

The Prevalence of Anosmia and Dysgeusia in Relation to Sex, Age, and Smoking during COVID-19 Second Wave: A Retrospective Analysis of a Sample of Patients in Hilla City

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Abstract

Background: Olfactory and gustatory dysfunction are among the significant symptoms of COVID-19 infection that show diversity in prevalence and recovery with a great impact on patients' life. **Objectives:** This study aimed to evaluate the impact of age, sex, and smoking on the prevalence and recovery of dysgeusia (abnormal taste) and anosmia (loss of smell) in COVID-19-infected patients. **Materials and Methods:** A retrospective single-institution study involved 194 records of COVID-19 patients of both genders evaluated according to study objectives, encompassing pertinent data such as age, gender, smoking habits, incidence of anosmia or hyposmia, changes in flavor, initiation and duration of the infection, and alterations in smell and taste. Medications utilized for treatment purposes were either acquired through direct telephone communication with patients or indirectly from patients' records. **Results:** A total of 194 patients were included, and the majority of them were women. Patients age had significant differences, with a mean age of 28 years. Infection duration was about 1 week for majority of patients, and the degree of COVID-19 infection was mild. Patients were significantly $P \leq 0.05$ had dysgeusia, anosmia, or both of them. Smoking was found to be significantly correlated with dysgeusia. **Conclusion:** Dysgeusia and anosmia are initial indications of mild COVID-19 infection that resolve on their own during the second phase of the virus's spread. Young female patients were identified as having a higher propensity to develop dysgeusia, anosmia, or both. Smokers had lower incidence of dysgeusia.

Keywords: Anosmia, COVID-19, dysgeusia, female, smokers

INTRODUCTION

COVID-19, the pandemic that affected people's lives and suspended activities in most parts of the world with an almost complete lockdown for a considerable time, still shows a diversity of symptoms and manifestations. SARS-CoV-2, the causative virus, expressed multiple changes during the last 3 years causing a variety of symptoms that expressed differently according to gender, age, and regional occupation.^[1,2]

The clinical presentation of COVID-19-infected patients ranged from asymptomatic to respiratory failure. The virus is known for its ability to affect neural bulbs, resulting in temporary or permanent neural dysfunction.^[3] Anosmia (loss of smell), hyposmia (partial smell loss), and taste derangement (dysgeusia) were among the observed neurogenic manifestations

of COVID-19 infection during the first phase of the pandemic; however, the incidence and prevalence were perplexing, requiring investigation at the national and international levels to highlight the problem and their impact on patients' life.^[4,5]

The principal mechanism by which SARS-CoV-2 causes neural dysfunction is still not well-defined, though it was hypothesized that the SARS-CoV-2 might interact

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with the ACE2 receptor.^[6] Despite the fact that many respiratory viruses such as influenza cause anosmia, COVID-19 was distinct in the absence of associated rhinorrhea.^[7,8] Globally, as mentioned in previous studies, alterations in taste and smell affect 40%–50% of population.^[9] The highest incidence of anosmia was in Europe^[10]; on the other hand, most of the cases were recovered within 2 weeks; however, a considerable number of patients reported a longer duration of recovery.^[11]

Indeed, smell and taste are valuable for human wellbeing sensation. The duration, psychological impacts of anosmia and taste dysfunction, and possible therapy require further investigation to understand the available facilities for health improvement.

The aim of study was to assess the prevalence of anosmia and taste dysfunction and the differences in their susceptibility according to age and sex in Al-Hilla city, Iraq.

MATERIALS AND METHODS

A retrospective cross-sectional single-institution study was performed in the College of Dentistry. The record of patients who visited the oral diagnosis clinic between September 2021 and May 2022 were included. The study was approved by the Department Of Oral Surgery Ethical And Scientific Committee and in accordance with the principles of the Declaration of Helsinki.

Sample

A total of 194 records of patients of both sexes were evaluated according to study objectives and included when they adhered with inclusion criteria. To increase the statistical power of the study, patients were contacted to obtain further information. Sample size was determined according to the number of the patients who visited the oral diagnosis clinic per year in which the sample would be represented with 95% confidence intervals using a web sample size calculator.

Inclusion criteria

Patients with a history of COVID-19 infection with a positive result of polymerase chain reaction (RT-PCR) specific for SARS-CoV-2 and detailed records of infection onset, duration, and symptoms were included.

Exclusion criteria

Patients with a history of chronic sinusitis, recent nasal surgeries, or any nasal or oral pathological lesions or tumors that interfere with normal smell and taste; patients with asthma and chronic obstructive pulmonary disorder; and patients on topical, nasal, and inhalation corticosteroids were excluded.

