

CURRENT APPROACHES IN MANAGING DENTAL ANXIETY: A NARRATIVE VIEW

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Abstract

Introduction: Dental anxiety is a common problem faced by dental practitioners worldwide. Generally, the management of dental anxiety can be classified as pharmacological and non-pharmacological approaches, in multiple studies and reports available on this subject.

Aims and objectives: This paper will provide a general overview of the pharmacological and non-pharmacological strategies in the management of dental anxiety, supported by dental literature. This would help dental practitioners understand the benefits and limitations of the different methods of treating their anxious patients.

Methodology: This is a narrative review and a summary of the different approaches and methods available in the management of dental anxiety. Relevant articles were searched from the online databases of PubMed, ScienceDirect, and Google Scholar, and the keywords used to identify the papers were 'Dental Anxiety', 'Pharmacological', and 'Non-pharmacological'.

Conclusion: Appropriate management of dental anxiety is crucial to ensure a successful dental procedure. The choice of the anxiety management must be based on the complete understanding of the particular patient, identifying the source of anxiety, and working hand-in-hand with the patient for better oral health care.

Keywords: *Dental Anxiety, Non-pharmacological, Pharmacological*

Introduction

Anxiety is an emotional reaction to a perceived threat. In dentistry, it is characterised by a feeling of nervousness or unease, in the apprehension of an uncomfortable situation with an uncertain outcome in a dental setting (1-3). Dental fear and phobia, while related to dental anxiety conceptually, are not identical and involve different physical and emotional components (1-3). Dental fear is a cognitive response to a known, distinct and immediate threat such as certain dental procedures. Phobia, in contrast, is an overwhelming feeling of fear resulting in exaggerated responses (1, 2).

Some common examples of dental anxiety encountered in the daily office setting could be the mere thought of a painful injection or a lengthy procedure. Past experiences, such as pain during a dental procedure, might create a higher anxiety level. A Malaysian survey (4) found that more than 80% of the participants reported low-to-moderate anxiety and approximately 3.5% were phobic

and experienced extreme anxiety. The same study also looked into factors associated with dental anxiety, namely gender, age, educational level, employment status and treatment-seeking behaviour.

Anxiety level shows an inverse correlation with age (4). However, there is a high proportion of the dentally anxious in the elderly population (5, 6). This is a worrying issue as it reflects dental anxiety in every aspect of dentistry. Each dental patient is different, as the nature and intensity of anxiety vary among individuals. They could be mildly anxious, moderately anxious or extremely anxious, terrified or phobic (1, 2, 4). Some dental practitioners estimate the anxiety level of their patients based on clinical experience, but the results are often subjective. Self-reporting questionnaires are generally available for assessing anxious patients: Corah's Dental Anxiety Scale (CDAS); Modified Dental Anxiety Scale (MDAS); and Dental Fear Survey (DFS). None could be regarded as a gold standard, with a lack of agreement between the clinicians' ratings and the patients'

self-reported anxiety. Hence, it is worthwhile to understand each patient in order to discover the aetiology behind their anxiety and fear level. An interplay of multiple factors, such as traumatic experiences, second-hand learning, psychological traits and cultural factors are correlated to anxious behaviour (4).

Dental anxiety is one of the main reasons that delay visiting the dentist and the dental treatment which initially might be simple to address at an early stage could become complicated with the delay. The aetiology of dental anxiety is multifactorial; hence there is no single treatment or therapy for the management of anxiety (1-3). Besides the common techniques such as good communication skills by the dentists, building up good rapport and trust between the dentist and patient will enhance the emotional well-being of the patient. The management of dental anxiety basically can be grouped into two approaches: pharmacological and non-pharmacological. A combination of different approaches can be utilised depending on the anxiety level and clinical condition. This article aims to review the basic information about the available methods in the management of anxiety among dental patients.

Non-pharmacological approach

Non-pharmacological approaches are popular methods as they are safe, non-invasive and reversible. Dental practitioners must identify and acknowledge the source as well as the level of anxiety before deciding on the strategies to be used. The non-pharmacological approach is mainly based on psychotherapeutic intervention, with a focus on alleviating psychological distress, perceived pain, anticipatory fear and avoidance of dental treatment (1,

2, 6). While there are different methods and techniques implementing this approach, it is important that dental practitioners understand the nature of dental fear so that the patients with dental anxiety are managed correctly.

