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'Lost Scents, New Hope: Understanding Anosmia and the Promise of Smell Retraining'

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ABSTRACT:
Anosmia, defined as partial or complete loss of the sense of smell, has gained increased clinical relevance following the COVID-19 pandemic due to the rising incidence of post-viral olfactory dysfunction. Olfactory impairment significantly affects nutrition, safety, emotional health, and overall quality of life. This review highlights the etiology, pathophysiology, diagnostic methods, and therapeutic approaches for anosmia, with a primary focus on Smell Retraining Therapy (SRT), also known as Olfactory Training (OT).
Anosmia may occur due to viral infections, nasal obstruction, head trauma, aging, neurodegenerative disorders, congenital conditions, toxin exposure, and medication use, with post-COVID-19 anosmia being one of the most prevalent forms. Pathophysiological mechanisms involve damage to olfactory sensory neurons, supporting cells, inflammatory responses, and central olfactory pathways. Conventional pharmacological treatments such as corticosteroids and nutritional supplements show variable and often temporary benefits. In contrast, SRT is a safe, non-invasive, and cost-effective intervention that promotes olfactory recovery through repeated exposure to specific odorants, facilitating neuronal regeneration and neuroplasticity. Current evidence supports SRT as an effective patient-centered approach for olfactory rehabilitation.

I. INTRODUCTION:

Imagine waking up one day to a world without scent - no morning coffee aroma, no fresh rain, no warning smoke - a reality faced by millions with anosmia. Olfaction plays a crucial role in daily life, influencing not only our ability to enjoy meals but also our safety and emotional well-being. Anosmia, the loss or impairment of the sense of smell, affects millions worldwide. It is characterized and placed on the spectrum based on the way it surfaces in the individuals such as: [1] Anosmia (the complete inability to perceive odors, resulting from various causes), hyposmia (reduced sense of smell, where odors are detected but with diminished intensity, often due to aging or chronic sinus conditions), parosmia (qualitative olfactory disorder characterized by the perception of distorted or unpleasant odors from familiar scents, commonly occurring after viral infections) & lastly [2] phantosmia (a condition where individuals perceive smells that aren't actually present in the environment, often described as imaginary or phantom odors). Despite its prevalence and impact, anosmia & its types remain underdiagnosed and undertreated. [3] Based on the comprehensive analysis by von Bartheld and Wang, it is estimated that approximately 5.2% of adults worldwide experience olfactory dysfunction due to Omicron infection. When applied to the global adult population, this prevalence suggests that over 220 million individuals may be affected by loss or impairment of smell related to this variant. [1]
Anosmia may arise from multiple causes, including inflammatory or obstructive nasal conditions (such as chronic rhinosinusitis or nasal polyps), head trauma that disrupts olfactory nerves or pathways, and neurodegenerative diseases like Parkinson's and Alzheimer's. It may also occur congenitally in disorders such as Kallmann syndrome, or following viral infections, notably COVID-19, which damage the olfactory epithelium. Additional causes include exposure to toxins, certain medications, and intracranial or sinonasal tumors that interfere with olfactory signaling. [4]Approximately 25–30% of COVID-19 patients continue to suffer smell disturbances due to Persistent olfactory dysfunction and in one cohort 21.9% still had not recovered their sense of smell at one year. Individuals with lingering

smell loss also report significantly lower quality of life and diminished pleasure in daily experiences. [5] Pharmacological treatments investigated for post-COVID-19 anosmia include oral and intranasal corticosteroids, vitamin A, zinc supplements, theophylline, and even platelet-rich plasma (PRP) injections. While some patients experienced mild to moderate benefit, the overall effectiveness remains inconsistent, with many therapies showing limited improvement in olfactory scores and lacking long-term validation. [6] In contrast, olfactory training (OT) - a non-invasive, low-risk therapy, has consistently shown greater effectiveness than medications, particularly in post-viral olfactory loss, and is now emerging as the most reliable first-line intervention for anosmia management. [7] Smell Retraining Therapy (SRT), also known as Olfactory Training (OT) is a structured technique involving repeated, daily exposure to specific odor categories—typically floral, fruity, spicy, and resinous scents—to stimulate olfactory recovery through neuroplasticity mechanisms. Recent advances like these offer new hope - particularly through smell retraining therapies aimed at restoring olfactory function. This review explores the underlying mechanisms of anosmia, evaluates current diagnostic approaches, and highlights emerging treatment strategies, with a focus on the promising role of smell retraining.