Method

A total of 300 patient records were analyzed, encompassing pertinent data such as age, gender, smoking habits, incidence of anosmia or hyposmia, changes in flavor, the initiation and duration of the infection, and alterations in smell and taste. Medications utilized for treatment purposes were acquired either through direct telephone communication with patients or indirectly from patients' records maintained within the department. Verbal consent was obtained from all patients to conduct the study on the condition that their contact information remains confidential.

Statistical Analysis

In order to conduct appropriate comparisons and correlations, parametric data were subjected to statistical analysis utilizing the one-way ANOVA, independent sample *t* test with mean $\pm$ standard deviation, and Pearson's correlation test. Conversely, nonparametric data were assessed and compared through the application of the chi-square test, while the Mann–Whitney U and Wilcoxon W tests were used to determine the significance level. Analysis was conducted utilizing SPSS software developed by IBM Microsoft. The significance level was set at $P \leq 0.05$.

Ethical statement

The study was approved by the Department Of Oral Surgery Ethical And Scientific Committee and was conducted in accordance with the principles of Helsinki declarations. The study was conducted according to approval document number 5010 (including the number and the date in 25/10/2021)

RESULTS

In accordance with study objectives and inclusion criteria, 194 patients were included, and the majority of them were women (77.3%), as shown in [Table 1]. Patient age had significant differences, in which most of the patients were young adults with a mean age of 28 years. Infection duration was about 1 week for the majority of patients, and degree of COVID-19 infection was mild.

Regarding COVID-19-induced neural dysfunction, patients were significantly $P \leq 0.05$ had dysgeusia, anosmia, or both of them during infection period [Table 1]. Furthermore, dysgeusia was the major complaint in 54.6% of patients.

The impact of sex and age on neural dysfunction had no correlation with hyposmia, anosmia, and dysgeusia ($P \geq 0.05$), as shown in [Table 2]. In contrast, smoking was significantly correlated with dysgeusia, in which smokers developed less dysgeusia during the COVID-19 infection period, see [Table 2] and [Figure 1].

Females and males had one or two episodes of neural dysfunction during COVID-19 infection and had

Table 1: Demographic data and prevalence of anosmia, dysgeusia, and hyposmia in study population. Data expressed by percentage in parenthesis

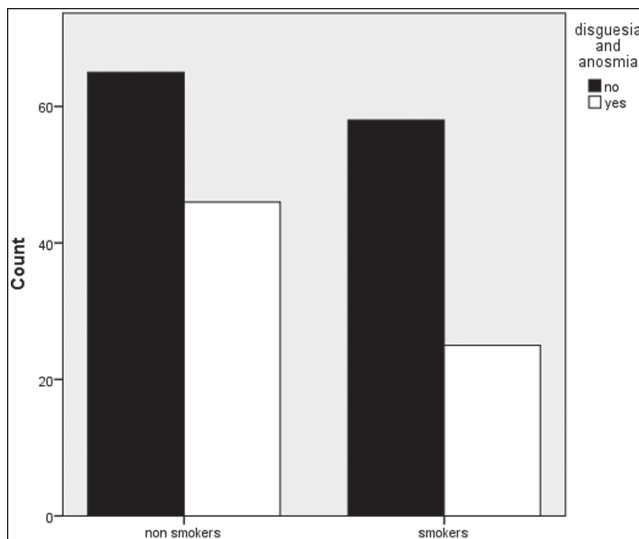
Criteria	Number of patients 194	P value
Age	28.24 ± 11.74	0.00*
Sex		
Male	44 (22.7%)	0.00*
Female	150 (77.3%)	
Smoking	83(42%)	0.286
Neurogenic involvement		0.001**
Hyposmia	45 (23.2%)	0.430
Anosmia	91 (46.9%)	0.00*
dysgeusia	106 (54.6%)	0.022*
Both (anosmia and dysgeusia)	71 (36.6%)	0.00*
Duration of neural dysfunction		0.00**
1–2weeks	128 (66%)	
2–4 weeks	50 (25.8%)	
4 weeks and more	16 (8.2%)	
Duration of symptoms	5–10 days	0.354

*P ≤ 0.05,

**P ≤ 0.001

Table 2: Correlation of neural dysfunction with age, sex, and smoking factors

	Age R value	Sex R value	Smoking R value
Hyposmia	-0.037	0.520	0.068
Anosmia	0.105	0.312	0.002
dysgeusia	0.528	0.467	0.238**
Olfactory and gustatory dysfunction	0.27	0.00**	-0.116

**Figure 1:** Impact of smoking on the prevalence of anosmia and dysgeusia in patients infected with COVID-19. The number of smokers is 83 out of 194 patients

statistically significant differences when compared with each other [Table 3]. However, females were more prone to develop neural dysfunction during COVID-19 infection.

