

Olfactory Training for Olfactory Dysfunction of Different Etiologies, especially for COVID-19.

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ABSTRACT

Aim: Aim of this article is to focus on management of olfactory dysfunction of different etiologies with olfactory training, which is a non-pharmacological and non-surgical treatment.

Materials: Four sniff bottles or jars (the volume of each container should be approximately 50 ml) are required for preparation of olfactory training. There should be 1 ml of an odor solution soaked into cotton pads. Typically rose scent, eucalyptus scent, lemon scent, and clove scent are used in this process. In our daily practice, four different perfume or concentrated attar or different fragrant soap can be used for easier availability.

Methods: In order to maintain a standard olfactory training, the patients got to sniff two times a day (preferably once in the morning before breakfast and once in the evening before going to bed) for at least 20 to 30 seconds on each of the four scents separately for at least 24 consecutive weeks.

Conclusion: Olfactory training is proved effective for post-infectious (, like post COVID-19), post-traumatic, and idiopathic olfactory dysfunction and olfactory dysfunction because of Parkinson disease. So, patients with olfactory decline must be given olfactory training for a quick and successful recovery.

INTRODUCTION

Olfactory dysfunction (OD) is a common symptom of COVID-19, with reported rates ranging from 47.9% to 70% [1,2]. whereas about 598 million (till 25th August 2022) COVID-19 positive cases were reported worldwide. Two years post-COVID-19, 29.8% of patients reported persistent OD, but only 2.9% had abnormal identification psychophysical evaluation [3]. Thus, a huge number of world population has been added in the pool of total olfactory dysfunction cases.

Impaired olfaction paves the way to a reduced quality of life. Like atmospheric jeopardy, impaired olfaction might be breakneck such as the smell of natural gas or smoke may not be applauded in any way. As the sense of taste is closely related to the sense of smell, a patient may experience diminished taste if he/she suffers from impaired olfaction [4]. Moreover, missed indications of danger, such as spoiled or contaminated food might occur in case

of diminished taste [5,6]. Besides, impaired olfaction may be a dangerous sign for common neurodegenerative disorders, such as Alzheimer's dementia and Parkinson disease. Sinonasal disease, viral infection, and nasofacial trauma are the most common causes of olfactory decline [7,8].

Olfactory therapy may be appropriate for the patients suffering from damage to the olfactory epithelium and olfactory pathways due to inflammation, toxins, trauma, viral infection, or unknown causes [3,8,9]. Patients having olfactory collapse might get relief from medications such as corticosteroids for chronic rhino sinusitis and other inflammatory conditions [3,8]. Though there are different ways to fight against olfactory decline with sodium citrate, zinc, and vitamins, but their working efficacy has not been truly testified to date [3,8]. Therefore, in order to develop olfactory function is olfactory training which is totally a non-surgical and non-pharmacological method, where patients got to expose themselves twice daily to different odors over the course of several weeks [3,8].

Various surveys have revealed the effectiveness of olfactory training [10-13]. Though the surveys' findings are questionable due to the absence of appropriate control groups or the lack of double-blinded experimental design [3,13]. However, some patients with olfactory dysfunction recover deliberately. Up to 20% of patients with post-traumatic olfactory dysfunction and up to 60% of patients with post-infectious olfactory dysfunction demonstrate spontaneous resolution of symptoms [14,15].

It is well noticed that younger patients, patients with relatively well-preserved olfactory function, females, and non-smokers get a great chance of a drastic improvement of olfactory functioning while the tobacco smokers should not be encouraged as it might hamper the improvement of the sense of smell [14]. Although its precise mechanism of action and effectiveness are not entirely understood, olfactory training is increasingly applied in routine care for patients with olfactory dysfunction of varying etiologies as it comparatively very simple and free from any serious side effect [3,8,13].

ANATOMY & PHYSIOLOGY

The olfactory system is the most pristine of the human special senses and is intimately related to the limbic system, the seat of emotion [16]. Airborne particulates are inhaled into the nose and dissolved in the mucinous secretions of the nasal cavity; ciliary action brings them into contact with the olfactory epithelium, where water-soluble molecules from these particulates bind to chemoreceptors that subsequently transduce signals via the unmyelinated axons of the olfactory projections up through the cribriform plate of the ethmoid bone to the olfactory bulbs, and then ultimately to the olfactory cortex of the forebrain [17].

The olfactory epithelium is located at the apex of the nasal cavity, along both the upper septum and the superior turbinate, as well as the roof of the nose. Olfaction helps people to recognize danger and identify the edible food, and is liable to cause human sense of taste. It is important to note here that taste buds on the tongue can only distinguish among sweet, sour, salty, bitter, and umami (savory) flavors, but the human sense of smell can differentiate as many as 1 trillion odorants [18]. The chorda tympani branch of the facial nerve and the glossopharyngeal nerve supply the oral and pharyngeal portion of the taste pathway, but the major contribution of the sense of smell shows why olfactory decline opts to have a deleterious effect on gustation as well. Of note, the path of the olfactory nerve fibers through the skull base may represent a direct route by which infectious pathogens, such as SARS-CoV-2, may access the central nervous system [19]. The very thin fibers of the olfactory

projections that travel through the perforations of the cribriform plate are also highly susceptible to shearing injury, which is why craniofacial trauma may result in hyposmia or anosmia.