Causes of Anosmia

1. Viral infection

Many viruses such as corona virus, influenza virus, adenoviruses, Para influenza, may lead to olfactory dysfunction. In COVID-19 the virus affects the cells (Sustentacular cells, Bowman's glands, etc.) and also vascular cells, stem cells are affected not only olfactory sensory neurons themselves. This damage leads to downstream effects on olfactory sensory neurons. [8]

2. Conductive Obstruction / Inflammation

Inflammation of nasal mucosa, blockage of olfactory cleft, sinus disease, nasal polyps prevent the odorants to reach the receptors. Olfactory epithelium causes Obstruction or fluid accumulation due to Local Inflammation.

3. Damage of Olfactory Epithelium and supporting structure

Damage of stem cells that are important for regeneration, loss of sustentacular cells, loss of cilia on the olfactory neurons, and also degeneration of neuro-epithelium, mucosal atrophy. [9]

4. Neural involvement

Damage of the olfactory sensory neurons directly or indirectly via support cell, Neural change in the brain in olfactory bulb and higher central pathways causes direct neuroinvastion by virus. [10]

5. Immune/ Inflammatory Response

Problem faced even after Clearance in COVID cases such as Lon term inflammation, Cytokinin release, immume cell infiltration in epithelium. Decrease in regulation of genes involve in Odour Detection and signalling in Olfactory Sensory neurons due to immune milieu.

Other causes

- Trauma Causes shearing of olfactory nerve fibers or damage of cribriform plate.
- Sinonasal disease
- Neurodegenerative disorders such as Alzeimer's, Parkinson's disease cause olfactory decline.
- Aging and congential causes [9].

Diagnosis / Assessment of Anosmia (Loss of smell)

Types of test:

1. Psychophysical testing (Olfactory Testing)
2. Imaging/ Objective tests
3. Electrophysiological test
4. Questionnaries and subjective measures

1. Psychophysical testing – Where patient are presented with different odors with decreasing concentration and have to detect and discriminate and identify amoung them
Eg.Sniffin stick, T and T Olfactometry Screening 12, Quick smell test
2. Imaging Anatomical tests- any Structural changes or correlate anatomical changes with functional smell loss.
Eg. CT scans of Sinuses/ Olfactory cleft, MRI, Endoscopy
3. Electrophysiological tests- Electroofactogram Is a device used to measure electrical potentials from olfactory epithelium in response to odour stimulation.
4. Questionnaries and subjective measures- self assessments, how lifw get affected due to loss of smell compare with test scores.
Eg.Questionaries of olfactory Disorders etc. [11-13]

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Olfactory System and Classification of Anosmia

The human olfactory system is vital for detecting and processing odors, influencing safety, nutrition, and emotional behavior[14]. It includes the olfactory epithelium, bulb, and cortex, which together detect odorants and relay signals to the brain[15]. Odor molecules bind to nasal receptors, triggering neural impulses that travel through the olfactory nerve to brain centers for processing [16]. Remarkably, the system can regenerate — olfactory neurons are regularly replaced by new ones from basal stem cells, maintaining function and supporting therapies like smell training [17].

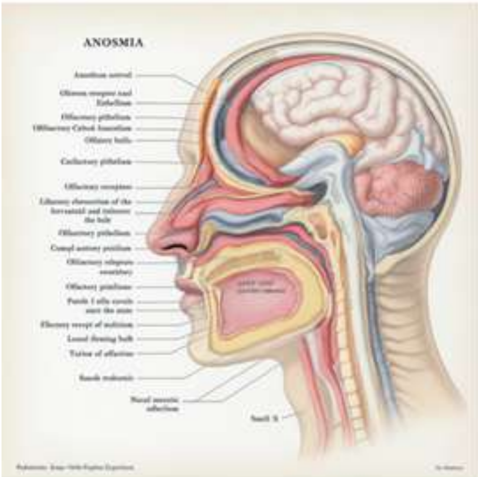

Fig. No. 1: Olfactory Overview

Anosmia, or complete loss of smell, can arise from various causes and is classified as either conductive or sensorineural[18]. Conductive anosmia results from blockages preventing odorants from reaching the olfactory epithelium, as seen in nasal polyps, sinusitis, or allergies [19]. Sensorineural anosmia stems from damage to olfactory neurons or brain pathways, often due to viral infections, head injury, or diseases like Parkinson's and Alzheimer's[1]. Congenital cases, such as Kallmann syndrome, are rare [20]. Post-viral anosmia, notably linked to COVID-19, may persist for months or longer [3]. Other factors include toxins, medications, and tumors affecting smell pathways[1]. Identifying the cause is key for effective management and recovery through methods like smell training or medication[18,19].

