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Review Article

Patterns of Anxiety Management in Pediatric Patients in Dentistry: A Systematic Review

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ABSTRACT

Introduction: Emotional responses in the form of anxiety and a child's behavior towards dental care are serious problems for general dentists and pediatric dentists. Anxious, fearful or uncooperative behavior of the child can hinder the provision of efficient dental care and interfere with the quality of care provided. If not adequately addressed, persistent negative response patterns may appear and become a barrier to regular dental care. Thus this systematic review reviewed some literature on the pattern of handling anxiety in child patients in dentistry. **Methods:** In this systematic review, article searches are conducted in Google Search, Pubmed, and Cochrane Library. The study was published from 2013 to 2020. 86 articles rated, including 86 articles from electronic databases, 0 from manual searches. 65 records filtered, 20 records excluded, 45 full-text articles rated for eligibility and 17 full-text articles included. **Result:** There are 17 articles on patterns of anxiety management in pediatric patients in dentistry. Broadly speaking, it consists of non-pharmacological and pharmacological approaches. Handling anxiety behavior in pediatric patients with a non-pharmacological approach includes communication, modeling, tell show do, ask-tell-ask, distraction, desensitation, voice control, reinforcement, hypnosis, sensory-adapted dental environments (SADE), and Animal- assisted therapy (AAT). Meanwhile, when non-pharmacological approaches are not successful, pharmacological approaches can be applied in the form of sedation, general anesthesia, and nitrous oxide / oxygen inhalation. Or using a combination of the two to relieve anxiety in pediatric patients during dental treatment can be an option. **Conclusion:** Anxiety management can be a non-pharmacological approach and a pharmacological approach or a combination of the two. This pattern of treatment can be used to overcome children's anxiety towards dental care so that this systematic review can be used as a reference in the treatment of anxiety in children patients in dentistry.

Keywords: *Anxiety, Child behavior management, Dentistry*

INTRODUCTION

Anxiety is defined as an unpleasant state related to fear of danger and is generated through a process that a person learns from their environment. [1,2] Anxiety is a non-specific symptom that is often found and is often a normal emotion. [3] Anxiety is the most common problem. general and important for a dentist, therefore it is better if a dentist as early as possible should be able to understand the presence of anxiety in children sufferers, so as to facilitate identification of patients with a tendency to anxiety. The approach and ways of dealing with child sufferers greatly influence the smoothness and success of the treatment plan that will be carried out. Facing a child sufferer who is not cooperative, often makes it difficult for a dentist to perform treatment.[2,4,5]

Anxiety is the most frequent and common problem in dentistry, especially pediatric dentistry because children who are very anxious about avoiding examinations and refusing dental care.[1,3] One study reported the prevalence of anxiety in all age groups worldwide is 3-43% .[1,6] The prevalence children who are anxious when receiving dental care aged 4-18 years are 6-20% .[4,7] Studies reported by dentists say that child patients with anxiety are difficult to manage and treat so it is important for a dentist to treat children with anxiety , because anxiety is the cause of 75% failure of routine dental care.[4,8] Anxiety about dental care

can increase caries and score of Decayed, Missing or Filled Teeth (DMFT), and increase the use of analgesic antibiotics. The cognitive effects of anxiety include fear, crying, and aggression. Another problem caused by anxiety in dental care is reduced parental satisfaction with the treatments offered or planned so that the perception of dentist competence decreases.[1,9,10]

In general, dental anxiety can be treated through non-pharmacological, pharmacological, or a combination of the two, depending on the level of anxiety, patient characteristics, and clinical conditions. The non-pharmacological approach is behavioral or cognitive intervention. Pharmacological approaches are carried out using sedation or general anesthesia. Sedation is a conscious pharmacological approach and general anesthesia as an unconscious pharmacology. Behavior modification therapy aims to change unacceptable behavior through the learning process and involves muscle relaxation and breathing along with guided imaginary techniques and physiological observation using hypnosis, acupuncture, distraction, positive reinforcement, stop signals, desensitization, "tell-show-do". And modeling. Patients who are unresponsive, uncooperative, and refuse to undergo treatment through a non-pharmacological approach may be considered pharmacologic treatment such as sedation or general anesthesia.[5,11,12] According to the American Academy of Pediatric Dentistry (AAPD), a combination of non-pharmacological and pharmacological approaches is used to alleviate anxiety in pediatric patients with the aim of maintaining a positive attitude and obtaining maximum dental treatment results.[6,12,13] An unconscious pharmacological approach with general anesthesia in dental procedures is an important part that demands a close working relationship between dentists, anesthetists and other multidisciplinary teams .[7,8,14]

METHODS

Search Strategy

A search was..performed on Google Search, Pubmed, dan Cochrane Library. Studies published from 2013 to 2020. Pubmed keywords and terms..used for the search,,included various,combinations of the following "Anxiety", " *Child behavior management* ", and "Dentistry" or each of the searches abstracts and titles were screened and the text full versions of articles that met criteria were downloaded.