The olfactory system is out and out unique in that sense that it can adapt and regenerate [20, 21]. Exposure to odors enhances this process and leads to improve olfactory functioning [22,23]. This regenerative phenomenon first appeared in healthy human subjects in the mid-1990s [24,25]. Repeated exposure to odors was proven to improve olfactory function for patients with deficiencies due to a broad range of causes, a decade later [26]. Numerous studies have confirmed the efficacy of olfactory training in humans in recent times [10,11]. In addition to that, findings from several animal studies and functional imaging studies in humans ensure the effectiveness of olfactory training [27-30].

INDICATIONS

Recent study indicates that olfactory training works more effectively in younger individuals than in the elderly and is more effective in individuals with severe olfactory dysfunction than in individuals who are only mildly affected. The most common indications reported in the literature are as follows:

- Post-infectious olfactory dysfunction: This is one of the most common causes of olfactory decline in clinical practice and one of the most common indications for olfactory training [8,10,11]. Following mild to severe upper respiratory tract infection, particularly virally-mediated, post-infectious olfactory dysfunction may occur. Neither abstinence from alcohol intake nor patient gender appears to affect the chance of improvement with olfactory training in patients with post-infectious olfactory dysfunction [31]. Olfactory testing in these patients shows diminished odor threshold and odor discrimination but normal odor identification [32]. Many patients with COVID-19 infection and decline of the chemical senses have this type of olfactory dysfunction [33]. The likelihood of improvement with olfactory training for patients with post-infectious olfactory dysfunction is comparatively good. A study involving more than 100 patients showed that 71% of patients with post-infectious olfactory dysfunction improved with olfactory training over one year, while 37% of patients without olfactory training spontaneously recovered over the same time period [34]. Olfactory training may be used in combination with corticosteroid treatment in selected patients with post-infectious olfactory dysfunction [8,35,36].
- Post-traumatic olfactory dysfunction: This type of olfactory dysfunction may occur suddenly or with a delay after a brain or nasal injury [8]. Results of olfactory training is less dramatic than for post infectious smell disturbance [37,38,39,26,31].
- Parkinson disease: Patients with Parkinson disease have a severe impairment of olfactory functioning, which starts many years prior to onset of motor symptoms, like- tremor, rigidity, or bradykinesia [37-39]. About 20% of patients with this disease get benefit from olfactory training, while 10% recover olfactory function spontaneously.
- Idiopathic olfactory dysfunction: After excluding all other causes of smell disturbance this diagnosis is made [8,31].

CONTRAINDICATIONS

In the past medical or surgical history or medications no described contraindications are found for olfactory training.

MATERIALS

Four sniff bottles or jars (the volume of each container should be approximately 50 ml) are required for preparation of olfactory training. There should be 1 ml of an odor solution soaked into cotton pads. The various scents typically phenylethyl alcohol (rose scent), eucalyptol (eucalyptus scent), citronella (lemon scent), and eugenol (clove scent) are used in this process.

In our daily practice, four different perfume or concentrated attar or different fragrant soap can be used for easier availability.

METHODS

In order to maintain a standard olfactory training, the patients got to sniff two times a day (preferably once in the morning before breakfast and once in the evening before going to bed) for at least 20 to 30 seconds on each of the four scents separately. Patients constantly sniffing for 20 to 30 seconds on each odor without a break is a must for a successful olfactory training.

In the process of undergoing the olfactory training, a patient usually has to have 24 weeks training period. However, patients with post-infectious olfactory dysfunction might need a year and so for producing a much better result [34]. It is revealed in a study that olfactory training with 12 odors was more effective than training with four odors in patients with post-infectious olfactory dysfunction [40]. Another study showed that high odor concentrations were more effective than low concentrations of odor for olfactory training in patients with post-infectious olfactory dysfunction [41]. Though these findings are not testified in patients with olfactory dysfunction due to other etiologies, patients with hyposmia or anosmia without a history of sinu-nasal infection, olfactory training, following the standard protocol (that is, olfactory training with four different odors twice daily for at least 24 weeks), might be a key beginning point.

For a successful and effective result in case of olfactory training, it requires a high degree of discipline to follow the standard protocol of olfactory training [3,13]. It's going to be very challenging for both the patients and the health care provider over the olfactory training period. An olfactory training ball having 4 tubes and containing the different odors can be used to improve adherence and outcomes of olfactory training [42]. Patients might be scheduled for regular office visits (e.g., every six weeks) to monitor their compliance and progress with a view to improving olfactory training adherence and outcomes.

RESULT

Total 912 patients of olfactory dysfunction were treated by olfactory training. Among them 11 patients had no improvement, 45 patients had minimum improvement; rest 856 patients had significant improvement. Most of the (92%) improvement occurs within 1 to 2 months.

PERSONNEL

A skilled physician, a nurse, a nurse practitioner, or other medical professionals with experience in managing olfactory dysfunction are needed to instruct the patients on how to perform olfactory training.

COMPLICATIONS

After conducting more than 40 clinical surveys that have been reviewed in several independent meta-analyses, no significant complications are found from olfactory training [10,11,12,36]. However, because of the daily or regular training over several months, patients may feel it much exhausting and boring.

CONCLUSION

Olfactory training is actually an easy-to-use method to improve one's olfactory dysfunction. It may be part of the therapeutic repertoire of both the specialized smell and taste clinic and the general ENT practice. There is no established medical or surgical treatment for olfactory dysfunction apart from post-viral olfactory dysfunction and olfactory dysfunction secondary to chronic rhino sinusitis. That's why, it is obvious that olfactory training is the only treatment option available to patients with olfactory dysfunction due to other etiologies, even for COVID-19.

To sum up, patients with olfactory decline must be given olfactory training for a quick and successful recovery.

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