

## LONG TERM RECOVERY ASSESSMENT OF POST-COVID-19 LOSS OF TASTE AND SMELL- A POPULATION-BASED SURVEY

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### ABSTRACT

Coronavirus Disease (COVID-2019) has remained a pandemic for more than two years and has badly affected human lives. It was a novel disease without even knowledge of its symptoms. It has caused millions of deaths all around the world. It involves multiple organ system with a variety of symptoms but sense of taste, smell, were commonly affected. This was a prospective population-based survey conducted by using a pre-defined questionnaire. About 218 COVID -19 RT-PCR positive patients were treated at home without any significant illness. There were 141 and 125 patients who recovered completely with return sense of smell and taste respectively, while 11 patients had both dysfunctional senses. Females had a significantly higher rate of complete recovery of sense of taste but smell had no association with gender. Our study showed a significant proportion of patients showing incomplete recovery of the taste and smell. Further studies on the neurological pathways are recommended to explore it in depth and develop interventions to cure the disability.

**Key Words:** COVID-19, Long COVID, Sense of smell and taste

### INTRODUCTION

Coronavirus Disease (COVID-2019) is a viral infection caused by an RNA virus named SARS-CoV-2. The infection was first reported in Wuhan city of China in 2019; it causes mild symptoms to severe respiratory illness and causes death. According to a World Health Organization (WHO) report, since its discovery in 2019, it accounts for more than 6 million deaths worldwide. Many patients develop the infection without showing any symptoms, while others develop debilitating disease causing hospitalization and even respiratory failure. Following complete recovery, some patients have mild symptoms ranging from mild myalgia to severe dyspnea.

More than half of the patients reported a loss of taste and smell as the most common symptoms (1). Later, long COVID was reported initially from the support groups then confirmed by the scientific community(2). Nevertheless, mechanism and pathogenesis of development of long COVID are not yet understood. Still, it is precisely reported to be with the persistence of the virus for a long time and damage to the nervous and respiratory systems (2). Further reports suggest the involvement of all body systems in long COVID (3), including the immune, musculoskeletal, nervous, gastrointestinal, cardiovascular and renal systems. Thus no system is spared. Altered taste and smell are the most commonly reported symptoms of long COVID (4). A previously reported study suggested a loss of taste and smell in 28% of cases six months post-COVID(5). Another study from Faroe Island included non-hospitalized, PCR positive COVID 19 patients (n=180). Over 53% of participants reported having at least one symptom after 125 days of recovery. Out of these, >20% of participants reported having a persistent loss of taste and smell (6). In another study, 25.5% of COVID recovered patients reported to have smell and taste disorders more than six months after recovery from the

acute phase(7). Initial reports also suggested up to 30% prevalence of smell and taste dysfunction after one-year post-COVID recovery (8).

The available literature includes all patients with COVID-19. There is limited literature available on patients of all levels of severity. There is little literature on patients who had mild symptoms and did not receive aggressive therapy for COVID symptoms. Therefore, this study was designed to evaluate smell and taste dysfunction persistence in patients with mild symptoms.

## METHODS

This questionnaire-based survey, including RT-PCR nasal swab confirmed COVID-positive patients diagnosed between 1st April 2020 and 30<sup>th</sup> April 2021. All patients self-reported having mild symptoms, and no hospitalization was required. The patients who had a loss of smell and taste at the first diagnosis were included in this study, and they were requested to participate. Those who consented after informed consent were included. The self-administered structured questionnaire was designed and requested from the patients who came in contact at least one year after recovery(n=455), and 218 questionnaires were returned filled with informed consent. The questions were asked regarding smell and taste recovery. The questions included recovery of both the senses as complete, incomplete, and dysfunctional. Both senses were questioned separately, and also loss of both senses together.

The data was entered and analyzed using the Statistical Package for Social Sciences (SPSS version 21.0). The questions were reported as categorical variables and presented as frequency distribution in numbers and percentages. Gender was correlated with recovery of both senses by using Chi-squared test, and a p-value <0.05 was considered significant.

