Development patterns of olfactory disorders in Covid-19 patients, Aden, Yemen

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Received: May 2021; Accepted: June 2021; Published: July 1, 2021.
Citation: Saleh Mohammed Abubakr Al-Shuaibi. Development patterns of olfactory disorders in Covid-19 patients, Aden, Yemen. World Family Medicine. 2021; 19(7): 54-61 DOI: 10.5742/MEWFM.2021.94077

Abstract

Background: Covid-19 is characterized as a global pandemic and health emergency. Post viral olfactory dysfunction maybe conductive due to swelling of the mucosa in the olfactory cleft, or sensorineural impairment due to degeneration of olfactory neuroepithelium.

Objective: To delineate the different development patterns of olfactory disorders in Covid-19 patients.
Materials and method: This was a descriptive prospective study conducted in Aden. Seventy ENT patients underwent Covid-19 testing by real-time PCR in the Center of Covid-19 during June 1 to August 31, 2020

Data were collected and analyzed by SPSS software version 17 and the results were presented as mean values with the standard deviation (SD), frequencies and percentage. The statistical significance of differences between data was evaluated using Fisher test. A level of significance of $p < 0.05$ was used.

Results: Among the 70 patients, (78.6%) were females and (21.4%) were males.

Their age ranged between 18-51 years and the mean age was 29.2±8.8 years.

The largest age group of patients was 21–30 years (41.9%) followed by 31–40 years (27.1%). Generalized body ache was the most common nonspecific symptom (24.3%). High nonspecific symptoms occurred more in female patients, ($p > 0.05$).

Comorbid conditions were diabetes mellitus in (11.4%) patients and hypertension in (7.1%). Anosmia was found in (85.7%) and hyposmia in (14.3%) patients.

Parosmia was the most common development pattern of olfactory disorders in covid-19 patients 24 (34.2%). Full recovery was found in 14.3% of patients.

Conclusion: The situation of a significantly higher proportion of patients with anosmia followed by hyposmia supports the need for ENT health care for patients with Covid-19 diseases.

Key words: patterns, olfactory dysfunctions, Covid-19, Aden

Introduction

The coronavirus disease of 2019 (Covid-19) is an infection caused by the severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2), which is characterized by respiratory failure in its most severe form of presentation. The first case was described in Wuhan, China, from where it rapidly spread to 188 countries. In March 2020, it was declared a pandemic by the World Health Organization (WHO) [1].

The disease caused by the new coronavirus (Covid-19) has brought about a worldwide viral pandemic, which emerged in East Asia and quickly spread to the other continents. This infection, caused by the type-2 coronavirus, is responsible for triggering severe acute respiratory syndrome (SARS-CoV-2), and symptoms such as fever, cough, fatigue, and myalgia are usually reported [2].

Covid-19 was characterized by the World Health Organization (2020) as a global pandemic and health emergency on March 11, 2020, which led to a worldwide concern [3].

The most reported symptoms of Covid-19 are fever, cough, dyspnea, myalgia, arthralgia, headache, diarrhea, rhinorrhea, and sore throat [4]. The British association of otolaryngology has recently identified the sudden loss of sense of smell and taste as “significant symptoms” which were found even in the absence of other symptoms [5].

The post-viral olfactory dysfunction maybe conductive due to swelling of the mucosa in the olfactory cleft [6].

Olfactory dysfunction can be classified as quantitative which implies an alteration in intensity, or qualitative when there are changes in the quality of the perception of smells. While normal olfactory function is defined as normosmia, quantitative disorders are classified as partial (hyposmia) or total (anosmia) loss of smell [7].

Objective

Objective: To delineate the different development patterns of olfactory disorders in Covid-19 patients, Aden, Yemen

Materials and Method

This was a descriptive prospective study conducted in Aden. A total of 70 ENT patients were seen in our private clinic during the period from June 1 to August 31, 2020, in Aden, Yemen. These patients were tested by real-time PCR at the Center of Covid-19 at Algamhoria Teaching Hospital.

The Ministry of Health has designated this Center as the referral center uniquely for testing and admission of patients with Covid-19. Our 70 patients were tested by real-time PCR and all patients were positive with Covid-19.