The flowchart in Figure 1 identifies the excluded and included articles at each stage. 86 were assessed, including 86 articles from the databases electronic, 0 from the manual search. 65 records screened, 20 records excluded, 45 full-text articles assessed for eligibility and 17 full text articles included.

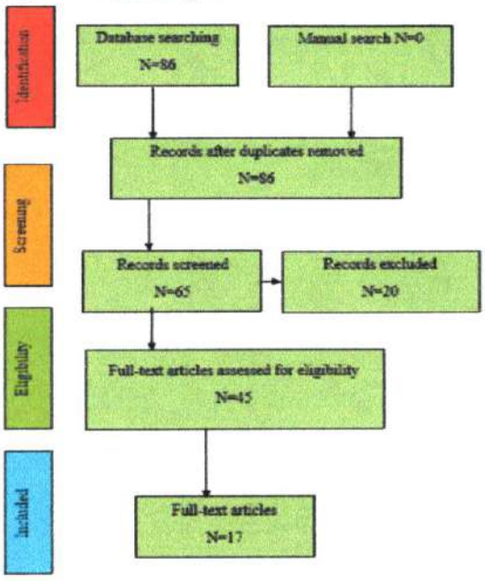

Fig.1:

RESULTS

In this systematic review there was a choice of studies: the inclusion criteria for this review were: 1) Articles 2013-2020 years, 2) English and Indonesian, 3) Type of publication and all study designs considered, 4) published and unpublished data is being sought. The exclusion criteria were studies that did not discussed the management of anxiety in pediatric patients in dentistry.

Table 1. Article on Anxiety Management Patterns in Pediatric Patients in Dentistry

No.	Author	Year	Title	Conclusion
1	S. Bagattoni, L. Lardani, M.R. Gatto, M.R. Giuca, G. Piana[14]	2020	Effects of audiovisual distraction in children with Down syndrome duringdental restorations: a randomised clinical trial	Audio-visual distraction using video glasses is of no use in managing the anxiety behavior of a pediatric patient with Down syndrome in the unit chair during dental and oral care.
2	A. Vinita Mary, R. Kesavan, Priya G., Priyanka P, and Ramya R[15]	2020	Dental Anxiety Among Pediatric Patients And Their Parents	An adequate approach regarding children with dental anxiety can help in building a good dental experience and a trusting relationship between pediatric dentists, patients and parents.
3	Madhuri Khandelwal ,Raghavendra MShetty, Sujata Rath[16]	2019	Effectiveness of Distraction Techniques in Managing Pediatric Dental Patients	AVD techniques installed on the ceiling and on seats are new distractions that can be an effective alternative distraction technique for the behavioral management of anxious children's patients.
4	Sreeraksha Radhakrishna, Ila Srinivasan, Jyothsna V Setty, Murali Krishna D R, Anjana Melwani, Kuthpady Manasa Hegde[17]	2019	Comparison of three behavior modification techniques for management of anxious children aged 4-8 years.	Penggunaan teknik permainan Tell-Show-Play-doh dan smartphone efektif untuk mengurangi kecemasan pada pasien anak dalam perawatan dental yang dilakukan.
5	Kuthpady Manasa Hegde, Neeraja R, Ila Srinivasan, Murali Krishna D R, Anjana Melwani, Sreeraksha Radhakrishna[18]	2019	Effect of vibration during local anesthesia administration on pain, anxiety, and behavior of pediatric patients aged 6–11 years: A crossover split-mouth study.	The use of device methods is more effective than conventional methods in dealing with pain, anxiety, and behavior of patients aged 6-11 years. This device is cost-effective, simple, and friendly to children especially in administering local anesthetic to pediatric patients.
6	Prema Sivakumar, Deepa Gurunathan[19]	2019	Behavior of Children toward Various Dental Procedures	The importance of adequate behavioral management techniques and skills from dentists to build good relationships with children and parents for more cooperation and better treatment outcomes.
7	Sandaka Raja Rajeswari, Rayala Chandrasekhar, C Vinay, KS Uloopi, Kakarla Sri RojaRamnya, Manumanthu Venkata Ramesh[20]	2019	Effectiveness of Cognitive Behavioral Play Therapy and Audiovisual Distraction for Management of Preoperative Anxiety in Children	Anxiety management in child patients with Active distraction techniques with cognitive behavioral play therapy proved more effective in reducing preoperative anxiety in child patients compared to audiovisual distraction and tell-show-do technique.
8	Manal Al Halabi, Iyad Hussein, Anas Salami, Rawan Awad, Najla Alderei, Ahtiq Wahab, Mawlood Kowash[21]	2019	A study protocol of a single-center investigatorblinded randomized parallel group study to investigate the effect of an acclimatization visit on children's behavior during inhalational sedation in a United Arab Emirates pediatric dentistry postgraduate setting as measured by the levels of salivary Alpha Amylase and Cortisol	The use of IHS or general anesthesia (GA) is recommended to facilitate dental care when nonpharmacological behavioral treatment cannot cope with the anxiety of a child's patient during dental care.