Biology of Recovery and Neuroplasticity

The olfactory system shows strong neuroplasticity, enabling partial or full recovery after injury or disease [21]. Basal stem cells in the olfactory epithelium can form new sensory neurons, restoring receptor function[17]. Central regions like the olfactory bulb and cortex also reorganize connections to aid recovery [22].Neurotrophic factors such as BDNF and NGF support neuron growth and survival [19]. Recovery depends on factors like age, damage severity, and duration of loss, with early treatment giving better results [23]. This adaptability underlies smell retraining therapy, which uses repeated odor exposure to stimulate olfactory pathways and boost recovery [21,22]

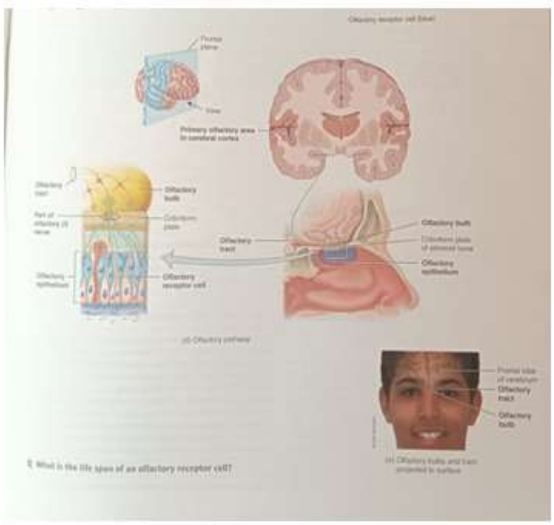

Fig. No. 2 : Olfactory Mechanism

II. LITERATURE REVIEW

Smell Training : Methods

SRT was first systematically introduced by **Hummel et al. (2009)** as a simple, non-invasive, and cost-effective intervention for post-infectious olfactory dysfunction [25].The mechanism is based on neuroplasticity: repeated odor exposure stimulates regeneration of olfactory sensory neurons and promotes reorganization of central olfactory pathways, facilitating functional recovery [21].This review explores various studies, clinical trials, and meta-analyses on olfactory training, with a special focus on those using essential oils and aromatherapy-based approaches. Research articles published between 2020 and 2025 were collected from reliable databases such as PubMed, Scopus, and Google Scholar. Only peer-reviewed studies and clinical reports in English were considered, while editorials and anecdotal evidence were excluded. The selected studies were carefully compared based on their methods, types of odorants used, duration of training, and outcomes, giving particular attention to those involving volatile oils.

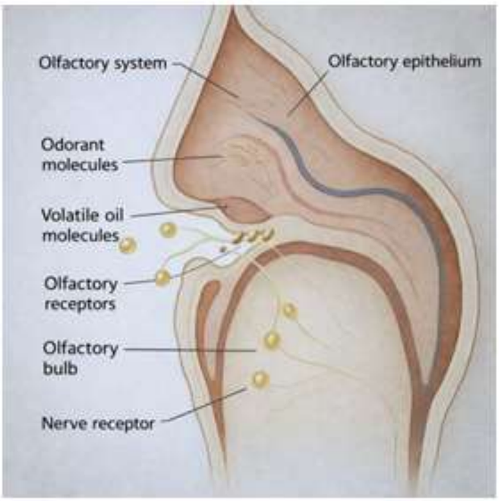

Fig.No. 3 :Target action of oils

Olfactory training (OT)—typically a twice-daily exposure to a set of odorants over weeks to months—has emerged as a low-risk, widely recommended rehabilitation strategy for chronic olfactory dysfunction, with multiple systematic reviews and meta-analyses reporting a positive pooled effect on validated olfactory tests. However, findings are heterogeneous: while Delgado-Lima et al. (2024) and Asseri et al. (2025) report overall significant pooled benefits (and suggest greater effects with longer training and/or adjunct therapies), recent placebo-controlled trials such as Mogensen et al. (2024) found no advantage of 12-week classical OT over odorless control in COVID-19 patients, and Bischoff's clinical review highlights mixed evidence and promising results from alternative therapies in some studies. Mechanistically, OT is hypothesized to act via peripheral receptor re-engagement, olfactory bulb and cortical plasticity, and top-down perceptual learning; nonetheless, inconsistent protocols, variable trial quality, spontaneous recovery, and subgroup effects (e.g., parosmia) limit firm conclusions and underscore the need for large, standardized, sham-controlled RCTs and mechanistic imaging studies. Below is a table summarizing the reviews studied:

