Non-pharmacological Management of Dental Anxiety:

Considerations for Oral Health Professionals

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Abstract

Dental anxiety is a psychological disorder that affects approximately 15% of the population worldwide. There lies a vicious cycle between dental anxiety and avoidance of dental care which can contribute to a decrease in oral health quality of life. To provide optimal care, oral health professionals should be knowledgeable about dental anxiety and its etiology, pathophysiology, assessments, as well as management techniques. Several non-pharmacological dental anxiety management techniques are available such as music therapy, aromatherapy, and virtual reality. Techniques implemented should be individualized to enhance patient comfort and encourage regular appointments.

Introduction

Dental anxiety is a common psychological condition that may lead to avoidance of dental care and contribute to deteriorating oral health.[1-3] Dental anxiety is an emotional or physical reaction to a perceived threat or anticipated future threat.[1] Dental fear and dental phobia are often used interchangeably with dental anxiety, however, they are distinct and separate disorders. Dental fear produces physical or phycological reactions to a perceived immediate threat associated with the dental setting.[1] Dental phobia is an intense illogical, persistent, severe, overwhelming fear of dental stimuli.[2,4,5] Dental phobias can be very intense, yet rarely diagnosed.

Research on dental anxiety correlates with avoidance of treatment, deteriorating oral health, low self-esteem, and low oral health-related quality of life (OHRQoL).[6,7] Avoidance of dental care can contribute to adverse dental disease and chronic oral health conditions, which can lead to shame or embarrassment, increasing the likelihood of further avoidance of dental care. Oral health professionals should be familiar with ways to assess a patient's level of dental anxiety and help find effective ways to manage it. Therefore, in order to provide optimal care, oral health professionals should be knowledgeable about dental anxiety etiology, pathophysiology, assessments, as well as management techniques.

Prevalence and Etiology

According to the World Health Organization, anxiety disorders are the most common mental disorders affecting over 300 million people worldwide.[8] A global meta-analysis determined the prevalence of dental anxiety is approximately 15% of the adult population.[9] The prevalence of dental anxiety in people 14 years or older ranges from 37%-77%.[2] Women report experiencing dental anxiety more than men,[1,2,9-12] and anxiety tends to decrease with age.[1,2,9,12]

Research suggests dental anxiety may be more prevalent in people of low socioeconomic status compared to those of greater socioeconomic status.[10,12] Dental anxiety may be triggered by patients thinking about upcoming dental treatment, and while being in the waiting room. Patients may experience dental anxiety due to a feeling of loss of control while in the dental chair, or from hearing the sound or use of a drill, scaling and polishing, or in anticipation of being administered local anesthesia via injection.[10]

The etiology of dental anxiety has a multifaceted origin and can arise from various sources.[11,13,14,] One contributing source to dental anxiety can include past traumatic experiences.[3,5,7,13,15] Research indicates children who have history of traumatic dental experiences are more likely to experience dental anxiety later in life as adults.[3] Among past traumatic dental experiences, local anesthetic injections have been reported as the most feared procedure.[3] Another source of dental anxiety is vicarious conditioning, which is when individuals develop anxiety towards dental procedures by observing others experiencing fear or discomfort during dental visits.[3,13] Vicarious conditioning has been noted in numerous articles to be a compelling factor to dental anxiety.[2,5,7,13,14]

Another source of dental anxiety can arise from genetic predispositions.[3,7,16] Inherited genetic predispositions plays a role in individuals who have phobias, including odontophobia, that make them susceptible to anxiety.[3,13,16] There is no specific gene responsible for dental anxiety; however, people with a family history of dental anxiety are more likely to develop dental anxiety. Lastly, dental anxiety has been associated with certain personality traits. Personality traits have been studied in relation to dental anxiety and two personality traits, neuroticism and extraversion, will be discussed in relation to dental anxiety.[17] Neuroticism or a neurotic personality is behaving in a strange or anxious way and incorporates feelings of anxiety

and depressive symptoms. Neuroticism has been shown to have positive correlation to dental anxiety, suggesting people who have a neurotic personality are also likely to have dental anxiety. Extraversion is negatively linked to dental anxiety suggesting that extraversion may act as a protective factor against dental anxiety.[17] Extraverted individuals tend to be sociable, outgoing, and assertive, which may enable them to approach dental visits with more confidence and less apprehension.

