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THE EFFECT OF ANIMATION MOVIE AGAINST ANXIETY LEVEL IN DENTAL TREATMENT OF ELEMENTARY SCHOOL 15 PADANG INDONESIA STUDENT

(PENGARUH FILM ANIMASI TERHADAP TINGKAT KECEMASAN PADA PERAWATAN GIGI SISWA SD 15 PADANG)

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ABSTRACT

Anxiety is a normal condition that is part of human development that happens from childhood. Dental anxiety has been studied for 10 years ago and still be a fundamental problem for dental treatment. Distraction is a technique to manage dental anxiety. Distraction is a method to distract a patient from something that the patient likes. Audiovisual distraction is one of many techniques that are effective for children. One of the ideas is to distract children from watching animated movies. This study uses a post-test-only control group design. This study uses 50 samples. The anxiety level is measured by blood pressure, breathing, heartbeat, and psychological and physiological signs when a student is treated for a dental plaque record. Based on the Kolmogorov-Smirnov test, the result showed an effect of animation movies on dental treatment

with a p<0.05 compared to the control group. The conclusion of this study is animation movies have an impact on anxiety levels in dental treatment.

Keywords: anxiety; animation movie; audiovisual distraction

ABSTRAK

Kecemasan, kondisi normal yang merupakan bagian dari perkembangan manusia yang terjadi sejak kecil. Kecemasan gigi telah dipelajari selama 10 tahun yang lalu dan masih menjadi masalah dasar untuk perawatan gigi. Gangguan adalah teknik untuk mengelola kecemasan gigi. Gangguan adalah metode untuk mengalihkan perhatian pasien ke sesuatu yang disukai pasien. Gangguan audiovisual adalah salah satu dari banyak teknik yang efektif digunakan untuk anak-anak. Salah satu ide untuk mengalihkan perhatian anak untuk menonton film animasi. Penelitian ini hanya menggunakan desain kelompok kontrol pasca tes. Penelitian ini menggunakan 50 sampel. Tingkat kecemasan diukur dengan tekanan darah, pernapasan, detak jantung, tanda psikologis, dan tanda fisiologis ketika siswa dirawat karena catatan plak gigi. Berdasarkan uji Kolmogorov-smirnov, hasil penelitian menunjukkan bahwa terdapat efek film animasi untuk perawatan gigi dengan nilai p<0,05 dibandingkan dengan kelompok kontrol. Kesimpulan dari penelitian ini adalah film animasi memiliki efek terhadap tingkat kecemasan pada perawatan gigi.

***Kata kunci**: distraksi audiovisual; film animasi; kecemasan*

INTRODUCTION

Visits to the dentist are often associated with an unfamiliar atmosphere, unfamiliar equipment, and pain, leading to anxiety in many patients[1,2]. This anxiety significantly affects patient behavior, resulting in a decrease in the frequency of regular dental visits [3]. Although anxiety is a normal aspect of human development [4], it can manifest in physical and emotional symptoms that hinder an individual's interaction with healthcare services,

particularly dental care [5,6]. These symptoms include discomfort, fear, withdrawal, and physiological reactions such as increased pulse rate and cold sweats.

Dental anxiety has been recognized as a significant issue in dental care for more than a decade[7]. High levels of dental anxiety are associated with irregular visits, treatment delays, and avoidance of dental healthcare services [8,9]. This condition has profound implications for oral health, particularly in children and adolescents, where the prevalence of dental anxiety ranges from 5% to 20% [10]. Patients with severe dental anxiety often neglect their dental health problems, including pain and infections, before seeking treatment [11].

One approach to managing dental anxiety is the use of distraction techniques. Distraction involves shifting the patient's attention from the anxiety-inducing procedure to a more enjoyable stimulus [12,13]. Audiovisual distraction, such as watching animated films, has been shown to effectively reduce anxiety, especially in children[14,15]. Animated films provide a rich visual and auditory experience, helping to divert attention from pain and fear. The advantages of this medium include its ability to deliver messages in an engaging, imaginative, and easily understandable manner [16,17].

