REVIEW ARTICLE

CONTENTS

Novel non-pharmacological strategies for managing dentophobia in adult patients – literature review

Artur Los, Jakub Fiegler-Rudol, Monika Tysiąc-Miśta, Marta Tanasiewicz
DEPARTMENT OF CONSERVATIVE DENTISTRY AND ENDODONTICS, MEDICAL UNIVERSITY OF SILESIA, KATOWICE, POLAND

ABSTRACT

Dentophobia concerns a substantial portion of the adult population, often leading to avoidance of dental care and subsequent deterioration in oral health. This comprehensive review explores the multifaceted nature of odontophobia and examines various non-pharmacological strategies aimed at its management in adult patients. Factors contributing to dentophobia, including past traumatic experiences, feelings of vulnerability, and mistrust in dental professionals, are discussed, highlighting the complex interplay of psychological, physiological, and environmental influences. Novel approaches such as Virtual Reality Exposure Therapy offer promising avenues for systematically desensitising patients to their fears and enhancing treatment acceptance. Aromatherapy utilising essential oils like chamomile, orange, and lavender, as well as dog-assisted therapy, have shown potential in creating calming environments and reducing patient anxiety during dental procedures. Muscle relaxation therapy, biofeedback techniques, and process simulations provide additional tools for addressing the physiological and cognitive aspects of odontophobia. Cognitive-behavioural therapy interventions, including brief sessions focused on cognitive restructuring and exposure therapy, demonstrate efficacy in reducing fear of dentists and improving treatment outcomes. By incorporating these diverse non-pharmacological strategies into dental practice, clinicians can enhance patient experiences, increase treatment acceptance and adherence, and ultimately improve oral health outcomes. While these interventions show promising results, further research is needed to refine their implementation, optimize their effectiveness, and ensure accessibility to patients with dentophobia. By addressing the multifaceted nature of dental anxiety and adopting a patient-centred approach, clinicians can provide holistic care, fostering better oral health and overall well-being in their patients.

KEY WORDS: stress, dentistry, dentophobia

Wiad Lek. 2024;77(8):1617-1622. doi: 10.36740/WLek202408112 DOI

INTRODUCTION

Dentophobia is a significant issue affecting a large population of adults. This severe anxiety can lead to avoidance of dental care, resulting in potentially more complex and urgent dental conditions in the future such as periodontitis, which leads to tooth loss and general deterioration of oral health. Without proper management, odontophobia can prevent patients from seeking necessary dental treatments, which is detrimental not only to oral health but also general well-being [1].

The management of fear of dentists is crucial for the comfort and mental health of patients and the effectiveness of dental treatment. Adequate management strategies can significantly enhance patients' cooperation, reduce the stress associated with dental visits, and improve overall treatment outcomes [2, 3].

Dental anxiety can stem from various sources, both personal experiences and external influences. A traumatic dental encounter in the past can leave a lasting imprint, causing individuals to dread future visits. Feelings of vulnerability and loss of control while confined to the dental chair can also contribute to this anxiety. Furthermore, a sense of shame or embarrassment about one's teeth or oral health can exacerbate the discomfort associated with dental visits. In some cases, a lack of trust or confidence in the dentist's competence or bedside manner can fuel apprehension [4]. Dentophobia is among the most prevalent phobias globally, despite increased awareness and efforts to enhance the dentist - patient relationship [5].

AIM

The aim of this review is to provide information about less common non-pharmacological strategies for managing odontophobia in adult patients, discuss their effectiveness and encourage implementation of these methods into clinical practice to improve patient experiences and treatment outcomes. The review also highlights the need for further research to validate and optimize these strategies for use in routine clinical dental settings.

MATERIALS AND METHODS

The preparation of this review article involved a structured search of the PubMed and Scopus databases to identify relevant studies on non-pharmacological interventions for managing odontophobia in adult patients. Keywords used in the search included "odontophobia," "dental anxiety,""Virtual Reality Exposure Therapy,""aromatherapy,""muscle relaxation therapy,""biofeedback," "process simulations," and "Cognitive Behavioral Therapy." The search was restricted to peer-reviewed articles published in English. Studies were selected based on their relevance to adult patients, the robustness of their methodology, and the use of non-pharmacological interventions. Data were extracted regarding intervention type, study design, sample size, duration, outcome measures, and main findings.