Existing approaches can be categorised into cognitive-behavioural management strategies; relaxation procedures with music therapy, aromatherapy, or massage; hypnosis; and alternative medicine such as acupuncture. Techniques utilising technology-based intervention (23, 24) and animal-assisted therapy (29) are fairly recent and not yet fully incorporated, with the suitability in dental practices still in question. The first impression of the dental office environment, although seemingly insignificant, is, in fact, crucial in alleviating the anxiety level of patients. The atmosphere and ambience of the waiting area can be designed to produce a calming effect while integrating music therapy and aromatherapy simultaneously. Once the patient steps into the treatment room, the operator can enhance dentist-patient communication, making full use of cognitive-behaviour modification and/or hypnosis, allowing the patient to relax and subconsciously increasing the acceptance of the dental procedures. The last resort for behaviour modification method is the physical restraint (7) where techniques such as “hand-over-mouth exercise” and “papoose board” are used to hold the patient down. These methods are generally applied in pediatric dentistry; however, it should be noted that these approaches are controversial and not comfortably accepted. Indeed, these methods might even backfire, causing higher levels of anxiety for future dental visits. Table 1 summarises the different approaches of non-pharmacological methods as reported by multiple studies.

Table 1: Non-pharmacological approaches

Management		Researchers
Dental office environment	<ul style="list-style-type: none"> Plays a significant role as patients tend to associate distinctive sight, sound and smell with feelings of anxiety Create a nice ambience with good lighting, office adorned rather than bare walls, and slightly cooler environment Relaxing music played to reduce the activity of the neuroendocrine and sympathetic nervous system, effective for both children and adults Music therapy: proven anxiolytic benefit and positive influence on patients by influencing human brain waves leading to deep relaxation Aromatherapy can be incorporated, which is the therapeutic use of essential oil to produce a physiological or pharmacological effect through the sense of smell Patients who received aromatherapy reported significantly greater improvement in their mood and perceived level of anxiety 	Appukuttan, 2016 (1) Armfield <i>et al</i> , 2013 (7) Moola <i>et al</i> , 2011 (21) Muzzarelli <i>et al</i> , 2006 (22)
Behavioural management	<ul style="list-style-type: none"> Based on principles of learning aiming to change undesirable behaviour under certain circumstances through learning “Tell-show-do”: behavioural shaping technique that reduces fear of the unknown and promotes predictability in clinical settings Positive reinforcement: provides useful incentive for cooperation and appropriate behaviour, include positive voice modulation, facial expression, verbal praises and appropriate physical demonstration of affection Systematic desensitisation: gradually exposing a fearful patient to the subject they find frightening while encouraging them to use relaxation strategies to reduce anxiety 	Appukuttan, 2016 (1) Armfield <i>et al</i> , 2013 (7)

Table 1: Non-pharmacological approaches (continued)