9	Lojain Abdulaziz Melebari, Seba Essam Attas, Abla Arafa[22]	2019	The motivational effect of multicolored dental restoration on dental behavior of first preliminary school children	The use of colorful restoration can provide benefits that are improving the oral health status of the child and may help in improving cooperative behavior in dental clinics, especially children patients with a younger age.
10	Nadica Pop-Jordanova, Olivera Sarakinova, Maja Pop-Stefanova-Trposka, Efka Zabokova-Bilbilova ,Emilija Kostadinovska[23]	2018	Anxiety, Stress and Coping Patterns in Children in Dental Settings	Moderate levels of stress and anxiety were present in both groups of orthodontics and dental care in general such as extraction. Several strategies to deal with this problem are discussed both non-pharmacologically and pharmacologically.
11	Idelia Gunawan, Eriska Riyanti, Annisa Isfandiary[24]	2018	Combined techniques for managing behavior in anxious children: a case report	Dental treatment in general anesthesia is carried out according to indications and if the nonpharmacological approach does not give a good response and results. Dental treatment in general anesthesia is carried out according to indications and if the nonpharmacological approach does not give a good response and results.
12	Nidhi Agarwal, Jayata Dhawan, Dipanshu Kumar, Ashish ANAND, Karan Tangri[25]	2017	Effectiveness of Two Topical Anaesthetic Agents used along with Audio Visual Aids in Paediatric Dental Patient	In dental care, especially in pediatric patients, the use of Eutectic Mixture of Local Anesthesia with Audio Visual aids is better than Eutectic Mixture of Local Anesthesia without Audio Visual aids followed by benzocaine with Audio Visual aids.
13	A. Ramírez-Carrasco, C. Butrón-Téllez Girón,O. Sanchez-Armass, and M. Pierdant-Pérez[26]	2017	Effectiveness of Hypnosis in Combination with Conventional Techniques of Behavior Management in Anxiety/Pain Reduction during Dental Anesthetic Infiltration	The use of hypnosis methods combined with conventional pain management techniques has shown improvements in pain and anxiety control in children receiving dental anesthetic treatment.
14	Vasanthi Done, Ravichandrasekhar Kotha, Aron Arun Kumar Vasa, Suzan Sahana, Raghavendra Kumar Jadadoddi , Sushma Bezawada[27]	2016	A Comparison of the Effectiveness of Oral Midazolam –N_2O Versus Oral Ketamine – N_2O in Pediatric Patients-An in–Vivo Study	Both drugs are effective in reducing patient anxiety during tooth extraction. Oral midazolam-N2O showed slightly better results compared to oral ketamine-N2O with respect to psychomotor effects.
15	Denise Espíndola Antunes, Karolline Alves Viana, Paulo Sucasas Costa, Luciane Rezende Costa[28]	2016	Moderate sedation helps improve future behavior in pediatric dental patients – a prospective study	Dental treatment in early childhood caries with moderate sedation was shown to significantly improve children's cooperative behavioral responses during subsequent memory lifting 4 to 29 months after completing treatment. Sedation can reduce the suffering of toddlers and preschoolers during dental work. However, pediatric dentists should receive special training to provide sedation.
16	Saumya Navit, Nikita Johri, Suleman Abbas Khan, Rahul Kumar Singh ,Dheera Chadha , Pragati Navit ,Anshul Sharma, Rachana Bahuguna[29]	2015	Effectiveness and Comparison of Various Audio Distraction Aids in Management of Anxious Dental Paediatric Patients	Audio distraction techniques are effective in reducing anxiety in pediatric patients and audio-stories are the most effective.
17	Kaviani N, Ashrafi S, Jabbarifar SE, Ghaffar E[30]	2015	The Efficacy of Two Intravenous Sedative Drugs in Management of	There were no significant differences between the intravenous midazolam-ketamine or midazolam-fentanyl groups. Both types of drugs are appropriate

			Uncooperative Children for Dental Treatments	in controlling the child's behavior during dental treatment.

Table 2: Pattern of Anxiety Management in Pediatric Patients in Dentistry

Non Pharmacological Approach		Pharmacological Approach
1	Communication[31,32]	1. Sedation[41] 2. General Anesthesia[41,42] 3. Nitrous oxide/oxygen inhalation[43]
2	*Modelling* [33,34]	
3	Tell Show Do (TSD)[35,36]	
4	Ask-tell-ask[37,38]	
5	Distraction[39,40]	
6	Desensitation [32,34]	
7	Voice Control[36,38]	
8	Reinforcement[30,31]	
9	Hypnosis[11,13]	
10	Sensory-adapted dental environments (SADE)[30,32]	
11	Animal-assisted therapy (AAT)[33]	