Data including sex, age, nonspecific symptoms, comorbid conditions, olfactory disordersand development pattern of olfactory disorders, were collected.

SPSS Statistics software version 17 was used to perform all statistical analyses. Data are presented as mean values with the standard deviation (SD). The statistical significance of differences between data was evaluated using a Fisher test. A level of significance of $p < 0.05$ was used.

Results

There were 70 patients with olfactory disorders in Covid-19 during the study period June 1 to August 31, 2020. Among the Covid-19 patients, 55 (78.6%) were females and 15 (21.4%) were males. Female to male ratio was 3.7:1; (Table 1 and Figure 1).

The age of the patients ranged between 18-51 years. The mean age at the time of infection for all patients was 29.2±8.8 years, for male patients was 32.5±8.9 years and for female patients was 28.3±8.6 years.

The largest age group was 21–30 years (n=30, 41.9%), followed by 31–40 years (n=19, 27.1%) as shown in Table 1 and Figure 2.

Table 1: Distribution of demographic characteristics of the study patients (n = 70)

Variable	Ratio	Range	Mean	No.	%	p-value
Sex:						
Females				55	78.6	
Males				15	21.4	
Female to male	3.7:1					
Age range (years):		18 – 51				
Mean age ± SD* (years):						
All patients			29.2 ± 8.8			P > 0.05
Male patients			32.5 ± 8.9			
Female patients			28.3 ± 8.6			
Age groups (years):						
≤ 20				11	15.7	
21 – 30				30	42.9	
31 – 40				19	27.1	
41 – 50				10	14.3	

SD*: Standard deviation;