Author (Year) Source / Publisher	**Design**	**Population**	**Intervention**	**Outcome Measures**	**Main Finding (Result)**
Treder-Rochna N. (2024) Frontiers in Human Neuroscience	Systematic review / narrative synthesis	Adults with chronic olfactory dysfunction (post-infectious, post-traumatic, idiopathic)	Classical OT (4 odors, twice daily ≥12 weeks) ± variants	Psychophysical tests (threshold, discrimination, identification), patient-reported outcomes	OT significantly improved olfactory performance in many patients; supports neuroplastic regeneration mechanism.
Delgado-Lima A.H. (2024) European Archives of Otorhinolaryngology (SpringerLink)	Systematic review & meta-analysis	Post-infectious and post-COVID olfactory dysfunction	Standard OT (4 odorants, 12–24 weeks) ± adjuncts	Standardized smell tests (e.g., Sniffin' Sticks TDI)	OT led to statistically significant improvement in olfactory scores; strongest effects seen in post-infectious etiologies.

Bischoff S. (2024) Frontiers / PMC	Clinical review	Post-COVID-19 anosmia patients	OT, corticosteroids, vitamin A, zinc, sodium citrate	Psychophysical and subjective smell recovery	OT identified as the safest and most effective first-line therapy; combination regimens may enhance recovery.
Mogensen D.G. (2024) The Laryngoscope (Wiley Online Library)	Controlled clinical study (placebo-controlled RCT)	COVID-19–related olfactory dysfunction	Classical OT (4 odorants, 12 weeks) vs control	Objective olfactory measures (TDI)	12-week classical OT showed no significant difference vs control, suggesting limited short-term effect in some COVID-19 patients.
Asseri A.A. (2025) Journal of Clinical Medicine / PMC	Systematic review & meta-analysis (RCTs, 2020–2025)	Post-COVID olfactory dysfunction	OT alone or with adjuncts (PEA-luteolin, vitamin A, etc.)	Pooled olfactory test scores, recovery rates	Pooled data confirmed OT effectiveness; combination with adjuncts yielded higher recovery rates than OT alone.

Table No. 1 : Summary of Key Studies on Olfactory (Smell) Training in Chronic and Post-COVID-19 Anosmia.

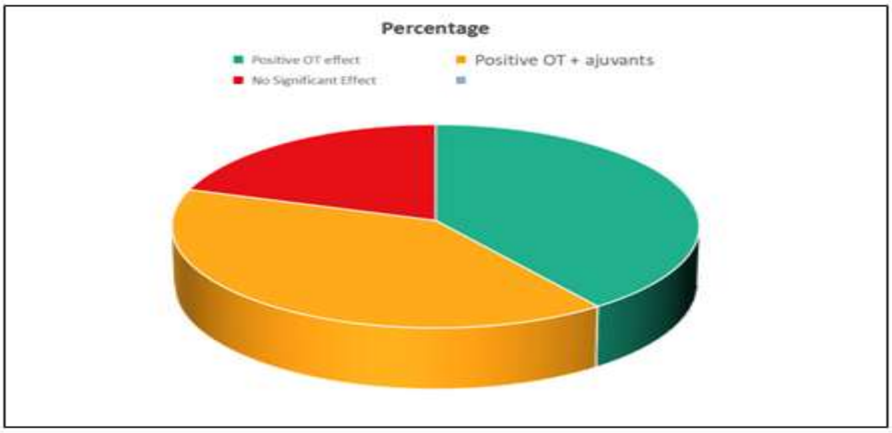

Fig. No. 4 : Pie diagram representing the recent studies on Smell Training

The review was completed over six weeks. In the first two weeks, relevant papers were searched, collected, and screened. The following two weeks were spent reading, extracting key data, and organizing findings into themes. The final two weeks focusedon writing, revising, and formatting the review with proper references and proofreading.

Aim :

To explore the underlying causes and mechanisms of anosmia, particularly post-viral and COVID-19-associated cases, and to critically assess the effectiveness and emerging potential of olfactory training and other therapeutic strategies for smell recovery.

Objectives :

- To understand the normal anatomy and physiology of the olfactory system and how its dysfunction leads to anosmia.
- To explore the various causes of smell loss, including post-viral, traumatic, congenital, and neurodegenerative origins.
- To explain the concept and scientific basis of Smell Retraining Therapy (SRT) as a non-pharmacological, neuroplasticity-based approach for olfactory recovery.
- To review and critically analyze existing research and clinical studies evaluating the effectiveness of SRT in different types of anosmia.
- To compare different SRT protocols based on odor type, duration, frequency, and patient response, identifying the most effective approaches.
- To discuss the factors that influence the success of SRT, such as age, duration of smell loss, motivation level, and type of olfactory damage.
- To identify current limitations, challenges, and research gaps in SRT and suggest possible improvements or innovations.
- To highlight the future potential of SRT in improving not only olfactory function but also the overall quality of life and psychological well-being of individuals with anosmia.