DISSCUSSION

Anxiety in dental care is often defined as an abnormal fear or fear when visiting the dentist for preventive or therapeutic treatment, unwarranted anxiety over dental procedures, may have psychological, cognitive, and behavioral consequences. In addition, an anxious person tends to overestimate the pain and discomfort caused by dental work and may also delay or miss appointments, with negative consequences for their oral health and often having to undertake more complex interventions, thus entering a vicious cycle that tends to increase anxiety related to treatment. Dental care anxiety can be a major obstacle for children receiving dental care. Children have limited communication skills and are less able to express their fears and anxieties. Their behavior is a reflection of their inability to cope with anxiety and behavior management is a guide that can provide appropriate coping strategies for pediatric patients.[1,3,25,29,44]

Anxiety in children is an unpleasant experience with dental care. Anxiety affects the child's behavior and further determines the success of dental treatment. Anxiety is a personality trait and fear of anticipating danger from unknown sources, while fear is an emotional response to something known as an external threat. The strategy for managing anxiety in children is the basis for starting treatment with the aim of developing the attitude of the child who is willing to carry out treatment so that oral health is achieved without causing fear and anxiety. In addition, communication is the basis of every treatment that will be carried out. The effectiveness of dentist-patient communication can reduce anxiety and increase patient satisfaction and comfort. [5,6,12,33,45]

The strategies for handling anxiety behavior in children in dentistry are divided into two general categories, namely non-pharmacological and pharmacological approaches. Handling anxiety in pediatric patients with a pharmacological approach in the form of sedation techniques, general anesthesia, or use of nitrous oxide / oxygen inhalation. Meanwhile, several behavioral management techniques with a non-pharmacological approach, including communication, modeling, tell show do, ask tell ask, distraction, desensitation, sound control, reinforcement, hypnosis, Sensory-adapted dental environments (SADE), and Animal-assisted therapy (AAT)).[2,6,24,46]

Table 3: Anxiety Management Pattern in Pediatric Patients with a Non Pharmacological Approach[47,48,49,50,51]

No	Anxiety Management Patterns in Pediatric Patients	Objective	Indication	Contraindicated
1	Non Verbal Communication	Increasing the effectiveness of communicative guidance techniques or maintaining patient attention and compliance with dentists.	In all pediatric patients	Does not exist

2	*Modelling*	It is a psychological principle that is learning from model observations. Children are invited to observe other children of their peer who are being treated for their teeth who behave cooperatively.	Effective in children 3-5 years of age and best used during the child's first visit to the dentist	In pediatric patients who are unable to see
3	Tell Show Do (TSD)	Teaching from dental visits and familiarizing the patient with dental care and the armamentarium and forming a positive response to the procedure by explaining and showing the treatment plan to be carried out.	In all pediatric patients either with anxiety, fear, or neither	Does not exist
4	Ask-tell-ask	Assessment of anxiety that could lead to treatment non-compliance; the patient is taught about the procedure and its implementation; and the patient feels comfortable with the treatment performed.	Can be applied to any patient, that is, with anxiety, fear, or without both	Does not exist
5	Distraction	Decrease in pediatric patient perception of discomfort and avoid negative or avoidant behaviors during treatment.	Dapat diterapkan dengan pasien manapun, yaitu dengan kecemasan, rasa takut, atau tanpa keduanya	Does not exist
6	Desensitation	Overcoming anxiety in pediatric patients on dental care and providing a series of experiences overcoming children's anxiety in dental care.	Can be applied to all pediatric patients, especially those with anxiety	Does not exist
7	Voice Control	Patient attention and adherence is obtained; avoiding negative behavior or avoiding treatment; and the establishment of appropriate roles between adults and children.	Can be applied with any pediatric patient including patients with anxiety.	Pediatric patients with hearing loss
8	Reinforcement	Establishment of behavior patterns that will increase the likelihood of the behavior occurring again in the future and generally for patient cooperation. Almost anything becomes a dentist's strength so that you can improve your social relationship by giving attention, praying, smiling, and hugging.	Can be applied to all pediatric patients including pediatric patients who have anxiety	Does not exist
9	Hypnosis	Makes the patient more comfortable, induces relaxation, causes amnesia and analgesia, prevents blockage and nausea.	Children over 5 years of age are the best subject to hypnosis, because their life images are an integral part of hypnosis.	Does not exist
10	Sensory-adapted dental environments (SADE)	Increased comfort and avoiding negative behavior or rejection from pediatric patients.	Patients with autism disorders, difficulty with sensory processing, other disabilities, or patients with anxiety	Does not exist

11	Animal-assisted therapy (AAT)	Establish interactions between patients and dentists; soothe or comfort an anxious or afraid patient; distraction from potentially stressful situations; And less pain is felt.	Additional techniques for reducing anxiety, pain, or emotional distress in pediatric patients.	Pediatric patients who have allergies or other medical conditions that are aggravated by exposure from animals; and a lack of interest or fear in therapy animals.