Figure 1: Sex percentage of the study patients

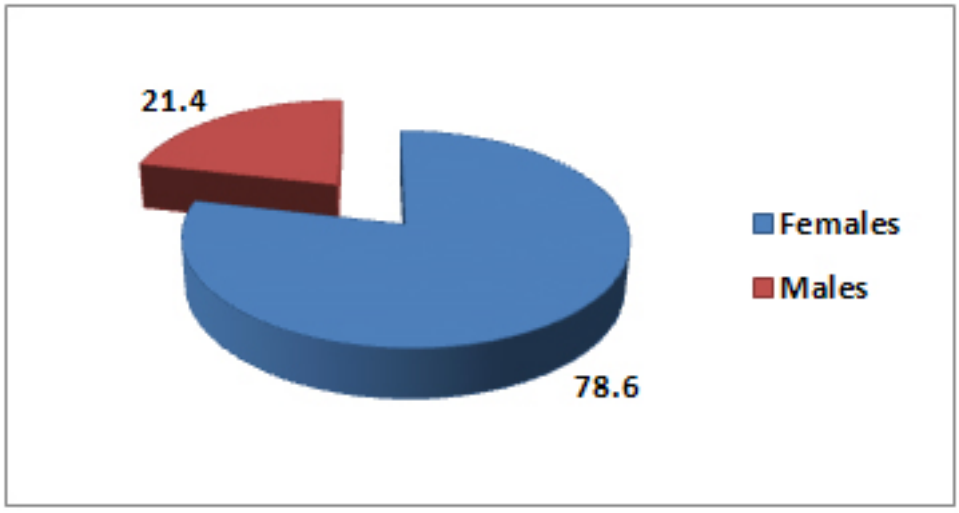
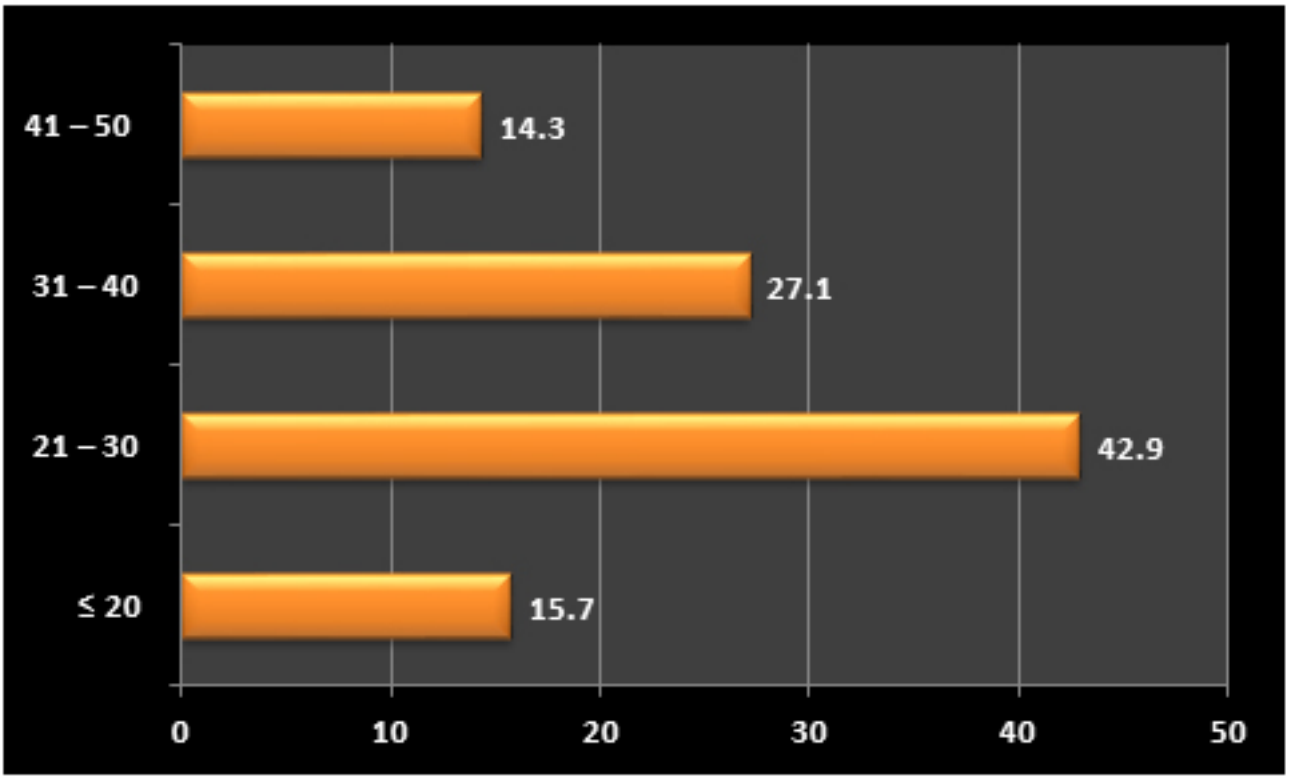


Figure 2: Distribution of age groups percentage of the study patients



In Table 2 we observed generalized body ache was the most common nonspecific symptoms 17 (24.3%), followed by headache and mild fever 12 (17.1%), cough 8 (11.4%) and slight dyspnea 3 (4.3%); (Figure 3).

High nonspecific symptoms occurred more in female patients. The difference between values showed no statistical significance ($p > 0.05$).

In all, there were 18 (25.6%) patients with comorbid conditions; diabetes mellitus 8 (11.4%) patients, hypertension and allergic rhinitis each one in 5 (7.1%) patients.

As olfactory disorders, we found anosmia in 60 (85.7%) patients and hyposmia in 10 (14.3%) patients; (Table 2 and Figure 4).

Parosmia (which is a distorted olfactory sensation in the presence of an odor) was the most common development pattern of olfactory disorders in Covid-19 patients 24 (34.2%), followed by cacosmia 14 (20.0%). Cacosmia is a distorted or perverted smell perception to odour stimulation.

Table 2 shows heterosmia (which is a condition where all odours smell the same) in 10 (14.3%) patients. Phantosmia {which is a dysosmic sensation perceived in the absence of an odour stimulus (a.k.a. olfactory hallucination)}; was found in 4 (5.7%); (Table 2 and Figure 5). Full recovery was found in 10 (14.3%) patients while no recovery was found in 8 (11.5%) patients.