Management		Researchers
Technology-based intervention	<ul style="list-style-type: none"> • A form of distraction technique to divert patients' attention from what may be perceived as an unpleasant procedure • E.g.: audio-visual distraction, video glasses, digital games • Facilitates cooperative behaviour and achieves high level of satisfaction especially among paediatric patients • Capable of overcoming the shortcomings of traditional treatments with technology advancement • Study on a serious game CliniPup® demonstrated significant reduction in preoperative anxiety, but not on other time points, i.e. perioperatively & post-operatively 	Matthysens <i>et al</i> , 2020 (23) Gujjar <i>et al</i> , 2019 (8) Appukuttan, 2016 (1) Armfield <i>et al</i> , 2013 (7) Ram <i>et al</i> , 2010 (24)
Massage	<ul style="list-style-type: none"> • Manipulation of tissues to relax muscles and improve circulation, comprising of different technique such as traditional massage, shiatsu and reflexology • Traditional massage: increases blood flow to muscles and consequently improves muscle tone and mobility • Shiatsu: different form of massage using pressure from fingers, elbows, knees and feet along meridian lines of the body and pressure points • Reflexology: more precise form of massage involving the pressure points of feet to restore energy flow throughout the body • RCTs showed self-administered foot massage led to reduction in anxiety, but lacking evidence in relation to the dental practice 	Lee <i>et al</i> , 2017 (25) Eguchi <i>et al</i> , 2016 (26)
Hypnotherapy	<ul style="list-style-type: none"> • Non-invasive intervention to stimulate relaxation, can be used as a stand-alone approach or as adjunct to other methods • An interactive process which attempts to influence patient's perceptions, thinking and feelings • Implementation is inexpensive and not very time consuming 	Appukuttan, 2016 (1) Glaesmer <i>et al</i> , 2015 (27) Armfield <i>et al</i> , 2013 (7)
Acupuncture	<ul style="list-style-type: none"> • Simple and inexpensive treatment modalities but requires special training • Auricular site as mostly used acupuncture points • Limited but good quality evidence indicated acupuncture was associated with clinical reduction in anxiety when compared to no treatment provided 	Allan <i>et al</i> , 2018 (28) Appukuttan, 2016 (1)
Animal assisted therapy	<ul style="list-style-type: none"> • Relationships between humans and animals produced calming effects • Have influence on improving blood pressure and neurohormone levels thus facilitating anxiety management • Dog-assisted therapy showed improvements in patients experience, but research on this subject must be expanded 	Cruz-Fierro <i>et al</i> , 2019 (29)

Pharmacological approach

Ideally, the non-pharmacological approach, especially the behavioural management technique, should be the first line of choice in treating anxious patients (1, 10). However, the outcome is not always favourable and predictable, particularly when the person is fearful or who being a special needs patient, is unable to cooperate (11). Currently, there is no consensus as to when the non-pharmacological approach is no longer enough. Hence it is of utmost importance for the dental operator to consider all the factors involved before employing any form of pharmacological agents, and this is only advisable when the behavioural strategies have failed.

Generally, a pharmacological approach involves conscious sedation or premedication to enhance patients' acceptance of any treatment or medical procedures. Sedation is a depressed level of consciousness achieved by means of a pharmacological method (9). The operator should bear in mind that any form of pharmacological techniques does not eliminate anxiety; instead, they reduce arousal and modify the anticipation towards danger (10). There are a variety of sedative drugs that can be used for dental procedures. The routes of administration include enteral,

parenteral, transdermal, transmucosal, and inhalational (9), in which oral, intravenous (IV) and inhalation sedation are the commonly utilised technique. Sedative drugs include the benzodiazepines with midazolam, diazepam, and alprazolam; barbiturates; ketamine; antihistamines with phenothiazine; opioids with fentanyl, morphine and meperidine; propofol; melatonin; and inhalation anaesthetics with nitrous oxide and sevoflurane.

Benzodiazepine

Midazolam, diazepam and alprazolam are the most used tranquilisers in the benzodiazepine group. They potentiate GABA-mediated chloride ion influx resulting in attenuation of the nerve impulse (10, 11). Midazolam can be administered via various routes as well as used in combination with other sedative agents to produce the desired clinical outcome (Table 2). When used as a premedication drug, it is effective in stabilising the vital parameters of blood pressure, pulse rate and respiratory rate, following a reduction in patient anxiety (12). Withdrawal phenomena such as vomiting, amnesia and enuresis are part of the side effects for this drug (11, 13). Benzodiazepines are considered the safest and most

effective sedative agents. However, clinicians using these drugs must have the expertise in the use of, and the immediate availability of, flumazenil, the specific reversal agent in case of emergency or complications (14).

Ketamine

Ketamine is a dissociative anaesthetic which antagonises the N-methyl D-aspartate (NMDA) receptor. It is frequently used together with benzodiazepine, to achieve deep sedation (10, 11, 14). Side effects of ketamine include delirium, unpleasant dreams and hallucinations (11), as well as incidence of vomiting as part of its emetic complication (14). This is a result of the stimulation of the salivary and tracheobronchial secretions which can be lessened by the prior administration of atropine. The use of ketamine can produce safe and effective sedation with proper planning.