Research indicates that audiovisual distraction techniques are more effective than auditory or kinesthetic distraction alone [18]. This method engages multiple senses, including vision and hearing, enabling optimal psychological absorption [19]. Based on this background, this study aims to evaluate the effect of animated films on dental anxiety in students of State Elementary School 15 Padang, Indonesia.

METHOD

Research Methods

This study employed a post-test-only control group design to evaluate the effect of animated movies as an audiovisual distraction technique on dental anxiety in elementary school children. Ethical approval for the research was obtained from the Ethics Committee of the Faculty of Medicine, Universitas Andalas, with approval number 178/UN.16.2/KEP-FK/2018. The study's goal was to measure the effect of distraction using animated movies on students' physiological and psychological anxiety during dental procedures, particularly dental plaque recording.

Design and Sampling

The post-test-only control group design was selected as it eliminates the risk of pre-test sensitization influencing the results. The

sample was determined using a total sampling technique, where all students in grades III and IV at SD Negeri 15 Padang who met the inclusion and exclusion criteria were recruited. The total sample size consisted of 50 students.

Inclusion Criteria:

Students who provided informed consent from their parents and were willing to participate.

Students experiencing anxiety related to dental procedures, as assessed by the Modified Dental Anxiety Scale (MDAS) questionnaire.

Exclusion Criteria:

Students who were absent from the Objective Structured Clinical Examination (OSCE) room during the research.

Students with medical conditions that could affect their physiological responses, such as cardiovascular or respiratory conditions.

The students were divided into two groups: the intervention group and the control group. The intervention group received animated movies as a distraction during the dental procedure, while the control group underwent the procedure without any form of distraction.

Research Procedures

The procedure began by assessing the students' anxiety levels using the MDAS questionnaire. This tool helped identify participants who experienced dental anxiety, ensuring that the study focused on the intended population.

In the intervention group, students watched animated movies as a distraction during the dental plaque recording process. The animated movies were played on a screen visible to the students throughout the procedure. This approach was chosen based on prior studies indicating that audiovisual distraction effectively reduces anxiety in children by shifting their attention away from the dental procedure.

In contrast, the control group underwent the same dental plaque recording process without any form of distraction.

For both groups, the dental plaque recording procedure lasted five minutes. Physiological parameters were measured at two points:

After the initial five minutes of the procedure.

Five minutes after the first set of measurements.

The physiological parameters measured included:

Systolic blood pressure: Recorded using a standard digital sphygmomanometer.

Respiratory rate: Measured by counting the number of breaths per minute.

Heart rate: Measured using a pulse oximeter.

Psychological and physiological signs of anxiety: These were observed and recorded by the research team.

All data were systematically documented for analysis.

Data Collection

Primary data were collected directly from the participants through physiological measurements and observations. Blood pressure, heart rate, and respiratory rate were measured using calibrated medical devices to ensure accuracy. Psychological and physiological signs of anxiety, such as sweating, facial expressions, and restlessness, were also noted.

Data collection was designed to minimize variability and ensure consistency across all participants. For example, the same dental procedures were performed by the same operator in a controlled environment to reduce confounding factors.

Data Analysis

Bivariate analysis was conducted to examine the relationship between the intervention (animated movies) and the dependent variable (anxiety level). The Chi-square test (2x4) was used to test the association between the intervention and changes in physiological parameters. If the Chi-square test assumptions were not met, an alternative test, the Kolmogorov-Smirnov test, was applied to ensure robust statistical analysis.

The statistical significance threshold was set at $p < 0.05$. This means that if the p-value was less than 0.05, the intervention would be considered to have a statistically significant effect on reducing anxiety.

RESULT

The subjects of this study are 50 people who were randomly selected from grades III and IV of SD Negeri 15 Jati Padang. A total of 25 people became an experimental group that had dental care while watching an animated movie, and another 25 people were a control group that had dental care without watching an animated film.

