performed by using IBM-SPSS 26. The chi-square test for nominal data was used. The contingency Coefficient was calculated to examine the relationship between recovery groups and a score of smell. The p-value ≤ 0.05 is considered as significant.

RESULTS

In total 637 patients completed this study, with female predominance accounting for 71.7%. The distribution of the study sample according to age illustrates that 60.1% of the study sample is within 20-30 years, while 1.2% is older than 60 years (Figure 1). The complete, partial and no recovery patterns in the age group 20-30 years were 59.3%, 60.3%, and 63.1 % respectively (Table 1, figure 1). This study illustrates that males had 52.8%, 36.7%, and 10.5%, while females had 50.1%, 35.7%, and 14.2% of complete, incomplete, and no recovery respectively (Table 1). Statistically, the differences are non-significant for age, gender, comorbidities, and history of allergy, as shown in (Table 1).

Complete smell loss was reported in 71.7% (in total 457 of 637 participants), in which 45.1% of complete loss developed complete recovery, while 65.6% of partial loss completely recovered, and among those with no recovery 5.5% and 16.2% were partial and complete loss respectively, which reveal a statistically significant difference in which (Table 2). In the first three weeks, 75.3% and 45.9% of complete and partial recovery occurred

respectively, and shows a significant statistical difference (Table 2). The current study portrays that 50.9% have a complete recovery, 35.9% with partial recovery, and 13.2% of patients did not recover olfactory function (Figure 2). Considering recovery patterns of cosmic patients (244 patients,

38.3% of total participants), this study shows that 118 (48.4%) patients develop complete recovery, 88 (36.1%) patients have partial recovery while 38 (15.5%) patients still have cacosmia with no recovery, as shown in Figure 3.

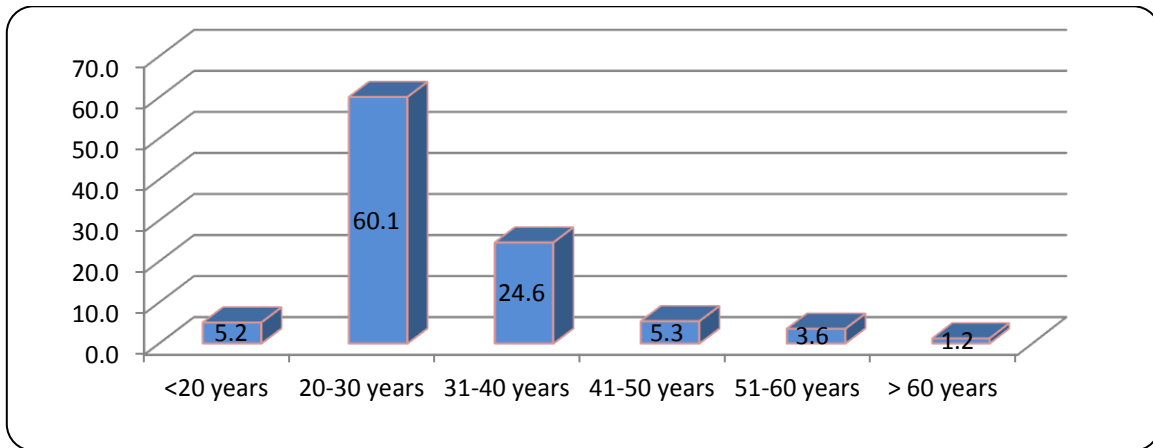


Figure (1): Distribution of study sample according to age.

Table (1): Distribution of recovery patterns according to age, gender, and comorbidities.

Study variables	Complete recovery		Partial recovery		No recovery		Total No. (%)	p-value
	No.	%	No.	%	No.	%		
Age:								
<20 years	14	4.3%	12	5.2%	7	8.3%	33(5.2%)	0.335
20-30 years	192	59.3%	138	60.3%	53	63.1%	383(60.1%)	0.814
31-40 years	84	25.9%	54	23.6%	19	22.6%	157(24.6%)	0.737
41-50 years	16	4.9%	17	7.4%	1	1.2%	34(5.3%)	0.085
51-60 years	14	4.3%	6	2.6%	3	3.6%	23(3.6%)	0.572
> 60 years	4	1.3%	2	0.9%	1	1.2%	7(1.2%)	0.919
Gender:								
Males	95	52.8%	66	36.7%	19	10.5%	180(100%)	0.464
Females	229	50.1%	163	35.7%	65	14.2%	457(100%)	
Co-morbidities:								
No	290	89.5%	203	88.6%	74	88.1%	567(89.1%)	0.912
Yes	34	10.5%	26	11.4%	10	11.9%	70(10.9%)	
HT	10	29.4%	8	30.8%	4	40.0%	22(31.4%)	0.354
DM	13	38.2%	5	19.2%	4	40.0%	22(31.4%)	
Asthma	11	32.4%	13	50.0%	2	20.0%	26(37.2%)	
History of allergy:								
Yes	131	40.4%	104	45.4%	32	38.1%	267(41.9%)	0.378
No	193	59.6%	125	54.6%	52	61.9%	370(58.1%)	

Chi-square test, p-value ≤ 0.05 is considered a significant

Table (2): Recovery patterns according to the sense of smell during Covid-19 and timing of recovery.