REVIEW AND DISCUSSION

VIRTUAL REALITY EXPOSURE THERAPY (VRET)

VRET is a novel cognitive-behavioural approach that uses computer-generated virtual environments to treat specific anxieties through systematic and gradual desensitization until fear extinction occurs. It is considered an in vitro form of exposure therapy, where the patient can confront their fears in a controlled setting, reducing anticipatory anxiety and increasing treatment acceptance and completion rates [6, 7]. VRET is equally or slightly more effective than real-life exposure therapy for anxiety treatment. Studies like those by Guijar et al. (2018) have demonstrated that VRET can significantly reduce dentophobia and behavioural avoidance, with patients in the VRET group more likely to schedule follow-up appointments and no longer meet the criteria for dental anxiety after treatment [6,8].

Yamashita et al. evaluated the effect of Virtual Reality (VR) in alleviating anxiety during impacted mandibular third molar extractions under local anaesthesia. They found that anxiety decreased among patients who used VR, while it increased in those who did not apply it. Objective measures like heart rate variability and subjective questionnaires confirmed these findings. Notably, 92% of participants reported decreased anxiety, 100% wanted to use VR in future surgical treatments, and 96% desired it for future dental treatments [9, 10].

AROMATHERAPY

Chamomile oil is known for its aromatherapeutic properties, which can help patients maintain a calm mental state. A randomised controlled trial assessed the effect of chamomile oil on dentophobia in patients undergoing extractions. The oil was administered through inhalation using a diffuser. The results concluded that chamomile oil significantly decreased odontophobia levels, showcasing its effectiveness in creating a calming environment for patients [11]. Orange oil possesses sedative and anxiolytic properties, which are attributed to its ability to permeate through mucosal membranes and stimulate the central nervous system after crossing the blood-brain barrier. A study investigating the effect of ambient orange fragrance on patient anxiety during the surgical removal of impacted third molars found that the intervention group exhibited significantly lower mean blood pressure, pulse rate, and respiratory rate during the surgical procedure. This indicates that orange fragrance effectively reduces anxiety during dental procedures [12].

Lavender oil is one of the most preferred essential oils for aromatherapy due to its sedative properties. Linalool, a key component in lavender oil, acts on gamma-aminobutyric acid (GABA-A) receptors, causing an inhibitory effect on the limbic system and autonomic transmission. This results in a decrease in blood pressure and anxiety levels. Studies have shown that lavender oil inhalation can produce effects like lorazepam, making it a safer and more accessible option for reducing dental anxiety. Lavender oil has also been shown to have antidepressant, sedative, calmative, antibacterial, and antifungal properties, further supporting its use as an anxiolytic agent [13].

DOG-ASSISTED THERAPY CONCEPT AND POTENTIAL BENEFITS

Dog-assisted therapy involves the use of trained therapy dogs to provide comfort, reduce stress, and improve overall emotional well-being in therapeutic settings. This form of therapy leverages the innate bond between humans and animals, particularly dogs, to promote psychological and physiological healing. The presence of a therapy dog can help reduce blood pressure, heart rate, and anxiety while increasing feelings of comfort and safety. It is particularly beneficial in medical environments, where patients may feel anxious or uneasy about the procedures they are undergoing [14].

A pilot study conducted by Cruz-Fierro et al. evaluated the effectiveness of dog-assisted therapy in managing dentophobia. The findings from this study indicated that the presence of a therapy dog during dental sessions significantly improved the patients' emotional state. The study observed a notable decrease in blood pressure and neurohormone levels among patients interacting with the therapy dog, suggesting a physiological response to the calming presence of the dog.

Patients reported a reduction in discomfort and an overall improved experience during their dental visits [15]. This improvement in patient experience is crucial as it can lead to better compliance with dental treatments and less avoidance of future dental care. The therapy provided by the dog's presence helped significantly reducing the anxiety levels of the patients, making them more relaxed during the dental procedures.

The pilot study on dog-assisted therapy for dental anxiety demonstrated promising results, indicating that this therapy could be a valuable addition to traditional methods for managing dental anxiety. However, the study also noted the need for further research to fully establish the effectiveness and implement this therapy widely in dental practices [16].