Successful management of anxiety in dental care not only paves the way to satisfactory clinical outcomes and better oral health, but also builds trust in pediatric patients and can help them regulate their emotions when facing other challenges in daily life. After the dentist's visit, the patient and the parents seem happy to continue to undergo dental examinations which is a good thing to find out the status of the patient's oral cavity and it is fun to see the dental environment for pediatric patients. Meanwhile, dentists still feel that pediatric patients are not anxious about undergoing dental examinations as described by dentists regarding the procedure. As for the use of conscious sedation, it is used to relieve anxiety, pain, and discomfort for patients with long dental procedures. [8,9,20,22,52]

One of the methods often used in dental care to overcome the anxiety of children patients is the method of distraction. The audio-video distraction (AVD) technique installed on the ceiling and on the seat is a new distraction that can be an effective alternative distraction technique for the management of the behavior of anxious children patients. However in some cases for example in behavioral management anxiety of children patients with Down syndrome the use of the method of distraction of audivisual video-extracted glasses is useless in this case. The AVD glasses method is not indicated in some situations. Some children who exhibit disruptive behavior and refuse treatment immediately refuse AVD glasses. Furthermore, AVD glasses are not suitable for children who are very alert and insist on controlling the situation or uncooperative, as well as the need for care and the un availability of glasses for children with small faces restricts the use of AVD glasses. In addition, the operator in this case the dentist should pay attention to the position of avd glasses correctly so as not to interfere in the treatment in pediatric patients.[8,10,42,53,54]

Tell show do and reinforcement methods should be used to complement the modelling procedure, along with desensitation, this is an effective approach to problem-solving in introducing simple care in children who are afraid and excessive anxiety. The Tell-Show-Do technique is based on the principle of learning theory and is carried out by the dentist himself in the treatment room. Play with denture toys and use tools to demonstrate and provide a clearer explanation of dental procedures in pediatric patients so that the child can receive the treatment that will be done by the dentist.[11,14,17,45,46]

Some studies essentially use the tell show do method, comparing the efficiency of Tell-Show-Play-doh, smartphone dentist games, and Tell-Show-Do in reducing child anxiety during dental care at the clinic. The results reported that tell-show-play-doh game techniques and dentist smartphones were more effective than Tell-Show-Do techniques at child anxiety levels and increased cooperative behavior during dental care at ages 4–8. children, which is consistent with previous research. The advantages of using Play-Doh dental toys and smartphone dentist games are convenient to use, easy to get, child-friendly, fun, and no harm.[1,11,30,55,56]

Hypnosis is an effective method of treating anxiety and fear in dental care in children. This technique makes the patient feel more comfortable, and the patient is instructed to concentrate and focus the mind. The advantage of this hypnosis is that it is comfortable, inexpensive, and can be used anytime and anywhere. This technique makes the patient more calm and focused on one thought. Thereby limiting the incoming sensory to only receiving hypnodontist commands. When the dental procedure is completed with the aim of hypnosis the patient becomes more oriented. The use of hypnosis methods combined with conventional pain management techniques has shown improvements in pain and anxiety control in children receiving dental anesthetic treatment.[20,27,33,57,58]

The use of sedation can be used safely and effectively in patients who are unable to cooperate due to a lack of psychological or emotional maturity and / or mental, physical, or medical conditions. Dental care in early childhood caries with moderate sedation has been shown to significantly increase responses to cooperative behavior. children during the next memory lift 4 to 29 months after completing treatment. Sedation can reduce the suffering of toddlers and preschoolers during dental work. However, pediatric dentists should receive special training to provide sedation. Contraindications to the use of sedation are in cooperative patients with minimal dental requirements; and any medical and / or physical conditions that cause sedation are discouraged. A number of studies regarding the

use of sedation drugs in pediatric patients in dental care found that there were no significant differences between the intravenous midazolam-ketamine or midazolam-fentanyl groups. Both types of drugs are appropriate in controlling the child's behavior during dental treatment.[22,23,41,50,51] Nitrous oxide / oxygen inhalation is a safe and effective technique for reducing anxiety and promoting effective communication. The onset of action is fast, the effects are easily titrated and reversible, and the recovery is fast and complete. In addition, nitrous oxide / oxygen inhalation mediates variable rates of analgesia, amnesia, and reduction of the gag reflex. This technique is one of the right techniques to overcome anxiety in pediatric patients in dental care with a pharmacological approach, patients whose vomiting reflex interferes with dental care, and patients who cannot be localized to anesthesia, and cooperative children undergoing long dental procedures. Contraindicated against respiratory diseases such as pulmonary obtructive and upper respiratory tract infections. Also in severe emotional disorders and patients with drug dependence, pregnant (first trimester) and patients with vitamin B-12 deficiency.[11,21,22,41,59]

Treatment of anxiety in children patients in dentistry can also be combined between a non-pharmacological approach and a pharmacological approach. In dental care especially in children patients, the use of Local Anesthetic Eutektic Mixture with Audio Visual aids is better when compared to Local Anesthetic Eutektic Mixture without Audio Visual aids followed by benzocaine with Audio Visual aids. Then, the use of device methods is more effective than conventional methods in dealing with pain, anxiety, and behavior of patients aged 6-11 years. This device is cost-effective, simple, and child-friendly especially in the administration of local anesthesia in child patients.[5, 20, 28,60,61]

CONCLUSION

Recent literature shows that there are various methods of treating anxiety in child patients in dentistry. Anxiety management can be a non-pharmacological approach and a pharmacological approach or a combination of the two. This pattern of treatment can be used to overcome children's anxiety towards dental care so that this systematic review can be used as a reference in the treatment of anxiety in children patients in dentistry.