Study variables	Complete recovery		Partial recovery		No recovery		Total No. (%)	p-value
	No.	%	No.	%	No.	%		
Sense of smell during Covid-19:								
Complete loss	206	45.1%	177	38.7%	74	16.2%	457(100.0%)	0.000
Partial loss	118	65.6%	52	28.9%	10	5.5%	180(100.0%)	
Time of recovery:								
<1 week	91	28.1%	30	13.1%	-----	-----	121(21.9%)	0.000
1-3 weeks	153	47.2%	75	32.8%	-----	-----	228(41.2%)	0.001
4- 12 weeks	55	16.9%	58	25.3%	-----	-----	113(20.4%)	0.016
4- 6months	19	5.9%	31	13.5%	-----	-----	50(9.1%)	0.002
>6 months	6	1.9%	35	15.3%	-----	-----	41(7.4%)	0.000

Chi-square test, p-value ≤ 0.05 is considered a significant

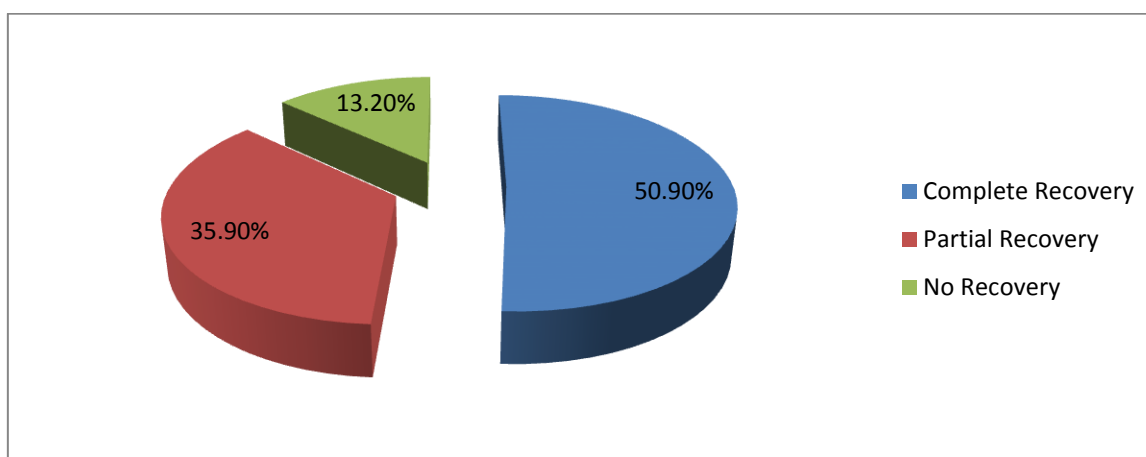


Figure (2): Distribution of study sample according to the recovery of smell.

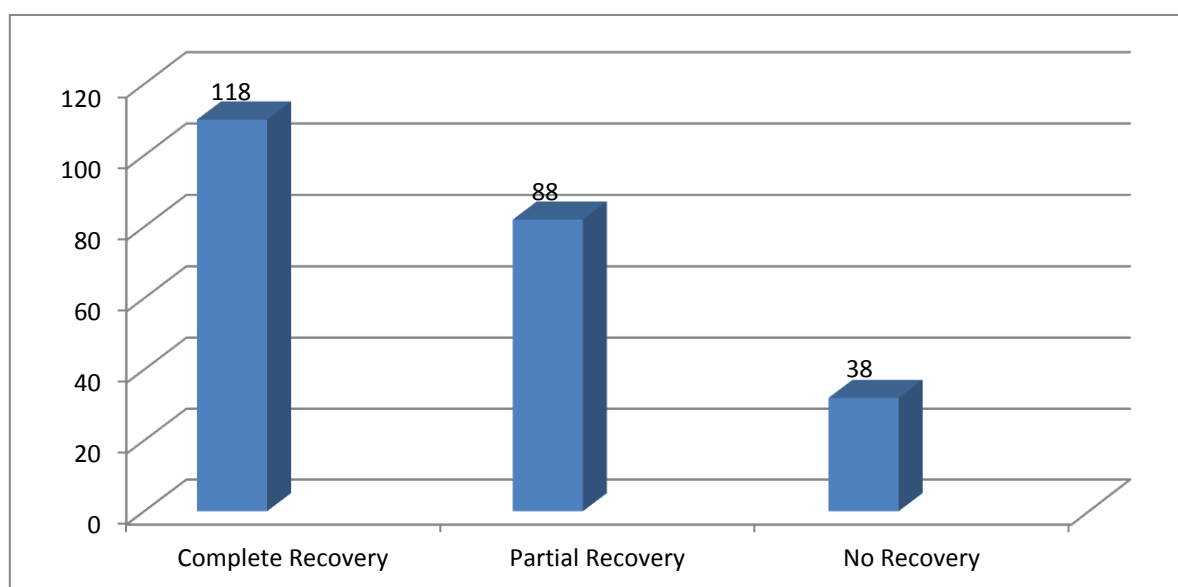


Figure (3): Recovery patterns of anosmia.