III. TREATMENTS EXISTING FOR ANOSMIA :

Types of studies includes:

1. Corticosteriods (Oral or intranasal)
2. Combination Of OT + steroids
3. Combination Of OT + intranasal
4. Other treatment (internasal insulin films, supplements, etc.)
5. Olfactory Training (OT) Smell Retention Therapy

1. Corticosteriods (Oral or intranasal)

Six Trials with a total population of 712, study include the therapy of both systemic and nasal corticosteroid and other with intranasal corticosteroid . There show no significance difference between the (Intervention) IG and (Control) CG group . The results shows that number of patient recovered from disease is higher in IG as compare to CG. [26]

2. Combination Of OT + steroids

72 individual infected by COVID-19 performed an olfactory test for 5 weeks after losing their ability to smell amoung these 37.5 subject around 27 patients anosmia is reduced likely 9 individual received an oral corticosteroids (OCS) and olfactory training while 18 only received OT . Participants received OCS and OT shows good results and certain individual only received Oral Corticosteroids Reported side effects thus corticosteroid and OT should be given in combination for better effect. [27]

3. Combination Of OT + intranasal

The study Conducted in El- Minia Health Insurance Hospital IT include 50 Patients divided into 2 groups each with 25 individual group A with OT and Intranasal and Group B with OT only hereintranasal steroid used is Mometasone furoate nasal spray that show no advantages more than OT for post COVID 19 Anosmia Accordingly OT is used and recommended for anosmia. [28]

4. Other treatment (internasal insulin films, treating underlying causes, surgery, supplements, etc.)

Internasal insulin fast-dissolving films used for the treatment of anosmia in post COVID-19 Infections in patient . Films are prepared by using Methylcellulose and polyvinyl alcohol. The clinical study shows an significant the score of intervention group than the control group, Thus the insulin film is used to manage post COVID-19 Anosmia.[29]Treatment of anosmia begins with addressing the underlying cause, such as sinus disease, nasal polyps, or inflammation using steroids, nasal sprays, or surgery when required, while allergies are managed with antihistamines and allergen avoidance, and infections with appropriate antibiotics. Topical or high-volume steroid irrigations are commonly used to reduce

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inflammation, and their effectiveness is enhanced when combined with olfactory training, particularly in patients with sinonasal disease. In cases of structural abnormalities such as deviated septum or nasal polyps, surgical correction may be necessary. Restoring normal nasal airflow allows odorants to reach the olfactory epithelium, thereby improving smell function.[30-32]

5. Olfactory Training (OT)/ Smell Retention Therapy (SRT): Concept, Rationale, and Clinical Significance

Smell Retraining Therapy (SRT), also known as Olfactory Training (OT), has gained considerable importance as a non-pharmacological approach for managing chronic olfactory disorders, especially post-infectious and post-viral anosmia. First introduced by Hummel and colleagues, SRT is based on the remarkable regenerative ability of the olfactory system—a feature that sets it apart from most other sensory systems [33]. Rather than focusing solely on reducing inflammation or providing symptomatic relief, as seen with many drug-based treatments, SRT works by repeatedly stimulating the olfactory pathways. This structured sensory exposure aims to restore olfactory function through long-term neuroplastic changes rather than short-lived effects [35,36].

The scientific rationale behind SRT is supported by growing evidence showing that consistent odor exposure can promote recovery at both peripheral and central levels of the olfactory system. Peripherally, olfactory sensory neurons are known to regenerate throughout life, and targeted stimulation helps reactivate these receptors and reintegrate them into functional neural circuits [34,35]. Centrally, studies using neuroimaging and experimental models have demonstrated improvements in olfactory bulb volume, synaptic organization, and cortical activation following prolonged training, highlighting the role of activity-dependent neuroplasticity in smell recovery [36,37]. These mechanisms help explain why SRT is particularly effective in post-viral anosmia, where the primary damage involves neuronal dysfunction rather than simple nasal obstruction [35,36].

