Smell and taste dysfunctions after COVID-19: sexual issues from the patient perspective. A paradigmatic case

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ABSTRACT

Olfactory and gustatory dysfunctions are reported by most individuals affected by COVID-19. Although smell and taste is usually recovered within one month, impairments persist in 2% of patients. No study has analyzed the impact of persistent olfactory and gustatory dysfunctions on an individual's sexuality.

Here we report the case of a 29-year-old woman presenting with persistent COVID-19-induced anosmia and dysgeusia. Her description of the pervading impact of her chemosensory impairment on her sexual identity, sex drive and intimate relationship is insightful. The reported impairment showed fluctuations across the menstrual cycle, with less impairment at ovulation and greater dysfunction around the time of her periods. The persistence of symptoms required retraining of her senses through home exercises based on neurorehabilitation principles. The progress of this rehabilitation displayed similar variations across the menstrual cycle.

This case highlights the importance of olfaction and taste in modulating sexual identity, function and relationships, and how deeply all these sexual dimensions can be impacted by the chemosensory damage induced by COVID-19, especially when prolonged in time.

Patients with COVID-19-induced smell and taste dysfunctions should be evaluated from the sexual point of view and offered appropriate psychosexual and rehabilitation support. The reported fluctuations of both the impairment and the efficacy of rehabilitation across the menstrual cycle is an aspect that deserves further investigation.

KEYWORDS

COVID-19; smell dysfunctions; taste dysfunctions; women's sexuality.

Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the third recorded highly pathogenic coronavirus infecting humans, and the first to cause a global pandemic [1]. This exceptionally insidious virus displays three main features: high rates of infection; high rates of mutation (typical of single-stranded RNA viruses); and the ability to infect multiple organs in the human body. While typically associated with respiratory pathology, infection by SARS-CoV-2 causes a comprehensive syndrome: coronavirus disease-19 (COVID-19). COVID-19 causes a spectrum of clinical manifestations, of differing severity, and comorbidities. Infected people can be asymptomatic, paucisymptomatic or severely affected, even suffering fatal outcomes. The pathophysiology of this polyhedric syndrome is the focus of intense research and clinical investigation.

Olfactory and gustatory dysfunctions are highly prevalent in the SARS-CoV-2-infected population [2,3]. Accurate olfactory testing using a well-validated 40-odorant test revealed that up to 98% of COVID-19 patients developed some degree of olfactory dysfunction (anosmia, and hyposmia or microsmia), with more than half of the patients completely losing their sense of smell [3]. In another European study, 88.8% of patients reported gustatory dysfunctions (ageusia or dysgeusia) [2].

Importantly, sudden-onset olfactory and gustatory dysfunctions are often the only symptoms reported in "paucisymptomatic" patients, who will not necessarily display the more established symptoms, such as cough, fever, tiredness and/or respiratory distress, but will still spread the virus. Thus, such chemosensory symptoms, although not justifying a presumptive COVID-19 diagnosis without molecular confirmation, could be predictive of infection, and should encourage the adoption of preventive and testing strategies [2,4]. These chemosensory symptoms seem to regress spontaneously in 98% of COVID-19-positive patients within one to two months [5]. However, these apparently minor symptoms are just the tip of an iceberg of multiple subtle yet pervading comorbid health and sexual consequences that deserve more focused medical attention.

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Women's sexuality is particularly modulated by olfaction and taste [6-9]. Together with touch, these senses form the "kinesthetic channel", which plays a prominent role in sexual attraction, sex drive and arousal, and in relational dynamics, far more so than the visual channel, which is stronger in men. The auditory channel falls between these two channels in terms of importance in female sexuality [6-9]. Olfactory discriminatory ability is modulated by sex hormones. In women, from the onset of puberty and throughout the fertile age, it becomes superior to that of men. Moreover, women's olfactory threshold fluctuates during the menstrual cycle peaking at ovulation, thus maximizing the ability of their olfactory and oral mucosae to capture and respond to pheromones [10,11]. Pheromones are a class of chemical substances, active within a specific species, which mediate social dynamics and behaviors critical for the survival of the individual (such as fear, panic, aversion) and of the species (such as reproduction). Given the recognized role of olfaction in different aspects of women's behavior, including sex drive and food preferences [11], COVID-19-induced olfactory and gustatory symptoms may disproportionately affect women's sexuality and relationships.

The impact of COVID-19 on sexuality is increasingly being investigated from the point of view of macro-changes in social behaviour [12–18], while the specific individual sexual impact of olfactory and gustatory dysfunctions remains under-reported, under-appreciated and under-investigated. The aim of this paper, therefore, is to present a paradigmatic case report of a young woman suffering from serious sexual consequences of long-lasting anosmia and dysgeusia caused by COVID-19. From a clinical perspective, the woman's direct account of her experience, on which this report focuses, provides some insight into the mysterious and still unexplored impact of chemosensory impairment on intimate sexual dynamics due to COVID-19. To this author's knowledge, this is the first reported case and description of the sexual impact of chemosensory dysfunctions in a COVID-19 patient.