Based on their records, no patients were hospitalized or received treatment for neural dysfunction during their infection period, except for traditional herbal therapy in 20% of patients.

DISCUSSION

Olfactory and gustatory dysfunction are early indicators of COVID-19 infection, with great impact on patient psychology.^[12] Although the process by which COVID-19 virus induces neural dysfunction is still unclear, variation was found in the expression of these neural dysfunctions in relation to various factors such as ethnicity, age, and sex.^[4] The current study aimed to verify the impacts of age, sex, and smoking behavior on olfactory and gustatory dysfunction during COVID-19 infection.

The study found significant dysgeusia and anosmia or both of them during COVID-19 infection. This finding agrees with that of AlEnazi *et al*^[7] who studied olfactory and gustatory dysfunction in Saudi population and found that 54% of patients reported olfactory and gustatory dysfunction as an early symptom during COVID-19 infection. This similarity reflects the impact of ethnicity on COVID-19-induced neural dysfunction as both populations are Arabs and belong to the same regional

Table 3: Prevalence of neural dysfunction in relation to gender according to independent-sample Mann–Whitney U test

	Male total number (44)	Female total number (150)	P value
Hyposmia	12 (27.2%)	33 (21.8%)	0.467
Anosmia	17 (38.6%)	74 (48.8%)	0.021*
dysgeusia	21 (47.67%)	85 (56.1%)	0.05*
Both (anosmia and dysgeusia)	14 (31.78%)	57 (37.6%)	0.09

*P ≤ 0.05

area. Moreover, the recent study finding is in concordance with previous study outcomes of quarantined patients in Iraq during the first phase of COVID-19 infection done by Al-Zaidi and Badr.^[13] However, the current study involved out-patients rather than hospitalized patients.

In this study, dysgeusia was reported by 54.6% of patients' alone symptom, which disagrees with Klopfenstein T *et al*^[14] results who found ageusia alone in one case, while 88% of patients had combined anosmia and ageusia. A possible explanation could be that this study is a retrospective study based on patients' recorded information and not an observational study to distinguish between anosmia and dysgeusia, which is highly confused by patients.^[15]

In regard of the impacts of sex and age on COVID-19-induced neural dysfunction, the results show a significant correlation; this could be because most of our patients were under 40 years and female. This finding concurs with those of AlEnazi *et al.* and Hamel *et al.*^[7,16] who postulated that female patients and patients younger than 40 years express olfactory and gustatory dysfunction more than other patients when infected with COVID-19. The available evidences declare that inflammatory and immunological variations in females influence their response to viral invasion, making them less susceptible to severe infection and mortality.^[2,17]

Duration of disease was 5–10 days in most of the patients, and olfactory and gustatory dysfunction were self-limiting within 10–14 days, with no history of specific pharmacological treatment. 20% of the patients reported herbal therapy during the infection period for hastening the recovery of smell and taste sense loss. These findings agree with those of a study performed by Esha Sehanobish *et al.*,^[18] who found that anosmia and dysgeusia associated with COVID-19 recovered earlier among younger men. Similarly, Gupta *et al*^[19] found that anosmia and dysgeusia are self-limiting and a common manifestation of COVID-19 infection. Conversely, the current study's findings disagree with those of Chudzik *et al*^[20] who stated that persistent anosmia and dysgeusia could affect nonhospitalized young adults in the acute COVID-19 infection phase. The available evidences revealed that the virus changed with time and immunity-related factors in addition to factors related to human genetic predisposition, which could provide a reliable

explanation for severity and persistence of COVID-19-associated neural dysfunction.^[11,21–23]

The data gathered in this study suggest that smoking inversely affects the prevalence of anosmia and dysgeusia. It seems difficult to describe the role of smoking in susceptibility to anosmia and dysgeusia; moreover, many studies explain the influence of smoking on olfactory and gustatory nerve bulbs.^[1,24] However, another study by Al-Magsoosi *et al*^[25] in Iraq showed that nonsmokers have more dysgeusia than smokers, nevertheless, this finding was insignificant.

The limitations of this study were that it was a retrospective study, involved patients of a single center, and had large numbers of female in comparison to male patients, which might interfere with study findings. Though, as far as to our knowledge, this study is pioneering in addressing the effects of age, sex, and smoking factors on the prevalence of anosmia and dysgeusia in our province. The recent study results provide additional evidence to previous studies in our country and region for better understanding of COVID-19-induced neurological effects and manifestations.

CONCLUSION

Dysgeusia and anosmia represent an early manifestation of mild COVID-19 infection with self-limiting manor in the COVID-19s wave infection era. Young female patients were more likely to develop dysgeusia and anosmia or both of them. Smokers had lower incidence of developing olfactory and gustatory dysfunction.

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Conflicts of interest

There are no conflicts of interest.

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