Pathophysiology

Anxiety producing stimuli trigger the autonomic nervous system leading to an increase in blood pressure and heart palpitations, pulse, and respirations.[18] The autonomic or fight-or-flight system is triggered by the hypothalamus-pituitary-adrenal axis, leading to the release of adrenaline into the sympathetic nervous system.[18] This cascade of events induces various physiological and psychological responses observed in the patient's vital signs and overall physical and psychological symptoms.[18] The most common of these responses exhibited are tremors or restlessness, feelings of being lightheaded, sweating, headaches, and reduction of the pain threshold.[4,18] Dilated pupils, an anxious facial expressions, involuntary leg and arm movements, a stiff body position, and avoiding eye contact are also signs of anxiety.[19]

Assessments for Identifying Dental Anxiety

Assessments enable oral health professionals to identify patients experiencing dental anxiety and determine the severity of their dental anxiety. There are several types of assessment methods that can be used, including single-item questionnaires and multiple-item questionnaires.[20] A single-item question that can help assess if a patient is experiencing dental anxiety is "Are you afraid of going to the dentist?" This question can be listed on the health history to be sure each patient is assessed for dental anxiety. Effective communication during a

review of the medical and dental history can be helpful in identifying a patient's reason for their visit, any fears or chief concerns, and negative past dental experiences.[20] Communication can also act as a bridge allowing rapport and trust to be established between the oral health professional and patient. Research has shown a decrease in dental anxiety when the patient feels trust between themselves and the oral health care provider.[21]

The most widely accepted questionnaires used in dentistry to assess dental anxiety include the Single-Item Visual Analog Scale (VAS) (Figure 1), Corah's Dental Anxiety Scale (CDAS), and Modified Dental Anxiety Scale (MDAS).[20,22] The VAS is a quick and easy assessment that measures pain, panic, or anxiety and typically takes less than one minute to complete. The VAS consists of a horizontal line with numbers ranging from 0 to 10, with lower numbers indicating less dental anxiety and higher numbers indicating greater dental anxiety.[20,23] The patient would self-report how anxious they feel by giving a number from 0-10 which best represents how anxious they are feeling.

The CDAS is an assessment consisting of four questions about varying dental situations, and each question has a range from 1-5 with 1 being not anxious and 5 being extremely anxious.[20] The oral health care provider can utilize this questionnaire to determine the patient's level of dental anxiety by calculating a total score. A total score of 4 could mean the patient is not experiencing dental anxiety, while a score of 5-8 may indicate low anxiety, a score of 9-14 could indicate moderate anxiety, and lastly a 15 or higher could indicate the patient is experiencing a high level of dental anxiety.[20] Even though the CDAS is a valid and reliable source for measuring dental anxiety, it does not address anxiety towards local anesthesia injections.[20,22] Therefore, in 1995, it was modified to the MDAS to include a fifth question regarding the level of anxiety with dental injections.[22] The MDAS is a widely accepted

questionnaire using a 5-point Likert scale. If the total score reaches 19 or above upon answering all five questions, it may indicate to the clinician that the patient is experiencing high levels of dental anxiety.[20,22]

When using assessment scales, oral health professionals need to properly document and include scale responses into the patient record so levels of dental anxiety can be assessed over time and per appointment. Evaluating vital signs, symptoms, and the results of the dental anxiety assessments can help gauge the level of anxiety experienced by the patient. If the patient has dental anxiety, the oral health professional should initiate a conversation about what management technique the patient prefers based on the options available in the dental setting.

Non-pharmacological Management of Dental Anxiety

Due to the complex multifactorial etiology of dental anxiety, there is not one management strategy that can be applied to all patients. Identifying the patient's source of anxiety and level can help oral health professionals create an individualized management plan. Dental anxiety can be managed by non-pharmacological or pharmacological interventions, or a combination of both.[5] However, pharmacological interventions such as oral sedation may have unwanted side effects such as nausea, dizziness, drowsiness, delayed onset and/or prolonged duration of the sedative effect. In addition, inhalation sedation such as nitrous-oxide oxygen may be contraindicated in patients with upper respiratory tract infections, severe chronic obstructive pulmonary disease (COPD), claustrophobia, nasopharyngeal obstruction, and first trimester pregnancy.[24] Alternatively, non-pharmacological interventions such as music therapy, aromatherapy, and virtual reality may be used by oral health professionals to reduce dental anxiety.