MUSCLE RELAXATION THERAPY

Muscle relaxation therapy (MRT) is based on the principle that anxiety and stress lead to increased muscle tension. By consciously relaxing the muscles, the body's physiological response to stress and anxiety can be reduced. MRT help suppress the response of the sympathetic nervous system, which is activated during stressful situations like dental procedures. By inducing a relaxed state, muscle relaxation therapy lowers heart rate, respiratory rate, and blood pressure, which are elevated during anxiety. This therapy helps regulate both the peripheral and central nervous systems, reducing the overall stress response and promoting a calmer state. MRT has been shown to decrease levels of cortisol in the body. The most common form of muscle relaxation therapy used for dental anxiety is progressive muscle relaxation therapy (PMRT) [17, 18].

In PMRT, patients are guided to systematically tense and then relax different muscle groups throughout the body, helping them differentiate between tension and relaxation states. A study by Park et al. investigated the effectiveness of PMRT in alleviating dental anxiety. The study found that PMRT over four sessions effectively alleviated anxiety for at least three months following the intervention [17]. The intervention significantly reduced depressive symptoms, blood pressure, pulse rate, and salivary cortisol levels in participants. The study concluded that PMRT might be beneficial in reducing dentophobia. By lowering physiological parameters like heart rate, respiratory rate, and blood pressure, and regulating the nervous system, PMRT helps reduce stress, anxiety, and depression, thereby alleviating dental anxiety. Overall, the evidence presented in the study suggests that PMRT is an effective non-pharmacological intervention for managing odontophobia. It can help patients achieve a relaxed state, improve their ability to cope with the stress of dental procedures, and potentially enhance their overall experience and compliance with dental treatment [17, 19].

BIOFEEDBACK: CONCEPT AND POTENTIAL BENEFITS

Biofeedback is a technique that involves measuring and providing real-time feedback on an individual's physiological processes, such as heart rate, breathing rate, muscle tension, and skin temperature. The primary goal of biofeedback is to help individuals gain awareness and control over these physiological functions, which are often dysregulated during states of anxiety or stress. By providing visual or auditory feedback on physiological parameters like heart rate or breathing rate, patients become more aware of their body's stress response during dental procedures. With the help of biofeedback, patients can learn techniques to consciously regulate their physiological processes, such as slowing down their breathing or relaxing their muscles, which can counteract the anxiety response [20, 21].

Biofeedback empowers patients by giving them a sense of control over their body's reactions, which can be particularly helpful in situations where they feel a lack of control, such as during dental procedures. By promoting relaxation and self-regulation, biofeedback can effectively reduce anxiety, stress, and negative emotions associated with dental visits. A pilot study conducted by Morarend et al. investigated the use of a novel biofeedback device to reduce preoperative general anxiety levels in a dental setting. The results demonstrated the effectiveness of the biofeedback device in reducing dental anxiety and negative feelings associated with dental injections [22].

The biofeedback device allowed both the patient and the dentist to monitor the patient's physiological information, such as respiratory rate, which is often dysregulated during anxiety attacks. By providing real-time feedback, the device assisted patients in practising control and self-regulating their monitored physiological processes, thereby helping them down-regulate the sympathetic nervous system response associated with anxiety. Biofeedback offers a non-invasive and empowering approach to managing odontophobia by increasing awareness, promoting self-regulation, and reducing the physiological manifestations of anxiety [23].

CONCEPT OF PROCESS SIMULATIONS AND THEIR MECHANISMS

Process simulations (PSs) involve mentally simulating or imagining the process of undergoing a particular task

or procedure. In the context of dentophobia, PSs allow patients to mentally rehearse and familiarize themselves with the steps involved in a dental procedure before experiencing it.

By mentally simulating the process, patients can prepare themselves cognitively for what to expect during the actual procedure. This familiarity can help reduce anticipatory anxiety and fear of the unknown. PSs give patients a sense of control over the situation, as they can mentally rehearse and plan their responses and coping strategies. This perceived control can help mitigate feelings of helplessness and anxiety. Repeated mental simulations can lead to a gradual desensitization to the anxiety-provoking stimuli associated with the dental procedure, reducing the overall fear response. PSs can help patients identify and challenge irrational thoughts or beliefs related to dental procedures, allowing for cognitive restructuring and a more realistic perspective [24].