Figure 3: Distribution of nonspecific symptoms of study patients

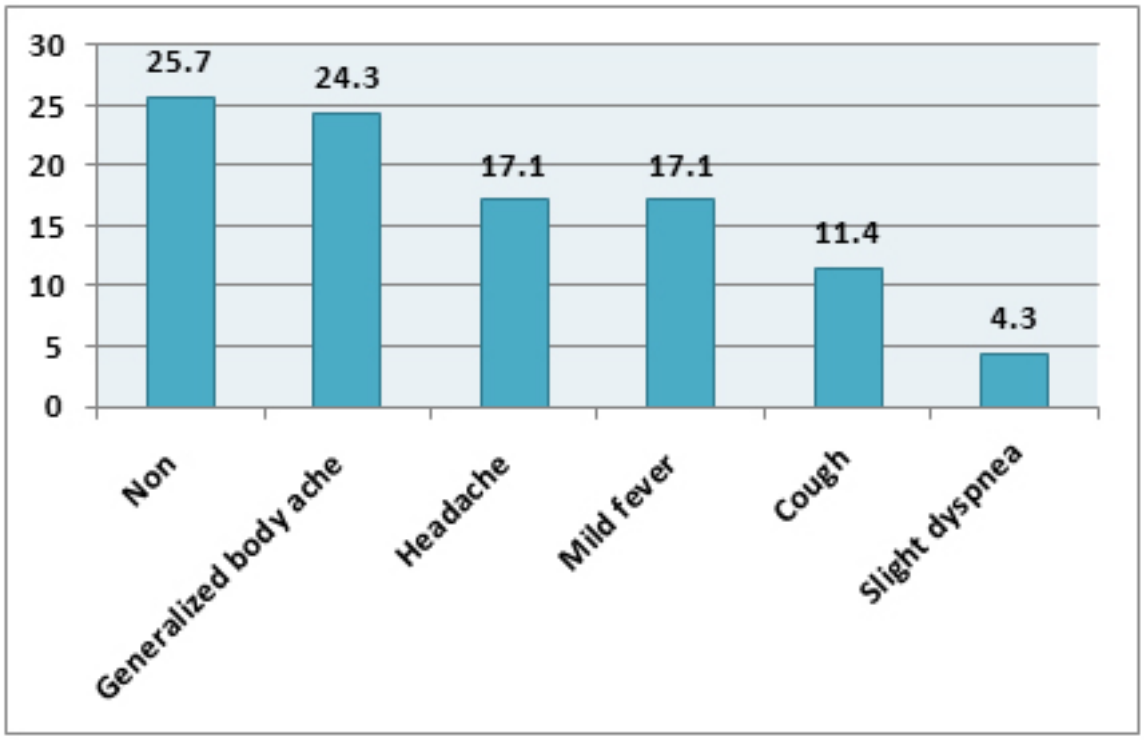


Figure 4: Anosmia & Hyposmia percentage in the studied Covid-19 patients