## RESULTS

A total of 218 participants consented to be part of our study, including 54.1% (n=118) males and 45.9% (n=100) females. The mean age of the participants was 38.73 years (range 21 to 65 years  $\pm$ SD= 11.01). All of these patients had PCR positive COVID-19, and the median duration of diagnosis was 18.6 months. All of these patients had experienced a loss of taste and smell, out of which 97 patients had complete recovery and return of both senses. 141 (64.7%) had complete recovery of the sense of smell, and 125(57.3%) had complete recovery of taste. 55 (25.2%) had incomplete recovery of smell sense, and 70 (32.1%) had incomplete recovery of taste. 11 (5.0) had both senses dysfunctional. Among dysfunctional senses, patients mentioned cacosmia in the majority of cases. Gender did not show a significant association with the recovery of the sense of smell. Still, the taste was significantly influenced by gender, where female patients had a significantly higher recovery rate (p-value=0.03) (Figures 1 and 2).

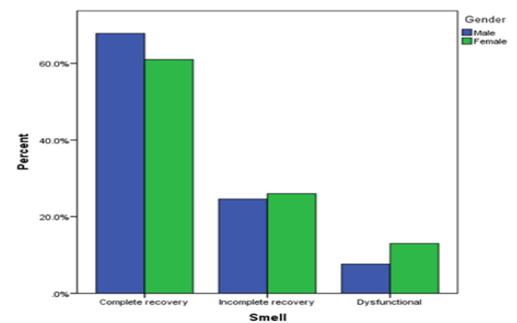


Figure 1. Association of gender with recovery of sense of smell

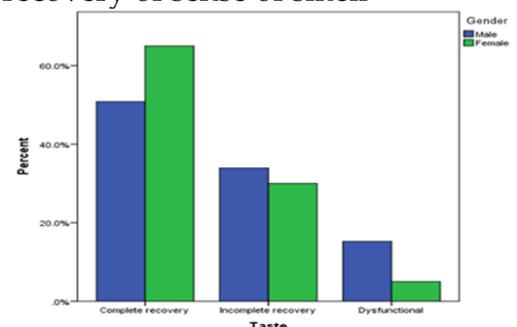


Figure 2. Association of gender with recovery of sense of taste

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## DISCUSSION

COVID-19 has developed into a systemic problem with some lethal complications resulting in millions of deaths. However, a significant majority recovered completely without any devastating effects on health. Loss of taste and smell were the most commonly reported symptoms in earlier days of the diagnosis. This study focused on the long-term recovery of the taste and smell senses. Though a significant majority in our sample had complete recovery. A considerable number is still suffering from the incomplete return of these senses, and a small number had dysfunction.

Previously reported studies focused on short-term recovery, where 38% and 41% lost taste and smell, respectively, out of which 74% had severe symptoms (9). A large study on the impact of olfactory sense loss on respiratory recovery should show a strong association between the two. Around fifty percent of patients showed recovery of the sense of smell within 40 days of onset(10). Another retrospective study conducted using a questionnaire reported complete recovery of the sense of smell in 85.71% of participants within 3-61 days while around 8% reported persistent hyposmia. Another small study, including 61 patients, reported that 28% of patients continued to have a loss of taste and smell after six months of recovery(5). A cohort study conducted in Melbourne focused on the recovery of taste and smell after COVID showed that 74% of COVID-19 positive patients complained of loss of taste and smell, out of which 34% had a persistent loss of smell after recovery and 28% had complaints of loss of taste(11). Another study reported that around 17% of patients reported having a loss of smell and taste even after nine months of recovery(12). Yet another study reported complete recovery of smell and taste functions in 52% and 61.5%, respectively, after 229 days (13). Our findings of recovery and persistent symptoms post-COVID are consistent with the existing literature.

Loss of smell is widespread during viral infection involving the respiratory system. However, the recovery from the loss of smell corresponds to the recovery of the respiratory symptoms. However, the case was different in COVID patients, where many recovered patients continue to have these symptoms even after biologically confirmed recovery. The exact cause of the loss is not yet understood. Still, specific mechanisms are thought to be involved, such as inflammatory response damaging mucosa or neuronal pathways of smell and taste(14). However, patients with no or minimal stress or depression, or cognitive dysfunction post-COVID are less likely to have a central nervous system problem. Theoretically, it is more likely to be the response at the organ/ mucosal level at the nose and tongue where there is damage to the nerve ending as part of the inflammatory response. Though it is not yet understood. An electrophysiological study was done on the sensory system and suggested no metabolic activation of the brain after an olfactory stimulus. Thus further detailed analysis would be helpful in exploring the cause and find out the cure of the disability.

## CONCLUSION

Our study suggests a considerable chance of having loss of smell and taste even after one year of complete recovery from COVID-19 viral infection. The exact mechanism of the loss is not yet fully understood, and further studies to explore the pathophysiology of the long-term effects of COVID-19 are essential to make it understood.

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