A study by Armitage and Reidy investigated the effectiveness of PSs in reducing anxiety before and after consultations. The key findings were that process simulations significantly reduced state anxiety (situational anxiety) before and after consultations. The results were consistent with previous research, demonstrating that PSs are clinically and statistically effective in reducing state anxiety [25]. The anxiety-reducing effects of process simulations had a prolonged effect, lasting even after the consultation. The study suggests that PSs can be effective in reducing anxiety in field settings, where there is an imminent threat of physical discomfort, such as dental procedures. Further research is needed to refine the technique of PSs and identify other active components that contribute to its effectiveness as an intervention for reducing anxiety [26].

COGNITIVE-BEHAVIORAL THERAPY

Cognitive-behavioral therapy (CBT) is a psychotherapeutic approach that focuses on modifying dysfunctional thoughts, beliefs, and behaviours that contribute to anxiety and other psychological distress. In the context of dentophobia, CBT aims to address the irrational thoughts, beliefs, and maladaptive behaviours that exacerbate fear and avoidance of dental procedures [1, 27].

The key principles of CBT for odontophobia include Identifying and challenging irrational or distorted thoughts and beliefs related to dental procedures, such as catastrophizing or overestimating the likelihood of negative outcomes. Gradually exposing the patient to anxiety-provoking dental stimuli in a controlled and safe environment, leading to desensitization and reduced fear response [27].

Teaching patients relaxation strategies, such as deep breathing exercises or progressive muscle relaxation, to manage physiological symptoms of anxiety during dental procedures. Developing coping strategies and problem-solving skills to better manage anxiety-provoking situations and increase a sense of control. Providing information about the nature of anxiety, its symptoms, and the rationale behind CBT techniques to promote understanding and engagement in the treatment process. The study highlights the potential effectiveness of brief CBT interventions, involving one to three sessions, in reducing dental anxiety.

Spindler et al.: investigated the effect of a brief dental fear intervention based on cognitive-behavioral principles specifically designed for dental practice. The findings showed that the immediate treatment group experienced a significant reduction in dental anxiety compared to the waiting list condition. After both groups completed the intervention, the reduction in anxiety were comparable and maintained at the two-year follow-up [28]. Previous studies suggest that brief interventions involving one to three sessions might effectively reduce odontophobia, even in the long term. Brief CBT interventions might be equal or superior to other forms of intervention, and their benefits persist over time. Brief cognitive-behavioural interventions performed by practising dentists might be sufficient for a significant proportion of patients with dental anxiety. However, it also acknowledges that the number of sessions in each study varies, and further research is needed to optimize the implementation of these interventions in dental settings [29, 30].

CONCLUSIONS

Dentophobia among adults can lead to avoidance of dental care, increased risk of periodontal diseases, tooth loss and general deterioration of oral health. Effective management of dental anxiety is crucial for patient comfort and treatment effectiveness. Various factors contribute to odontophobia, including past traumatic experiences and feelings of vulnerability. Non-pharmacological strategies such as VRET, aromatherapy, dog-assisted therapy, MRT, biofeedback, PSs, and CBT have shown promise in managing dental anxiety. VRET has been effective in reducing dental anxiety, while aromatherapy with oils like chamomile, orange, and lavender has demonstrated calming effects. Dog-assisted therapy has been shown to improve patient experience and reduce anxiety during dental visits. MRT, particularly PMRT, has been effective in suppressing the sympathetic nervous system response and reducing stress. Biofeedback helps patients gain awareness and control

over physiological functions, while PSs allow patients to mentally prepare for dental procedures. CBT, especially in brief interventions, addresses dysfunctional thoughts and behaviours contributing to anxiety. Overall, integrating these non-pharmacological strategies into dental practice can improve patient experiences and treatment outcomes, though further research is needed for optimization and widespread implementation.