Case presentation

The young woman, aged 29, sought assistance via phone for a distressing loss of olfaction and a taste dysfunction, which were severely impacting her personal and sexual life. During that time, March 2020, Italy was going through a strict lockdown and many women were having a difficult time, especially those having to face COVID-19 alone. The author offered daily free phone consultations during these hard times to support women in need. Here she reports the woman's account of her experience, in her own words, as it provides an accurate description of her symptoms and emotions. The woman's smart questions and particular feelings prompted a deeper analysis of the complaints, worth sharing with the scientific community.

Patient: "It's now a month since I completely lost my sense of smell. I am unable to smell or recognize scents and perfumes. Total zero. Since I lost my sense of smell, it's like the world has become foggy. Sometimes I have the feeling of a scent coming back. Then I lose it again. Even my taste is distorted. I get a prominent bitter taste. Everything is bitter. It is as if the world I knew has disappeared. I don't feel like myself anymore. Me, I'm no longer me! It's like being suddenly blind, but from the point of view of smell, and almost blind in terms of taste. I also have a headache that I never had before".

"I am concerned because I read that olfaction comes back in 98% of people in less than a month. I am very worried because a month has already passed, doctor. And what if I am in this 2% that does not recover? I don't want my life to turn into a concert without music, or a movie without video! [...]".

"[...] Besides, I have two more problems that I believe could be connected. Without any scent clues, and with this strange, bitter taste when we kiss, my boyfriend became a total stranger to me. My sex drive disappeared. Dead. We were going through a difficult patch, yes, but these symptoms killed the relationship and all that was left of it. I have left him. But I have an even bigger problem now. How can I kiss again? I "see" all these viruses here in my mouth. I feel terrified of infecting others. And terrified of being infected again. It's a nightmare, doctor. For me to lose my smell and my taste is not a minor problem! It's devastating! I'm so worried...".

"I live alone. I'll do what you say, doctor, but don't abandon me. I'll quarantine. But what can I do to help the recovery?".

Memory is a mysterious thing. Over the following days, her questions were constantly in my mind. Suddenly I remembered a thought-provoking lecture given at a neuroscience conference in New York that I attended at least thirty years ago, a turning point in my professional life. The lecturer was Paul Bach-y-Rita — I still remember his name — and he spoke beautifully about neurorehabilitation, neuroplasticity and the extraordinary ability of the brain to recover from damage [19]. Similar cases came back to mind, cases of loss of olfaction due to influenza. This was a stroke of intuition and luck! The principles of neurorehabilitation might be applied to this patient, to help re-train her smell and taste functions through central memory.

The patient called again a few days later: "It's me, doctor. I have the results! The swab is negative, the antibodies are positive. Bingo! The GP says that yes, it was COVID-19. And he prescribed me a high dose of vitamin D because it was very very low, he said".

Doctor: "Well done! Listen, I have two suggestions to make, to help you get better from the smell and taste point of view. We have to work on two connected fronts. It will be easy and you'll be able to do everything at home, with patience and perseverance, of course. Do you like coffee? Well, prepare yourself a cup of coffee. Then, eyes closed, no music, sip it slowly, very slowly. Taste it and try to get the scent of it back in your brain. It is an associative training: scent, taste and memories. Try to remember a place where you enjoyed a very good coffee, or a person whom you loved to have coffee with. The same for a cake, say your favorite sponge cake. Savor the scent from the oven – prepare it yourself! Then, take small bites, very small bites, and smell while thinking of loving memories. Repeat the process again and again, with patience each time. This will help your brain to get out of the fog, step by step so to speak".

Patient: "Kind of like Proust's madeleine?".

Doctor: "Brilliant! Exactly that! Second, please ask your GP to consider two supplements that may help your nerve cells and fibers to recover from the damage caused by the infection:

alpha-lipoic acid (300 mg twice a day) and palmitoylethanolamide (700 mg/day). Plus, continue taking vitamin D and please keep me updated. Ah, one last question: when did you have your last period? Two days ago? Perfect. Please make a smell and taste recovery diary until your next period, that will help too".

Four weeks later, more than two months from the onset of the symptoms, she called again. With a smiling, cheerful voice, she said: "Doctor, it's me! The coffee worked first. I mean, the coffee-tasting exercise you suggested was the first thing that worked. I practiced it so many times. It was mid-cycle, doctor, when I finally got it right — that scent I loved, that taste I loved — I was dancing alone in my kitchen. I'm slowly getting better. The scent of happiness is coming back to me, doctor...".

At the 6-month follow-up, the patient was still experiencing variations in her smell and taste sensitivity along the menstrual cycle: smell perception was best at ovulation and showed a variable blunting during her periods, when the persistence of a dominant bitter taste was reported.

Discussion

This report presents the case of a young woman with COVID-19-derived anosmia and dysgeusia. The story is purposely reported from the patient's perspective and using her own narrative of the experience, as her choice of words and accurate "symptom reading" may help physicians to better understand the complex role that smell and taste have in human well-being, sexual behavior, and sense of happiness, and how all these can be impacted by COVID-19-induced chemosensory dysfunctions.