From a clinical perspective, multiple systematic reviews and meta-analyses have established SRT as a safe, low-risk, and widely applicable intervention across various causes of olfactory loss. Significant improvements have been observed in odor threshold, discrimination, and identification scores, especially when therapy is initiated early and continued over longer periods [34,36]. An important advantage of SRT is that it actively involves patients in their own rehabilitation, which improves adherence and supports sustained recovery while reducing reliance on pharmacological or surgical treatments [33,35]. Owing to its safety profile, cost-effectiveness, and growing evidence base, SRT is now increasingly recommended as a first-line treatment for chronic and post-COVID-19 olfactory dysfunction. [35-38]

Olfactory loss is a challenge faced by many but noy yet discovered. Early Identification of olfactory Dysfunction Increases the chances of improvement with the help of olfactory Training. OT is non- invasive therapy where an individual repeatedly exposes themselves to a specific smell, Twice daily (or more) , over a certain period of time an improvement is seen in loss of smell (anosmia). The main aim of OT is to activate and stimulate the olfactory neurons, promote regeneration, improve signal discrimination and retain brain pathways for smell preception.

IV. MATERIALS &METHODS :

Volatile Oils in Smell Retraining Therapy

Smell Retraining Therapy (SRT) utilizes odorants representing distinct olfactory categories to stimulate diverse olfactory receptor populations and corresponding central pathways [1,4]. Based on the classical protocol proposed by Hummel et al. and subsequently validated by multiple clinical studies and systematic reviews, four volatile oils were selected for training:

- Rose oil (floral)
- Lemon oil (fruity/citrus)
- Clove oil (spicy)
- Eucalyptus oil (resinous) [33-35]

These odorants are widely preferred due to their strong recognizability, chemical stability, and ability to activate a broad range of olfactory receptors, making them suitable for repeated and long-term exposure during rehabilitation [33,34,36].

Volatile oils play a central role in SRT by directly stimulating olfactory receptors through low-molecular-weight aromatic compounds that readily bind to receptor sites, even in partially dysfunctional olfactory systems [33,35,37]. Repeated exposure to these odorants promotes peripheral receptor reactivation and induces neuroplastic changes within the olfactory bulb and higher cortical regions, supporting neuronal regeneration and functional recovery of smell perception [3–5]. Additionally, the use of familiar and distinct odorants enhances sensory memory, odor discrimination, and identification through top-down cognitive mechanisms and perceptual relearning [36,37].

From a practical perspective, volatile oils offer significant advantages in terms of safety and feasibility. They are non-invasive, cost-effective, and associated with minimal adverse effects, making them suitable for prolonged, home-based therapy under standardized protocols[33-35].

In SRT, patients are instructed to consciously expose themselves to each selected odorant for approximately 20 seconds, twice daily, over a minimum duration of 12 weeks, with many protocols extending to 6 months or longer depending on response[33,34,36]. This method of use has been consistently employed across clinical trials and meta-analyses evaluating the effectiveness of olfactory training, thereby providing a reproducible and evidence-based framework for therapy [34,35,36].

V. SUMMARY

The sense of smell is an often-underestimated yet essential part of human experience. Beyond simply detecting odors, it contributes significantly to memory, emotion, taste, and even personal safety. The disruption of this sensory system, most notably through anosmia, has gained unprecedented attention during and after the COVID-19 pandemic, which triggered a sharp global rise in olfactory dysfunctions. This review aimed to explore the causes, mechanisms, and treatments of anosmia, with a special focus on post-viral olfactory loss and the promise of olfactory training (OT) as a rehabilitative approach.

Anosmia can occur in various forms—complete loss (anosmia), partial loss (hyposmia), distorted smells (parosmia), or phantom odors (phantosmia)—each impacting quality of life in unique ways. While viral infections, especially SARS-CoV-2, have been major culprits, other causes include trauma, aging, neurodegenerative conditions like Parkinson's and Alzheimer's, congenital disorders, and certain medications or toxins. The pathophysiology of anosmia is multifaceted, involving both peripheral damage to the olfactory epithelium and central nervous system changes. In COVID-19-related cases, the damage is not limited to olfactory sensory neurons, but extends to supporting cells and neural circuits, leading to persistent dysfunction in many individuals.

This review analyzed a wide range of clinical studies, systematic reviews, and meta-analyses on current therapeutic approaches. Pharmacological interventions like corticosteroids (oral and intranasal), vitamin A, zinc, and PRP injections have demonstrated mixed success, often with modest short-term improvement and limited long-term validation. In contrast, olfactory training—particularly the classical protocol introduced by Hummel et al.—has consistently shown positive results. OT relies on the principle of neuroplasticity, encouraging regeneration and reorganization of olfactory pathways through repeated exposure to specific odorants.