Music Therapy

Music therapy is considered to be non-invasive, cost-effective, and does not cause side effects associated with pharmacological interventions.[25-28] Several studies have shown implementing music during dental procedures can reduce a patient's dental anxiety.[25-27,29,30] Specifically, music therapy can decrease blood pressure,[25-27] heart rate,[27] and salivary cortisol levels.[29] In a study by Karapicak et al. patients who received music therapy also self-reported a statistically significant reduction in dental anxiety when measured using the MDAS dental anxiety assessment.[26] Even though several studies showed a statistically significant decrease in dental anxiety with the use of music therapy, other studies found conflicting results.[28,31] Specifically, a meta-analysis included several studies that used varying music therapy techniques with patients with dental anxiety and concluded the efficacy of music therapy to decrease dental anxiety was inconclusive.[31] Furthermore, a study by Wazzan et al, compared a group of patients exposed to slow rhythm music and a group that was not exposed. It was observed that those exposed to music showed lower levels of salivary cortisol, blood pressure, heart rate, and body temperature compared to the control group; however, these findings did not reach statistical significance.[28]

When implementing music therapy into clinical practice, there are several aspects that can be individualized to enhance the patient's experience. Some studies indicate patients who listen to music using headphones may have reduced dental anxiety as the music may eliminate the sound of dental equipment that may induce fear and anxiety.[27,30] However, Bradt and Teague recommend allowing the patient to choose whether they want headphones or not, as headphones may increase dental anxiety in some patients due to making it harder to communicate with the clinician.[31] Patients should have control over the volume and music selection, as it empowers

them and enhances their sense of control in what could potentially be an unpleasant situation.[31] Telling the patient to actively focus on the music rather than passively listen to it can also be helpful.[31] Additionally, several studies have investigated music therapy's effects on patient anxiety levels in various dental settings, such as the waiting room, operatory, and during treatment.[26,27] These studies consistently show a reduction in dental anxiety when the patient starts listening to music before the start of dental procedures.[26,27,31] In conclusion, music therapy may be a technique for reducing dental anxiety in some cases, however, it is important to customize it to each patient. In addition, oral health professionals should consider working in conjunction with a trained music therapist to collaborate on most effective ways to manage the patient's dental anxiety with music.[31]

Aromatherapy

Aromatherapy is a non-pharmacological technique used in dental settings for the reduction of dental anxiety.[25,32-34] Aromatherapy uses essential oils which are diffused or applied topically to stimulate the olfactory sense. Olfactory nerves are capable of transmitting signals to the brain's portion of the limbic center that controls emotions and is shown to decrease anxiety and improve one's mood.[5] Cai et al conducted a systematic review of aromatherapy effects on dental anxiety and concluded aromatherapy, most commonly lavender and orange aroma, are effective in reducing dental anxiety when compared to no aromatherapy and comparable to the effects of music therapy.[33] A study comparing three intervention groups (music therapy, lavender aromatherapy, combined music therapy and lavender aromatherapy) against a control group found the group exposed to a combination of music therapy and aromatherapy had more reduction in dental anxiety than groups provided a single treatment or no intervention.[25] Therefore, oral health professionals may want to consider implementing multiple management

strategies for most effective dental anxiety reduction. Additional studies using lavender essential oils found a significant reduction in dental anxiety in patients who received aromatherapy compared to those who did not receive aromatherapy.[32,34] Aromatherapy can be an effective way to reduce dental anxiety during dental procedures.