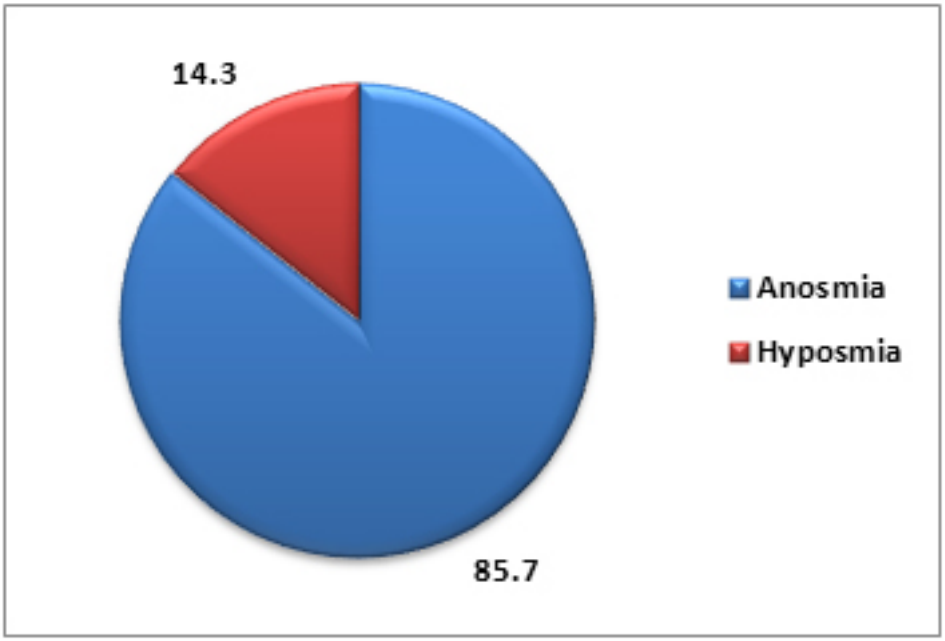
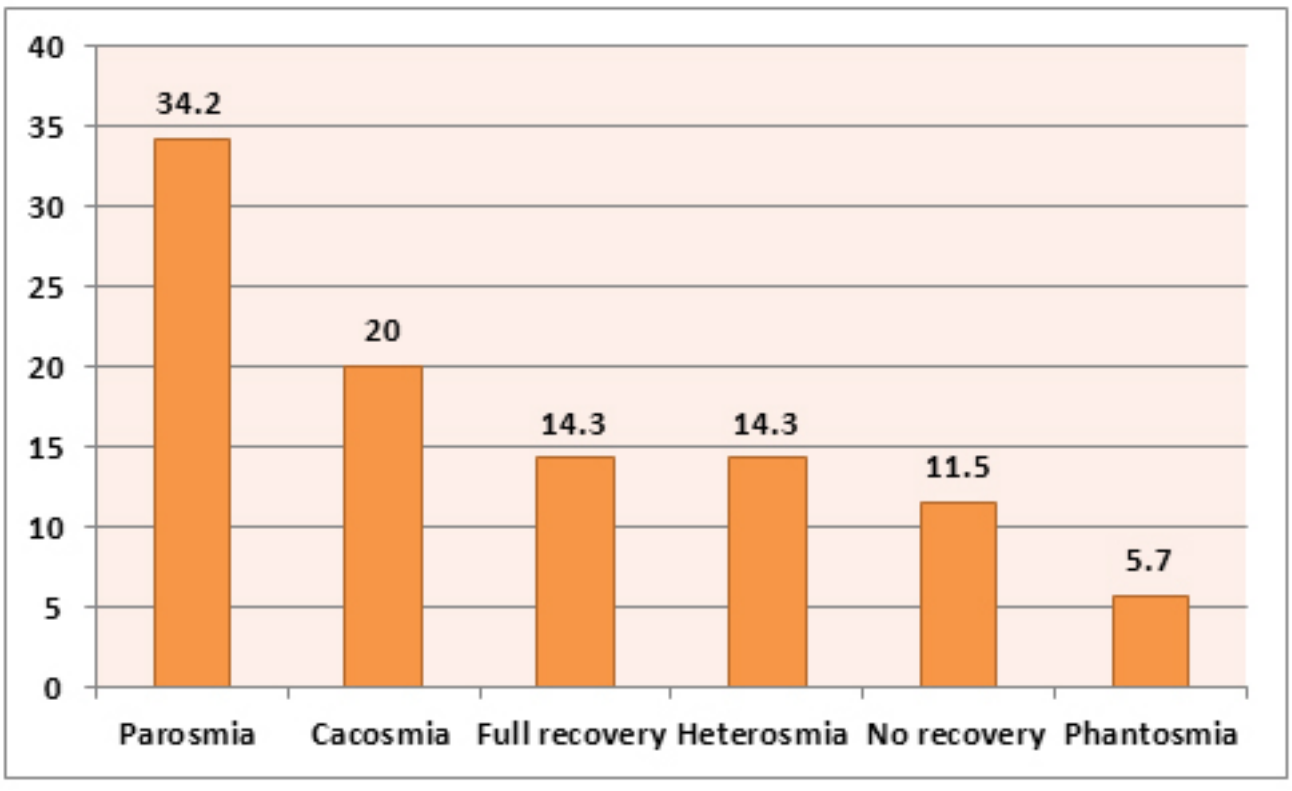


Table 2: Distribution of nonspecific symptoms, comorbid condition, olfactory disorders and pattern of development related to sex (n = 70)