REFERENCES

1. Hoffmann B, Erwood K, Ncomanzi S, Fischer V, O'Brien D, Lee A. Management strategies for adult patients with dental anxiety in the dental clinic: a systematic review. Aust Dent J. 2022 Mar;67 Suppl 1(Suppl 1):S3-S13. doi: 10.1111/adj.12926. Epub 2022 Jul 12. DOI
2. Armfield J, Heaton L. Management of fear and anxiety in the dental clinic: a review. Aust Dent J. 2013;58:390-407. doi: 10.1111/adj.12118 DOI
3. Sindhu R, Rajaram S, Bharathwaj VV, Mohan R, Manipal S, Prabu D. Is Individual deprivation measures associated with dental anxiety and socioeconomic status of patients visiting dentists. Indian J Dent Res. 2020;31:515-519.
4. Armfield JM. Towards a better understanding of dental anxiety and fear: Cognitions vs. experiences. Eur J Oral Sci. 2010;118:259-264. doi: 10.1111/j.1600-0722.2010.00740.x DOI
5. Sindhu R, Rajaram S, Bharathwaj VV, Mohan R, Manipal S, Prabu D. Is Individual deprivation measures associated with dental anxiety and socioeconomic status of patients visiting dentists. Indian J Dent Res. 2020;31:515-519. doi: 10.4103/ijdr.IJDR_802_18. DOI
6. Gujjar K, Sharma R, Jongh A. Virtual reality exposure therapy for treatment of dental phobia. Dent Update 2017;44:423-435. 10.12968/denu.2017.44.5.423.x
7. Gujjar K, Van Wijk A, Sharma R, De Jongh A. Virtual reality exposure therapy for the treatment of dental phobia: a controlled feasibility study. Behav Cogn Psychother 2018;46:367-373. doi: 10.1017/S1352465817000534 DOI
8. Boeldt D, McMahon E, McFaul M, Greenleaf W. Using Virtual Reality Exposure Therapy to Enhance Treatment of Anxiety Disorders: Identifying Areas of Clinical Adoption and Potential Obstacles. Front Psychiatry. 2019 Oct 25;10:773. doi: 10.3389/fpsyt.2019.00773. DOI
9. Yamashita Y, Shimohira D, Aijima R, Mori K, Danjo A. Clinical effect of virtual reality to relieve anxiety during impacted mandibular third molar extraction under local anaesthesia. J Oral Maxillofac Surg. 2020;78:545.e541–545.e546. 10.1016/j.joms.2019.11.016
10. Kothgassner OD, Goreis A, Kafka JX, Van Eickels RL, Plener PL, Felnhofer A. Virtual reality exposure therapy for posttraumatic stress disorder (PTSD): a meta-analysis. Eur J Psychotraumatol. 2019 Aug 19;10(1):1654782. doi: 10.1080/20008198.2019.1654782. DOI
11. Baskran R, Lakshmanan R. Assessment of effect of chamomile oil on dental anxiety for patients undergoing extraction – a randomized controlled trial. Drug Invent Today 2019;11:1875-1879.
12. Hasheminia D, Kalantar Motamedi M, Karimi Ahmadabadi F, Hashemzehi H, Haghighat A. Can ambient orange fragrance reduce patient anxiety during surgical removal of impacted mandibular third molars? J Oral Maxillofac Surg. 2014;72:1671-1676. doi: 10.1016/j.joms.2014.03.031 DOI
13. Karan N. Influence of lavender oil inhalation on vital signs and anxiety: a randomized clinical trial. Physiol Behav. 2019;211:112676. 10.1016/j.physbeh.2019.112676
14. Bert F, Gualano MR, Camussi E, Pieve G, Voglino G, Siliquini R. Animal assisted intervention: A systematic review of benefits and risks. Eur J Integr Med. 2016 Oct;8(5):695-706. doi: 10.1016/j.eujim.2016.05.005 DOI
15. Cruz–fierro N, Vanegas–Farfano M, González–Ramírez MT. Dog–assisted therapy and dental anxiety: a pilot study. Animals 2019;9. doi: 10.3390/ani9080512 DOI
16. Cherniack EP, Cherniack AR. The benefit of pets and animal-assisted therapy to the health of older individuals. Curr Gerontol Geriatr Res. 2014;2014:623203. doi: 10.1155/2014/623203. DOI
17. Park E, Yim H, Lee K. Progressive muscle relaxation therapy to relieve dental anxiety: a randomized controlled trial. Eur J Oral Sci. 2019;127:45-51. doi: 10.1111/eos.12585 DOI
18. Mejía-Rubalcava C, Alanís-Tavira J, Mendieta-Zerón H, Sánchez-Pérez L. Changes induced by music therapy to physiologic parameters in patients with dental anxiety. Complement Ther Clin Pract. 2015 Nov;21(4):282-6. doi: 10.1016/j.ctcp.2015.10.005. DOI
19. Mills MP. Periodontal implications: anxiety. Ann Periodontol. 1996 Nov;1(1):358-89. doi: 10.1902/annals.1996.1.1.358. DOI
20. Frank DL, Khorshid L, Kiffer JF, Moravec CS, McKee MG. Biofeedback in medicine: who, when, why and how? Ment Health Fam Med. 2010 Jun;7(2):85-91.
21. Schwartz MS, Andrasik F. Biofeedback: a practitioner's guide. New York: Guilford Press, 2003.
22. Morarend Q, Spector M, Dawson D, Clark S, Holmes D. The use of a respiratory rate biofeedback device to reduce dental anxiety: an exploratory investigation. Appl Psychophysiol Biofeed 2011;36:63-70. doi: 10.1007/s10484-011-9148-z DOI
23. Dou L, Vanschaayk MM, Zhang Y, Fu X, Ji P, Yang D. The prevalence of dental anxiety and its association with pain and other variables among adult patients with irreversible pulpitis. BMC Oral Health. 2018 Jun 7;18(1):101. doi: 10.1186/s12903-018-0563-x. DOI
24. Armitage CJ, Reidy JG. Evidence that process simulations reduce anxiety in patients receiving dental treatment: randomized exploratory trial. Anxiety Stress Coping. 2012 Mar;25(2):155-65. doi: 10.1080/10615806.2011.604727. DOI