Melatonin

Melatonin is a naturally occurring hormone produced by the pineal gland of the human body to regulate the sleep-wake cycle. It shows great potential as a premedication with its better acceptability by patients, a shorter half-life and with less adverse reactions with other drugs (15). However multiple studies 13, 16, 17 found that midazolam

was more superior as a premedication, especially in the paediatric patients. Melatonin might be the safer option in the right population and situation, but it cannot induce hypnosis in the very anxious dental patients.

Inhalational sedation

Nitrous oxide is a popular agent used to achieve mild to moderate sedation. It induces analgesia, hypnosis and sedation by potentiating inhibitory neurotransmission (10, 11). Generally, patients will need 30%-40% nitrous oxide to achieve effective sedation. It has the advantages of rapid onset and rapid elimination without impairing the higher cognitive functions (10, 18). Several studies involving nitrous oxide alone or in a combination of other drugs (Table 2) investigated the anxiety control of patients and demonstrated its effectiveness.

Sevoflurane, also an inhalational anaesthetic agent, has a low blood-gas coefficient, allowing better control during the procedure. When used with 40% nitrous oxide, a low concentration of inhaled sevoflurane (0.1%-0.3%) produces conscious sedation. Averley *et al.* reported that a combination of IV midazolam, nitrous oxide and sevoflurane could serve as an alternative to general anaesthesia provided proper measures taken (18, 19).

Table 2: Comparison of randomised controlled trials using various sedative drugs

Researchers	Procedures	Drugs	Outcome
de Moares <i>et al</i> , 2019 (18)	Extraction of upper third molars	Midazolam (orally) Diazepam (orally) Nitrous oxide (inhalation)	Statistically significant reduction of postoperative anxiety compared preoperatively for all drug groups, but no difference among the three technique
Joshi <i>et al</i> , 2016 (12)	Extraction of impacted lower third molars	Alprazolam (orally)	Premedication confirmed clinical equivalence of reduction of anxiety, as reflected by stability of vital parameters
B. Isik <i>et al</i> , 2008 (13)	Paediatric dental treatment	Melatonin (orally) Midazolam (orally)	Midazolam, although having side effects, seems to be a better option compared to melatonin
K. E. Wilson <i>et al</i> , 2007 (30)	Orthodontic extraction in children	Midazolam (transmucosal) Nitrous oxide (inhalation)	Transmucosal midazolam via buccal route seems to be as safe as inhalation sedation with nitrous oxide, but patient acceptability was poor
P. A. Averley <i>et al</i> , 2004 (20)	Paediatric dental treatment	Midazolam (intravenous) Nitrous oxide (inhalation) Sevoflurane (inhalation)	IV sedation in combination with inhaled agent(s) may be a useful alternative to dental general anaesthesia procedures
P. A. Averley <i>et al</i> , 2004 (Pilot study) (19)	Paediatric dental treatment	Midazolam (intravenous) Nitrous oxide (inhalation) Sevoflurane (inhalation)	IV midazolam in combination with nitrous oxide alone or in combination with sevoflurane were safe and effective

Combined pharmacological & non-pharmacological approaches

Clinical differences may exist between the use of pharmacological and non-pharmacological therapies in managing dental anxiety. Currently, there are limited studies and trials investigating the clinical outcomes of combining both strategies, specifically targeting the dentally anxious patients. Clinicians may often empirically employ a combination of treatments with positive effects in different domains, as combined interventions are postulated to increase effectiveness, compared to any single treatment alone. For example, premedication with oral sedative drugs, together with cognitive behavioural management targeting secondary problems, could bring complementary beneficial effects.

Conclusion

Dental anxiety represents a significant issue in dental practice as it adversely affects the delivery of timely treatment. This review reveals a wide variety of techniques, of pharmacological, and non-pharmacological, and of a combination of methods, in the management of dental anxiety. These techniques should be integrated in a comprehensive approach, based on professional experience, personal preferences and resources, as well as patients' factors. Basic protocols of good communication skills, the building of rapport and establishing of dentist-patient trust should be the foundation of a successful treatment outcome.

Competing interest

The authors declared that there is no conflict of interest.

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