DISCUSSION

The covid-19 pandemic is still a worldwide threat, with new waves of generations erupting every time. From a spectrum of symptoms induced by the disease, COVID-associated olfactory disease (CAOD) stays one of the most observable symptoms of the patients affected ⁴.

In total 637 participants completed this study, and we found a female predominance of 71.7% of CAOD. This result goes by Hopkins et al ⁵ in their study 74.6% were female. We interpret this female majority concerning olfactory disorders as the truth that females have a greater interest in smell function than males.

Patients with anosmia account for 71.7% while hyposmia 28.3%. Hopkins et al ⁶, reported 74.4% had anosmia. Also, this is in agreement with Amer et al ⁷, who found that 83% had anosmia, while 17% developed hyposmia.

Younger age groups are more affected by olfactory disorders than older ones, 60.1% of the study sample is within the 20-30 years age group and 1.2% is older than 60 years. These results are in concordance with Hasan et al ⁸. This result may be explained by the idea that mild disease which occurs in younger patients is characterized by mild symptoms which are mainly otolaryngological symptoms like olfactory dysfunction more than severe respiratory illness which occurs in an older age group with little concentration on the olfactory symptoms.

The higher recovery patterns are within 20-30 years, while the lower percentages are in patients older than 60 years. Konstantinidis et al ⁹, show the type of recovery was not age-related. Amer et al ⁷, in their study, showed the age group 31-40 years reported a higher rate of olfactory recovery than other age groups.

The gender difference among the recovery groups is statistically non-significant. According to Boscolo-Rizzo et al ¹⁰, the rate of recovery of smell and taste was parallel in males and females.

We found a non-significant difference between the presence and absence of co-morbidities and also between the types of co-morbidities. This is in agreement with Lechien et al ¹¹ and Boscolo-Rizzo et al ¹⁰. while Amer et al ⁷, disagree with our study, by validating statistically significant (p -value <0.001), the presence of comorbidities reduces the cure rate of CAOD.

Consistent with Kosugi et al ¹², complete recovery is observed more frequently in patients with partial loss of smell than the ones with complete loss. This is in agreement with our study which reveals a statistically significant difference (p -value = 0.000).

A significant recovery rate was recorded in the first 3 weeks but then it became decreasing. In the first three weeks, 75.3% and 45.9% of complete

and partial recovery occurred respectively. This can be explained by early recovery being strongly associated with complete recovery, while late recovery is associated more with partial or incomplete recovery, and if the patient didn't recover within six months, less likely to have complete recovery. This is in agreement with Hopkins et al ⁵, which shows the overall recovery rate reported in those with 3 weeks duration is 71%. We explained that as the local effect of the COVID-19 virus on the supporting cells might be an accepted mechanism and thus recovered soon, while for those remaining with no recovery along the period after healing from COVID-19 infection, the central effect on the olfactory pathway could be implied.

The distribution of the study sample according to the recovery patterns of smell after Covid-19 portrays that 50.9% has complete recovery, 35.9% has partial recovery, and 13.2% of the patient did not recover. This is consistent with Kosugi et al ¹². On the other hand, Amer et al ⁷, found that 33.3% of patients made a full recovery, 41.7% partially recovered, and 25% of patients did not show any kind of recovery. The reason could be explained by our study implying no upper limit for the timing of recovery instead of 4 weeks as the upper limit in the previous study.

Complete recovery of cacosmia was found in 48.3% and partial recovery in 36.1%, while 15.6% didn't recover. These percentages are almost identical to that of quantitative CAOD (anosmia/hyposmia), which could be explained by the fact that cacosmia (parosmia) may be a sequel of anosmia/hyposmia. Teaima et al ¹³, documented that cacosmia appeared in 28.4% of which 24.3% of them were recovered.

Limitations of this study are the small number of older participants, the higher proportion of female respondents, and the lack of follow-up. Because it's a cross-sectional online study with subjective and retrospective nature, possibly illuminating and invoking selection bias.

CONCLUSION

This study declares that most of the participants documented complete recovery of COVID-associated olfactory disorders in the first three weeks following infection. Complete loss of smell during COVID-19 was associated with poor recovery. Younger age groups are more affected by olfactory disorders. The recovery patterns were not related to age, gender, systemic comorbidities, and nasal allergy.

Funding : No funding was received for conducting this study.

Conflict of Interest : No Conflict of interest.

Ethical Approval : was obtained from the medical research ethics committee (MREC), university of Mosul, college of medicine, in reference number UOM/COM/MREC/21-22 (28).

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