25. Higgins D, Hayes M, Taylor J, Wallace J. A scoping review of simulation-based dental education. MedEdPublish (2016). 2020 Feb 27;9:36. doi: 10.15694/mep.2020.000036.1. DOI
26. Armitage C, Reidy J. Evidence that process simulations reduce anxiety in patients receiving dental treatment: randomized exploratory trial. Anxiety Stress Coping. 2012;25:155-165. 10.1080/10615806.2011.604727
27. Matsuoka H, Chiba I, Sakano Y, Toyofuku A, Abiko Y. Cognitive behavioral therapy for psychosomatic problems in dental settings. Biopsychosoc Med. 2017 Jun 13;11:18. doi: 10.1186/s13030-017-0102-z. DOI
28. Spindler H, Staugaard S, Nicolaisen C, Poulsen R. A randomized controlled trial of the effect of a brief cognitive–behavioral intervention on dental fear. J Publ Health. Dent 2015;75:64–73. 10.1111/jphd.12074
29. Blackwell SE, Heidenreich T. Cognitive behavior therapy at the crossroads. Int J Cogn Ther. 2021;8:1-22.
30. Curtiss JE, Levine DS, Ander I, Baker AW. Cognitive-behavioral treatments for anxiety and stress-related disorders'. Focus (Am Psychiatr Publ). 2021 Jun;19(2):184-189. doi:10.1176/appi.focus.20200045. DOI

CONFLICT OF INTEREST

The Authors declare no conflict of interest

CORRESPONDING AUTHOR

Jakub Fiegler-Rudol
Department of Conservative Dentistry and Endodontics
Medical University of Silesia, Poland
e-mail: jakub.fiegler@gmail.com

ORCID AND CONTRIBUTIONSHIP

Artur Los: 0009-0004-1743-7716 A B D
Jakub Fiegler-Rudol: 0009-0009-3173-9389 A D
Monika Tysiąc-Miśta: 0000-0001-5750-6174 E F
Marta Tanasiewicz: 0000-0002-8700-7381 E F

A – Work concept and design, B – Data collection and analysis, C – Responsibility for statistical analysis, D – Writing the article, E – Critical review, F – Final approval of the article

RECEIVED: 07.05.2024
ACCEPTED: 20.07.2024