REFERENCES

1. Viswanath D, Prabhuji. Dental anxiety, fear and phobia in children. *J Dental Research & Development* 2014; 4:1-14.
2. Milica JM, Aleksandar M. Dental anxiety: etiology and treatment options. *J Serbian Dental* 2015; 62:174-9.
3. Morgan et, al. Children's experiences of dental anxiety. *J Paediatric Dentistry*; 2017:1-11.
4. Deva PA. Strategies to manage patients with dental anxiety and dental phobia: literature review. Clinical, Cosmetic and Investigational Dentistry 2016; 8:35-50.
5. AAPD. Guideline on behavior guidance for the pediatric dental patient. 2015;180-93.
6. Sakarna B, et al. Dental management for pediatric patients under general anesthesia at queen rania al-abdullah hospital for children in jordan. *J Royal Medical Services*; 2015; 22:7682.
7. Caçola P. Physical and mental health of children with developmental coordination disorder. J Front Public Health 2016; 4:1-6.
8. Cajares CM, Rutledge CM, Haney TS. Animal assisted therapy in a special needs dental practice: An interprofessional model for anxiety reduction. *J of Intell Disabl.* 2016;4(1):25-8.
9. Achmad H, et al. Analysis of Risk Factors of Biopsychosocial with Early Childhood Caries (ECC) in Indonesian Pre-School Children. *Pesquisa Brasileira em Odontopediatria e Clínica Integrada.* 2019; Vol.19:1-11.
10. Cruz-Fierro N, Vanegas-Farfano M, González-Ramírez MT. Dog-assisted therapy and dental anxiety: A pilot study. Animals 2019;9(8):512. Available at: "https://www.mdpi.com/2076-2615/9/8/512".Accessed September 24,2020.
11. Theriot AL, Gomez L, Chang CT, et al. Ethnic and language influence on parents' perception of paediatric behaviour management techniques. *Int J Paediatr Dent* 2019;29(3):301-9.
12. Davis DM, Fadavi S, Kaste LM, Vergotine R, Rada R. Acceptance and use of protective stabilization devices by pediatric dentistry diplomates in the United States. J Dent Child 2016;83(2):60-6.
13. Goleman J. Cultural factors affecting behavior guidance and family compliance. Pediatr Dent 2014;36(2):121-7.
14. S. Bagattoni, L. Lardani, M.R. Gatto, M.R. Giuca, G. Piana. Effects of audiovisual distraction in children with Down syndrome duringdental restorations: a randomised clinical trial. *European Journal Of Paediatric Dentistry*; 2020. vol. 21/2-2020.
A. Vinita Mary, R. Kesavan, Priya G., Priyanka P, and Ramya R. Dental Anxiety Among Pediatric Patients And Their Parents. wjpls, 2020, Vol. 6, Issue 1, 145-149.
15. Khandelwal M , Shetty RM, Rath S. Effectiveness of Distraction Techniques in Managing Pediatric Dental Patients. *International Journal of Clinical Pediatric Dentistry*, 2019. 12(1): 1-24.
16. Radhakrishna S, et al. Comparison of three behavior modification techniques for management of anxious children aged 4-8 years.

J Dent Anesth Pain Med ; 2019 February; 19(1): 29-36.

17. Hegde KM, et al. Effect of vibration during local anesthesia administration on pain, anxiety, and behavior of pediatric patients aged 6–11 years: A crossover split-mouth study. *J Dent Anesth Pain Med* 2019;19(3):143-149.
18. Sivakumar P, Gurunathan D. Behavior of Children toward Various Dental Procedures. *International Journal of Clinical Pediatric Dentistry*, Oct 2019; 12(5):1-9,
19. Rajeswari SR. Effectiveness of Cognitive Behavioral Play Therapy and Audiovisual Distraction for Management of Preoperative Anxiety in Children. International Journal of Clinical Pediatric Dentistry; 2019, 12(5): 419-22.
20. Halabi et al. A study protocol of a single-center investigatorblinded randomized parallel group study to investigate the effect of an acclimatization visit on children's behavior during inhalational sedation in a United Arab Emirates pediatric dentistry postgraduate setting as measured by the levels of salivary Alpha Amylase and Cortisol. *Medicine*; 2019, 98:35(e16978).
21. Melebari LA, Attas SE, Arafa A. The motivational effect of multicolored dental restoration on dental behavior of first preliminary school children *Clin Exp Dent Res*. 2019;5:398–405.
22. Pop-Jordanova N, Sarakinova O, Pop-Stefanova-Trposka M, Bilbilova EZ, Kostadinovska E. Anxiety, Stress and Coping Patterns in Children in Dental Settings. *Open Access Maced J Med Sci*. Apr 2018; 6(4):692-697.
23. Gunawan I, Riyanti E, Isfandiary A. Combined techniques for managing behavior in anxious children: a case report. *Indonesian Journal of Paediatric* Juli 2018;1(2):148-153.
24. Agarwal N, Dhawan J, Kumar D, Anand A, Tangri K. Effectiveness of Two Topical Anaesthetic Agents used along with Audio Visual Aids in Paediatric Dental Patients. *Journal of Clinical and Diagnostic Research*. 2017 Jan, Vol-11(1): ZC80-ZC83.