Several recent studies have reinforced OT's effectiveness, especially when administered for longer durations and combined with adjunct therapies. However, inconsistencies in training protocols, variations in patient response, and the subjective nature of olfactory assessment still limit its universal acceptance. Controlled trials have also shown mixed results, highlighting the need for standardized, large-scale studies with robust outcome measures.

To support real-world application, diagnosis and progress tracking rely on tools like psychophysical testing (e.g., Sniffin' Sticks), imaging, electrophysiological assessments, and validated questionnaires. Despite advancements, one of the major barriers remains patient adherence and ease of continuing therapy at home, especially when the process feels abstract or time-consuming.

The expanding evidence base supporting Smell Retraining Therapy highlights its wide scope as a patient-centered and non-pharmacological intervention for olfactory dysfunction. As awareness of SRT increases, there is significant potential to enhance its real-world impact by focusing on accessibility, convenience, and ease of use. Developing portable and user-friendly approaches for delivering olfactory stimuli could encourage consistent practice, improve adherence, and allow individuals to integrate smell training seamlessly into daily life, thereby maximizing therapeutic benefits.

In addition, the integration of digital health tools presents an important opportunity to support and monitor olfactory training. Mobile applications designed to guide training sessions, provide reminders, track subjective improvements, and offer educational support could play a key role in improving compliance and long-term outcomes. Such tools may also help standardize training practices and increase patient engagement, particularly in home-based rehabilitation settings.

VI. CONCLUSION

In conclusion, anosmia is a clinically significant condition with far-reaching effects on

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safety, nutrition, and quality of life. While conventional pharmacological therapies offer limited benefit, Smell Retraining Therapy stands out as a safe, evidence-based, and widely applicable strategy for olfactory rehabilitation. By emphasizing accessible training approaches and leveraging digital monitoring tools, the future of SRT holds strong potential for broader acceptance, improved outcomes, and more effective management of olfactory dysfunction across diverse patient populations.

REFRENCES

[1]. Li X, Lui F. Anosmia. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025. PMID: 29489163.
[2]. Gillette, B., Reid, J. A., &Shermetaro, C. Phantosmia. In StatPearls [Internet]. StatPearls Publishing. (2023), PMID: 36256775.
[3]. von Bartheld CS, Wang X. Prevalence of olfactory dysfunction due to Omicron variant infection. Front Cell Neurosci. 2023;17:1173231.
[4]. Dumas LE, Vandersteen C, et al. Impact of post-COVID-19 olfactory disorders on quality of life, hedonic experiences and psychiatric dimensions in general population. BMC Psychiatry. 2024;24:111; 1-4
[5]. Bischoff S, Moyaert M, Clijsters M, et al. Treatment of COVID-19 associated olfactory dysfunction: a systematic review. Curr Allergy Asthma Rep. 2024;25:2; 1
[6]. Asseri AA, Aldukain M, Aldukain A, Alzuhairi A. Olfactory training for post-COVID-19 olfactory dysfunction: a meta-analysis of efficacy and combination therapies. J Clin Med. 2025;14(18):6578, 6–8.
[7]. Drahaman GZC, Drahaman AMP, Perera MB, Lakshan MTD. Anosmia – a holistic treatment approach. Ceylon J Otolaryngol. 2025;14(1):67–72
[8]. Las Casas Lima MH, Cavalcante ALB, Leão SC Pathophysiological relationship between COVID-19 and olfactory dysfunction: A systematic review Brazilian Journal of Otorhinolaryngology 2022 Sep-Oct;88(5):794-802
[9]. Abhinav Raj ,Abhay Kumar SinghAnosmia: A Clinic Based Review Indian Journal of Public Health Research and development 2023 Vol. 14 No. 2 23-27
[10]. Laura Ziuzia-Januszewska, Marcin Januszewski Pathogenesis of Olfactory Disorders in COVID-19 2022 Volume 12 issue 4, 449
[11]. Sipos L ,Galambosi Z, Bozóki S, SzádoczkiZStatistical overview of the Sniffin' sticks olfactory test from the perspectives of anosmia and hyposmia , Scientific Report 2025 15;15(1):8984
[12]. Hinz A, Luck T, Riedel-Heller SG, Herzberg PY, Rolffs C, Wirkner K, Engel C, Olfactory dysfunction: properties of the Sniffin' Sticks Screening 12 test and associations with quality of life 2019 ;276(2):389-395
[13]. Molnár A, Maihoub S, Mavrogeni P, Krasznai M, Tamás L, Kraxner H The Correlation between the Results of the Sniffin' Sticks Test, Demographic Data, and Questionnaire of Olfactory Disorders in a Hungarian Population after a SARS-CoV-2 Infection2023 ;12(3):1041.
[14]. Han SA. The olfactory system: basic anatomy and physiology for otolaryngologists. PMC [Internet]. 2023 [cited 2025 Oct 10].
[15]. Branigan B. Physiology, olfactory. StatPearls [Internet]. 2023 [cited 2025 Oct 10].
[16]. Dalton P, et al. Olfactory neurobiology: from receptor to perception. Chem Senses. 2018;43(5):343–356
[17]. Schwob JE, et al. Neurogenesis and regeneration in the olfactory system. Front Cell Neurosci [Internet]. 2021 [cited 2025 Oct 10];15:653232.
[18]. Thomas, D. C. (2020). Anosmia: A review in the context of coronavirus disease. PMC.
[19]. Landis, B. N., Hummel, T., et al. (2019). Epidemiology of olfactory disorders. European Archives of Oto-Rhino-Laryngology, 276(3), 719–728.
[20]. Boesveldt S, de Graaf K. The differential role of smell in health and disease. Chemical Senses. 2017;42(7):559–570
[21]. Croy I, Hummel T. Olfactory training: mechanisms and outcomes. Current Opinion in Otolaryngology & Head and Neck Surgery. 2017;25(1):20–26.
[22]. Peng M, et al. Neural plasticity and recovery in post-viral olfactory