The deep consequences of the symptoms on the patient's sexual life encompass many issues relevant to clinical practice, and the present account may deepen understanding of the complex interactions between olfaction, taste, hormonal fluctuation through the menstrual cycle, sexual identity, sexual function, and sexual relationships in humans, both in physiological and pathological conditions [9].

The role of the olfactory system in human behavior has been increasingly recognized in recent years and understanding of it could be further driven by cases of COVID-19-induced acute anosmia and ageusia/hypogeusia. Smell and taste are our only two "chemical" senses, defined by the use of molecules acting as trigger signals, which bind to specific chemoreceptors present on specialized sensory cells [20]. From an evolutionary point of view, smell and taste are the most archaic of the senses, having powerful connections with the rhinencephalon and the limbic brain [8]. Olfactory signals are collected in the olfactory mucosa by the olfactory nerve endings, the most peripheral outposts of the central nervous system. Flavor signals and the experience of the pleasurable and emotional value of food are processed by the posterior part of the orbital frontal cortex [21]. This area lies near to the primary olfactory piriform cortex, and thus positions olfaction close to gustation both anatomically and physiologically. This further underlines the close link between these two exquisitely sensual and sexual senses.

Because of their proximity, smell and taste share similar vulnerability to noxious agents, including viruses, as testified by the loss of both senses in the majority of COVID-19-positive subjects, as well as in this paradigmatic case [22,23]. Often, one sense can be more affected than the other, with olfaction usually being the most impaired, as reported by this patient.

The loss of smell and the distortion of taste severely affected this patient's sexual life, having major health, psychosexual and relational consequences that deserve comprehensive clinical attention. Chemosensory dysfunction impacted her sexual identity. When the patient, in response to her loss of smell and distorted sense of taste, said "Me, I'm no longer me", her words underlined the key role of olfaction first, and taste second, in the building, perception and maintenance of a consistent sexual identity over time. Sensations of the body ("body feelings") [24], which are extremely important for women, seem to be more affected than body image when the kinesthetic senses (olfaction, taste, and touch, in kissing and caressing) are lost.

Furthermore, the reported chemosensory impairment had a profound impact on the patient's sexual function. Without the ability to perceive her partner's scent and pheromones, a prominent component of her sexual attraction to him, and of her sex drive, was lost. The patient's complaints are strongly supported by published pathophysiological evidence. Loss of sex drive is reported in 29% of patients after olfactory loss of different etiologies, with depression triggered by neuroinflammation being the most frequent comorbidity [7]. With regard to the loss of arousal, there are two main aspects to consider. First, lost perception of the "aroma of arousal" causes impairment of sexual arousability [6]. Second, it also implies the risk of a shifting from "affiliative" to "unknown/aversive" feelings and dynamics. A comorbid taste distortion may further affect sexual function with a strong inhibitory effect. If the partner is perceived as a "total stranger", body odor attractiveness is lost [6]. And the intrinsic biological strength of sex drive vanishes with it.

Finally, the risk of infecting others and of being (re)infected, together with uncertainty concerning the duration of the symptoms, may trigger invalidating anxiety, further impairing sex drive and sexual behavior, as this case clearly indicates. The patient's anxiety was further amplified by her social isolation, illustrating the negative impact that social distancing- and lockdown-related measures have had in young people.

Within the framework of the psychosexual support offered via phone consultations, the therapy prescribed to the patient comprised three aspects: (1) memory-based neurorehabilitation; (2) exploitation of olfactory threshold fluctuation during the menstrual cycle; (3) reduction and repair of neural damage underlying the olfactory and gustatory dysfunctions.

First, the patient was given "homework" based on the role of memory in "smell and taste re-training" through basic principles of neurorehabilitation [25]. The exercises were designed to stimulate aroma-evoked memory pathways (e.g., coffee, pizza, sponge cake) going back to 0-10 years of age. Memories of this kind are more emotional, less frequently recalled, and capable of introducing retroactive "time-traveling" sensations of great therapeutic potential in situations of sudden dysfunctional loss of smell [26]. The use of these neurorehabilitation methods deserves to be evaluated in patients with long-lasting hyposmia and dysgeusia.

Second, the patient was advised to monitor her olfaction

and gustatory recovery with a diary, in order to connect it to the phases of her menstrual cycle. Women's olfactory threshold, and receptiveness and responsiveness to male odor, fluctuates following the hormonal changes of the menstrual cycle, peaking around ovulation, and usually mirroring their sexual arousal state [27–31]. Interestingly, the process of recovery of olfaction in this patient mirrored the same hormonal pattern, with the most pronounced improvement in scent perception reported at ovulation.

Finally, the synergistic role of vitamin D, alpha-lipoic acid and palmitoylethanolamide in reducing neuroinflammation after COVID-19 deserves further research.

In conclusion, this paradigmatic case is a strong call for attention to patients affected by COVID-19-induced olfactory and gustatory dysfunctions. More research and clinical commitment are needed to thoroughly evaluate the sexual impact of persistent chemosensory dysfunctions, especially in women, with a focus on variations along the menstrual cycle.

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