Variables	Sex				Total		p-value
	Female		Male				
	No	(%)	No	(%)	No	(%)	
Nonspecific symptoms:							
None	15	(21.4)	3	(4.3)	18	(25.7)	P > 0.05
Generalized body ache	11	(15.7)	6	(8.6)	17	(24.3)	
Headache	8	(11.4)	4	(5.7)	12	(17.1)	
Mild fever	11	(15.7)	1	(1.4)	12	(17.1)	
Cough	7	(10.0)	1	(1.4)	08	(11.4)	
Slight dyspnea	3	(4.3)	0	(0.0)	03	(4.3)	
Comorbid condition:							
None	41	(58.7)	11	(15.7)	52	(74.4)	P > 0.05
Diabetes mellitus	05	(7.1)	03	(4.3)	08	(11.4)	
Hypertension	04	(5.7)	01	(1.4)	05	(7.1)	
Allergic rhinitis	05	(7.1)	0	(0.0)	05	(7.1)	
Olfactory disorders:							
Anosmia	47	(67.1)	13	(18.6)	60	(85.7)	P > 0.05
Hyposmia	08	(11.4)	02	(2.9)	10	(14.3)	
Pattern of development:							
Parosmia	17	(24.2)	7	(10.0)	24	(34.2)	P > 0.05
Cacosmia	12	(17.1)	2	(2.9)	14	(20.0)	
Full recovery	8	(11.4)	2	(2.9)	10	(14.3)	
Heterosmia	8	(11.4)	2	(2.9)	10	(14.3)	
No recovery	6	(8.6)	2	(2.9)	8	(11.5)	
Phantosmia	4	(5.7)	0	(0.0)	4	(5.7)	

Figure 5: Patterns of olfactory developments in the study patients



Discussion

The presentation of olfactory dysfunction (OD) in viral infections such as the common cold or flu is very common, and many viruses lead to OD due to an inflammatory reaction in the nasal mucosa, with increased production of mucus (rhinorrhea), and/or in the neuroepithelium olfactory. The commonly known agents are rhinovirus, parainfluenza, Epstein–Barr virus and some coronaviruses. The follow-up of post-viral olfactory loss showed that over 80% of patients had subjective recovery at one year. The exact pathophysiology of post-viral OD remains under study. No specific upper respiratory symptoms allow Covid-19 to be reliably distinguished from other types of viral respiratory infections [8].

There appear to be two likely causes:
(a) during an upper respiratory infection the loss of smell occurs as a result of nasal swelling, mucosal oedema and obstruction of the airflow into the olfactory cleft, and/or (b) a postviral loss of smell is caused by infection and direct swelling of the olfactory mucosa, leading to the subsequent neurodegeneration of the olfactory neuroepithelium. Damage and dysfunction of the peripheral olfactory system, revealed by hyposmia or anosmia, could be a relevant indicator of disease progression [9].

Since the beginning of the pandemic coronavirus disease (Covid-19), an increasing number of patients have sought medical assistance reporting loss of smell [10,11]; and, thereby, a number of studies have been conducted to analyze the prevalence and determinants of olfactory dysfunction in coronavirus disease patients.

Our present study found 70 patients with olfactory disorders in Covid-19 during the 3 months of the study period and they were (78.6%) females and (21.4%) males. Female to male ratio was 3.7:1.

Amer et al [12] found in their study a predominance of females; they were (58%) females and (42%) males with female to male ratio 1.4:1.

Gorzkowski et al [13] reported in their study that the female patients were (64.2%) while the male patients were (35.8%) with female to male ratio 1.8:1.

Females have been reported [2,14] as significantly more affected by Olfactory and Gustatory dysfunctions in Covid-19 diseases.

According to our analysis, young patients aged ≤ 40 years could have a higher rate of olfactory dysfunction (85.7%) compared with elderly individuals (14.3%).
Similar findings have been reported in the study of Speth et al [3] who investigated self-reported olfactory dysfunction in 103 Covid-19 patients.