A. Ramírez-Carrasco, C. Butrón-Téllez Girón,O. Sanchez-Armass, and M. Pierdant-Pérez. Effectiveness of Hypnosis in Combination with Conventional Techniques of Behavior Management in Anxiety/Pain Reduction during Dental Anesthetic Infiltration. *Hindawi Pain Research and Management*, Volume 2017, Article ID 1434015, 5 pageshttps://doi.org/10.1155/2017/1434015.

25. Done V, et al. A Comparison of the Effectiveness of Oral Midazolam –N_2O Versus Oral Ketamine – N_2O in Pediatric Patients-An in–Vivo Study. *Journal of Clinical and Diagnostic Research*. 2016 Apr, Vol-10(4): ZC45-ZC48.
26. Antunes DE, Viana KA, Costa PA, Costa LR. Moderate sedation helps improve future behavior in pediatric dental patients – a prospective study. Braz. Oral Res. 2016;30(1):e107.
27. Navit S, et al. Effectiveness and Comparison of Various Audio Distraction Aids in Management of Anxious Dental Paediatric Patients. *Journal of Clinical and Diagnostic Research*. 2015 Dec, 9(12): ZC05-ZC09.
28. Kaviani N, Ashrafi S, Jabbarifar SE, Ghaffar E. The Efficacy of Two Intravenous Sedative Drugs in Management of Uncooperative Children for Dental Treatments. *J Dent Shiraz Univ Med Sci*., 2015 March; 16(1 Suppl):29-34.
29. Wu, L., Gao, X. Children"s dental fear and anxiety: exploring family related factors. *BMC Oral Health*, 2018; 18: 100.
30. Achmad H, et al. A Review of Stunting Growth in Children: Relationship to the Incidence of Dental Caries and its Handling in Children. *Systematic Reviews in Pharmacy*. 2020; 11(6):230-235.
31. Batinac T, SotošekTokmadžić V, Peharda V, Brajac I J Dermatol. Adverse reactions and alleged allergy to local anesthetics: analysis of 331 patients, 2013 Jul; 40(7): 522-7.
32. Susan R, et al. Diagnosis and management of developmental coordination disorder. J Canadian Medical Association. 2015;187(9):659-44.
33. Cermak SA, Stein Duker LI, Williams ME, et al. Sensory adapted dental environment to enhance oral care for children with autism spectrum disorders: A randomized controlled pilot study. *J Autism Dev Disord* 2015;45(9):2876-88.
34. Gussard AM,Weese JS, Hensten A, Jokstad A. Dog-assisted therapy in the dental clinic. Part B. Hazards and assessment of potential risks to the health and safety of the dental therapy dog. Clin Exp Dent Res. 2019;5(6):701-11.
35. Prado IM, Carcavalli L, Abreu LG, Serra-Negra JM, Paiva SM, Martins CC. Use of distraction techniques for the management of anxiety and fear in paediatric dental practice: A systematic review of randomized controlled trials. *Int J Paediatr Dent* 2019;29(5):650-68.
36. Vishwakarma AP, Bondarde PA, Patil SB, Dodamani AS, Vishwakarma PY, Mujawar SA. Effectiveness of two different behavioral modification techniques among 5– 7-year-old children: A randomized controlled trial. *J Indian Soc Pedod Prev Dent* 2017; 35: 143-9.
37. Shah HA, Nanjunda Swamy KV, Kulkarni S, Choubey S. Evaluation of dental anxiety and hemodynamic changes (Sympatho-Adrenal Response) during various dental procedures using smartphone applications v/s traditional behaviour management techniques in pediatric patients.*Int J Appl Res* 2017; 3: 429-33.
38. Achmad H, et al. Analysis of Disease Risk Factors of Early Childhood Caries (ECC) On Pre-School Children Psicososcial Project Review. *Sian Jr. of Microbiol. Biotech. Env. Sc.* Vol. 20 (October Suppl.) : 2018 : S18-S25.