dysfunction. Frontiers in Neuroscience. 2022;16:888274

[23]. Hsieh JW, et al. Regeneration and rewiring of the olfactory pathway: a new era of neuroplasticity research. Neuroscience Letters. 2024;829:137385.

[24]. Doty RL. Influences of age and injury on olfactory recovery. Handbook of Clinical Neurology. 2019;164:175–188.

[25]. Hummel T, et al. Introduction of classical olfactory training protocol. Laryngoscope. 2009;119(3):496–499.

[26]. Kabiri M, EmadzadehM ,The Effect of Corticosteroids on Post-Covid-19 Smell Loss: A Meta-Analysis , Iranian Journal Of Otorhinolaryngology .2023 ;35(130):235–246

[27]. Le Bon SD, Konopnicki D, Pisarski N, Prunier L, Lechien JR, HoroiMEfficacy and safety of oral corticosteroids and olfactory training in the management of COVID-19-related loss of smell2021 ;278(8):3113–3117.

[28]. Comparative Study between Use of Intranasal Steroids with Olfactory Training in Comparison to Olfactory Training Only in Treatment of Post-COVID Smell Dysfunction (Anosmia) 2024 Volume 94 Issue 1 , 1050-1055

[29]. Soad A Mohamad, Ahmed M. Badawi, Heba F. Mansour Insulin fast-dissolving film for intranasal delivery via olfactory region, a promising approach for the treatment of anosmia in COVID-19 patients: Design, in-vitro characterization and clinical evaluation, International Journal Of Pharmaceutics 2021 Volume 601,120600

[30]. Doty RL. Treatments for smell and taste disorders: A critical review. Handb Clin Neurol. 2019;164:455-479.

[31]. Marin C, Vilas D, Langdon C, Alobid I, López-Chacón M, Haehner A, Hummel T, Mullol J. Olfactory Dysfunction in Neurodegenerative Diseases. Curr Allergy Asthma Rep. 2018 Jun 15;18(8):42.

[32]. Li Y, Yankun Li, YinghongZhang ,Dawei Wu Protocol for a randomised controlled trial evaluating the effect of modified olfactory training on postoperative olfactory dysfunction in patients with CRS 2025 ;15(8):e101870

[33]. Hummel T, Rissom K, Reden J, et al. Effects of olfactory training in patients with olfactory loss. 2009 Laryngoscope.;119(3):496–499

[34]. Damm M, Pikart LK, Reimann H, et al. Olfactory training is helpful in postinfectious olfactory loss. 2014 Laryngoscope.;124(4):826–831.

[35]. Pekala K, Chandra RK, Turner JH. Efficacy of olfactory training in patients with olfactory loss: A systematic review. 2016 American Journal of Rhinology & Allergy.;30(1):17–22

[36]. Sorokowska A, Drechsler E, Karwowski M, Hummel T. Effects of olfactory training: A meta-analysis. 2017 Rhinology.;55(1):17–26.

[37]. Treder-Rochna N, et al. Neuroplasticity mechanisms underlying olfactory training. 2024. Frontiers in Human Neuroscience.

[38]. Bischoff S. Management of post-COVID-19 olfactory dysfunction: A clinical review. 2024. Frontiers in Medicine.