Several studies conducted on aromatherapy in the dental setting have utilized lavender and orange oils for dental anxiety reduction. Lavender essential oils have been shown to soothe the nervous system, alleviate anxiety, lower blood pressure, and decrease pain.[35] Similarly, orange essential oils are also used to alleviate anxiety and promote relaxation of the nervous system.[35] Due to these calming properties, orange and lavender essential oils are ideal choices for aromatherapy for anxious patients in the dental setting. There are several methods available for administering essential oils to patients including topical application on the skin or through inhalation. An essential oil(s) mixture can be created using a ratio of 10-15 drops of oil for every 4 oz of water in a spray bottle, then sprayed around the treatment room prior to patient care.[36] Another aromatherapy delivery method involves applying essential oils onto a cotton ball or gauze, which can be given to the patient for inhalation as needed during dental procedures when anxiety arises.[36] Alternatively, essential oils can be administered through a diffuser in 15-minute intervals every two hours.[36] Prior to utilizing essential oils, a patient's medical history should be reviewed to check for potential allergies or chronic conditions such as asthma.[35] Moreover, it's important to educate the patient about the potential benefits of essential oils in managing symptoms of dental anxiety. Additionally, their preference for a specific essential oil aroma should be inquired about to personalize the experience.[35]

Virtual Reality

Virtual reality (VR) therapy utilizes a headset to provide a computer-generated simulation. Several systematic reviews have found VR can be an effective method for reducing dental anxiety.[18,37-40] Hao et al. compared the effects of virtual reality and music therapy and reported music therapy to be more effective in reducing dental anxiety during tooth extractions.[37] Cunningham et al. specifically reviewed studies involving pediatric patients and found VR implemented during dental procedures decreased pain and anxiety compared to no intervention.[38] Yan et al. also focused on pediatric studies and concluded VR had a significant effect on reducing dental anxiety, pain, and heart rate during dental treatment.[39] Therefore, research suggests virtual reality is effective in reducing dental anxiety in patients during dental procedures.[18,37-40]

Virtual reality utilizes a distraction technique for reduced pain perception and dental anxiety.[23,40] Some examples of VR software available are interactive games and calming imagery for the patient's engagement.[23,40] Oral health professionals should be mindful that VR may induce nausea, dizziness, or headaches in patients.[23,40] However, reported incidence of these side effects is low, with one study reporting participants showed no symptoms of cybersickness (motion sickness due to immersive reality environments)[41] and another study reported nausea was not a significant finding in participants.[23] However, these potential side effects should be discussed with the patient before VR use. Patients who report they are prone to cybersickness, should not utilize VR.[23] When selecting the software to be utilized, opting for stationary imagery could prove advantageous in reducing cybersickness, as it allows the patient to keep their head still during treatment.[40] In a study of patients receiving scaling and root planning while exposed to VR via a headset, the dental hygienist providing treatment reported the headset did not impede

treatment or clinician positioning.[23] In conclusion, virtual reality holds promise as an effective distraction technique for alleviating dental anxiety during treatment. Nonetheless, it is crucial to weigh potential side effects and select appropriate software before implementation.

Conclusion

Dental anxiety is a psychological condition that elicits physiological responses such as elevated blood pressure, increased heart rate, and heightened salivary cortisol levels. When someone experiences dental anxiety, it can result in avoidance of dental care and a deterioration in oral health. Oral healthcare professionals can utilize dental anxiety assessments to ascertain the necessity for anxiety management and gauge its severity. Depending on the patient's dental anxiety level and preferences, pharmacological or non-pharmacological management techniques can be implemented to reduce dental anxiety. Non-pharmacological management options can include music therapy, aromatherapy, and virtual reality. Management methods implemented should be individualized to enhance patient comfort and encourage regular appointments.

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Attachments

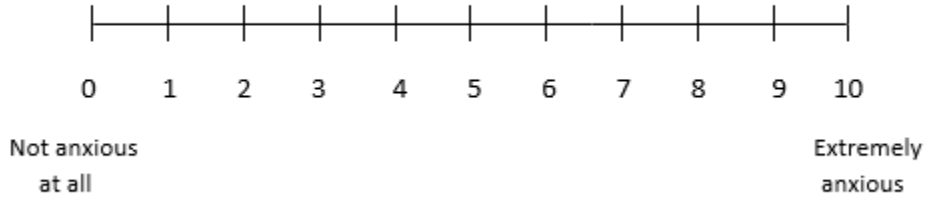

Figure 1. Visual Analog Scale for Dental Anxiety

This figure was created based off the description of the Visual Analog Scale for measuring dental anxiety that was validated by Appukuttan et al.[20]