39. Patil VH, Vaid K, Gokhale NS, Shah P, Mundada M, Hugar SM. Evaluation of effectiveness of dental apps in management of child behaviour: A pilot study. *Int J Pedod Rehabil* 2017; 2: 14-8.
40. Meshki R, Alidadi F, Behboudi A, Oliadarani FK. Effects of pre-treatment exposure to dental practice using a smart-phone dental simulation game on children's pain and anxiety: a preliminary double-blind randomized clinical trial.*J Dent* 2018; 15: 250-8.
41. Lee JH, Jung HK, Lee GG, Kim HY, Park SG, Woo SC. Effect of behavioral intervention using smartphone application for preoperative anxiety in pediatric patients. *Korean J Anesthesiol* 2013; 65: 508-18.
42. Campbell C, Soldani F, Busuttil-Naudi A, Chadwick B: British Society of Paediatric Dentistry Guidelines: Update of non-pharmacological behaviour management guide-line, 2011. Available at: "https://www.bspd.co.uk/Portals/ 0/Public/Files/Guidelines/Non-pharmacological%20 behaviour%20management%20.pdf ". Accessed July 18, 2020.
43. Fisher-Owens S. Broadening perspectives on pediatric oral health care provision: Social determinants of health and behavioral management. Pediatr Dent 2014;36(2):115-20.
44. Hulin J, Baker S, Marshman Z, Albadri S, Rodd H. The decisional needs of young patients faced with the decision to undergo dental treatment with sedation or GA. *SAAD Digest* 2017;33:18-23.
45. Achmad H, et al. Pulse Rate Change After Childhood Anxiety Management with Modeling and Reinforcement Technique of Children's Dental Care. *Pesquisa Brasileira em Odontopediatria e Clínica Integrada*. 2019; Vol.19:1-13.
46. Guney S, Araz C, Tirali R, Cehreli S. Dental anxiety and oral health-related quality of life in children following dental rehabilitation under general anesthesia or intra- venous sedation: A prospective cross sectional study. *Niger J Clin Pract* 2019;21(10):1304-10.
47. Clark MS, Brunick AL. N2O and its interaction with the body. In: Handbook of Nitrous Oxide and Oxygen Sedation. 5th ed. Maryland Heights, Md.: Mosby Elsevier; 2019:103-13.
48. American Academy of Pediatric Dentistry. Use of anes-thesia providers in the administration of office-based deep sedation/general anesthesia to the pediatric dental patient. The Reference Manual of Pediatric Dentistry. Chicago, Ill.: American Academy of Pediatric Dentistry;2019:327-30.
49. Achmad H, et al. Prevalence of medically compromised children regarding dental caries and treatment needs in Wahidin Sudirohusodo Hospital. *Journal of International Dental and Medical Research*. 2017; 10(3):915-920.
50. Coté CJ, Wilson S, American Academy of Pediatric Dentistry, American Academy of Pediatrics. Guidelines for monitoring and management of pediatric patients before, durin and after sedation for diagnostic and therapeutic procedures. Pediatr Dent 2019;41(4):E26-E52.
51. SmartTots. Consensus statement regarding anesthesia safety in children. Available at: "https://www.smarttots.org/smarttots-releases-consensus-statement-regardinganesthesia-safety-in-children".Accessed July 18,2020.
52. American Academy of Pediatrics. The pediatrician's role in the evaluation and preparation of pediatric patients undergoing anesthesia. Pediatrics 2014;134(3):634-41.
53. Aldossari GS, Aldosari AA, Alasmari AA, Aldakheel RM, Al-Natsha RR, Aldossary MS. The long-term effect of previous dental treatment under general anesthesia on children's dental fear and anxiety. Int J Paediatr Dent 2019;29(2):177-84.
54. Guney S, Araz C, Tirali R, Cehreli S. Dental anxiety and oral health-related quality of life in children following dental rehabilitation under general anesthesia or intra- venous sedation: A prospective cross sectional study. Niger J Clin Pract 2019;21(10):1304-10.
55. Kamath PS. A novel distraction technique for pain management during local anesthesia administration in pediatric patients. J Clin Pediatr Dent 2013;38(1):45-7.
56. American Academy of Pediatric Dentistry. Use of local anesthesia for pediatric dental patients. The Reference Manual of Pediatric Dentistry. Chicago, Ill.: The American Academy of Pediatric Dentistry; 2020:318-23.
57. American Academy of Pediatric Dentistry. Use of anesthesia providers in the administration of office-based deep sedation/general anesthesia to the pediatric dental patient. The Reference Manual of Pediatric Dentistry. Chicago, Ill.: American Academy of Pediatric Dentistry;2019:327-30.
58. Martinez Mier EA, Walsh CR, Farah CC, Vinson LA, Soto-Rojas AE, Jones JE. Acceptance of behavior guidance techniques used in pediatric dentistry by parents from diverse backgounds. Clin Pediatr 2019;58(9):977-984.
59. Melwani AM, Srinivasan I, Setty JV, Pamnani SS, LalityD. A clinical comparative study between conventional andcamouflaged syringes to evaluate behavior and anxiety i6–11-year-old children during local anesthesia administration- a novel approach. J Dent Anesth Pain Med 2018;18: 35-40.