In the present study, the mean age of patients was 29.2±8.8 years; 55 females (78.6%) and 15 males (21.4%) with evident female predominance. This goes in accordance with Amer et al [12] who reported that the mean age of their study patients was 34.26±11.91 years and they were 56 (58.3%) females and 40 (41.7%) males. Also, our finding goes in accordance with Kosugi et al [15] who studied 183 olfactory patients of Covid-19 with mean age of 36 years and female predominance 53.1% of their patients. Similarly, in a multicentric study of Covid-19 patients studied by Lechien et al [2] 357 patients were recruited with mean age 37 years and female predominance 63.1%.

We are also in agreement with Kosugi et al [15] and Lechien et al [2] who attribute this female predominance as regards olfactory complaints to the fact that females have a greater concern for their health as well as the decreased capacity of men to perceive olfactory disorders.

In our current study we observed generalized body ache was the most common nonspecific symptoms (24.3%), followed by headache and mild fever for each one (17.1%), cough (11.4%) and slight dyspnea (4.3%).

Kosugi et al [15] reported in their published study that most patients had sudden anosmia (83.8%) instead of sudden hyposmia, and most cases of olfactory dysfunction were accompanied by nonspecific inflammatory symptoms (coughing, fever, headache, fatigue/malaise, myalgia/arthralgia and/or anorexia).

In our present study we found in all study patients, there were 18 (25.6%) patients with comorbid conditions. They were diabetes mellitus in 8 (11.4%) patients, followed by hypertension in 5 (7.1%) patients.

Mendonça et al [16] reported that in olfactory dysfunction in Covid-19: diabetes mellitus was a significantly a more frequent comorbidity in hospitalized patients. Similar to our finding was that reported by Amer [12] that some patients reported comorbidities as diabetes mellitus (16%), and hypertension (8%).

Regarding olfactory disorders, we found in our present study anosmia in 60 (85.7%) patients and hyposmia in 10 (14.3%) patients.

Galougahi et al [17] found in their study in Tehran, Iran, that of the 76 participants, 46 patients (60.5%) had anosmia and 30 (39.5%) hyposmia.

The clinical picture of the infection with Covid-19 may vary regarding the disease severity and usually includes general otolaryngological and neurological symptoms [18,19]. Olfactory dysfunction is one of the most prevalent symptoms [18]. The prevalence of olfactory dysfunction may vary regarding the clinical setting, with rates of total loss of smell as high as 70% patients with mild Covid-19 form [18,20,21].

The prevalence of olfactory dysfunction in moderate to critical Covid-19 forms was poorly investigated [22,23].

In our study, we found parosmia was the most common development pattern of olfactory disorders in Covid-19 patients 24 (34.2%).

Dysosmia is more common. Usually dysosmia reflects dynamic alterations of degeneration or regeneration within the olfactory neuroepithelium over time [24].

Parosmia or distortion of smell is currently regarded as one of the long Covid-19 syndromes or chronic Covid-19 syndromes. Carfi et al [25] found that (87.4%) of patients in their study who recovered from Covid-19 had at least one persistent symptom with loss of smell among them.

Full recovery was found in 10 (14.3%) patients while no recovery was found in 8 (11.5%) patients.

Amer et al [12] reported in their study that, (33.3%) patients experienced full recovery while, (41.7%) patients showed partial recovery within one month from loss of olfaction, however, (25%) of patients showed no recovery within 4 weeks of onset. However, full recovery from sudden olfactory dysfunction was reported by only 11.5% of their patients, and only 5.3% of patients in the study were tested for Covid-19, making it early to extrapolate their results [5,15].

Conclusion

The high prevalence of olfactory dysfunction in Covid-19 patients in our study, appeared with a significantly higher proportion of patients with anosmia followed by hyposmia.

Hyposmia recovers more rapidly than anosmia. Co-morbid conditions worsen the recovery and females develop a different olfactory disorder pattern more than males. Parosmia follow by cacosmia were the most common development patterns of olfactory disorders.

This situation supports the need for primary care, ear, nose and throat (ENT) physicians to be able to counsel patients regarding the likelihood of recovery, and to identify those at risk of persistent olfactory dysfunction, such that therapeutic strategies can be targeted appropriately.

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