The selection of samples in the population consisting of two class levels is based on total sampling, namely taking the entire population to be used as a sample, which is grouped into two groups, with each group randomly selected so that each sample has the same opportunity. Before

conducting the research, each class was given an announcement that dental and oral examinations would be carried out on students and asked students to fill out informed consent forms by parents. Afterward, students fill out the Modified Dental Anxiety Scale questionnaire to meet the inclusion criteria. Based on the results of the questionnaire, it was found that all students had anxiety about dental care. Generally, students were very anxious if anesthesia injections were carried out on the gums.

The control group recorded plaque control without looking at the animation film, while the experimental group recorded plaque control while looking at the animation film. When plaque control records were carried out, students were checked for blood pressure, breathing, pulse, and psychological and physiological signs and compared with a scoring table data analysis using the Kolmogorov Smirnov test.

Systolic Blood Pressure, Respiration, and Pulse Animation Film Group

Systolic blood pressure, respiration, and pulse rate are determined by scoring tables.

1. The highest blood pressure level, 110-117 mmHg, is 72%. While the lowest, which is 118-121 mmHg, is 4%.

Table 1. Systolic blood pressure distribution animated movies group

Systolic blood pressure	n	Percentage
110-117 mmHg	18	72%
118-121 mmHg	1	4%
122-125 mmHg	4	16%
>125 mmHg	2	8%
Total	25	100%

2. The highest respiratory rate, which is 16-24 times per minute, is 48%, while the lowest, 25-32 times per minute, is 28%.

Table 2. Respiratory distribution of animated movies group

Respiratory rate	n	Percentage
16-24/min	18	72%
25-32/min	7	28%
33-40/min	0	0%
>40/min	0	0%
Total	25	100%

3. The highest pulse rate is more than 100 beats per minute at 48%. At the same time, the lowest is 91-95 times per minute by 20%.

Table 3. Pulse distribution of animated movies group

Pulse	n	Percentage
≤90/min	7	28%
91-95/min	5	20%
96-100/min	1	4%
>100/min	12	48%
Total	25	100%

Systolic Blood Pressure, Respiration, and Group Pulse Without Watching Animated Movies

The group without watching the animated film uses the same score table as the animated film group.

1. The highest systolic blood pressure level ranges from 110-117 mmHg with a percentage of 72%, while the lowest is more than 125 mmHg at 4%.

Table 4. Systolic Blood Pressure Distribution Without Watching Animated Movies Group

Systolic blood pressure	n	Percentage
110-117 mmHg	18	72%
118-121 mmHg	2	8%
122-125 mmHg	4	16%
>125 mmHg	1	4%
Total	25	100%

2. The highest respiratory rate, which is 16-24 times per minute, is 48%, while the lowest is more than 40 times per minute by 4%.

Table 5. Respiratory distribution without watching animated movies group

Respiratory rate	n	Percentage
16-24 per menit	12	48%
25-32 per menit	10	40%
33-40 per menit	2	8%
>40 per menit	1	4%
Total	25	100%

3. The highest pulse rate is more than 100 beats per minute at 56%. At the same time, the lowest is less than and equal to 90 times per minute by 20%.

Table 6. Pulse distribution without watching animated movies group

Pulse	n	Percentage
≤90/min	5	20%
91-95/min	0	0%
96-100/min	6	24%
>100/min	14	56%
Total	25	100%

Comparison of Anxiety Levels Between Animated Film Groups and Groups Without Watching Animated Movies

The comparison of the anxiety level of the animated film group with the group without watching the animated film is assessed from the examination of systolic blood pressure, respiration, pulse, psychological signs, and physiological signs, which can be seen in the following table:

Table 7. Results of the Kolmogorov-Smirnov Test analysis of anxiety levels between the animated movies group and the group without watching animated movies

	Not Anxious	Anxious moderate	Anxious severe	Very anxious	n
Watching animated movies	76%	24%	0%	0%	50%
Without watching Animated movies	24%	60%	12%	4%	50%
Total	50%	42%	6%	2%	100%

Based on Table 7, it can be seen that 76% of students who watch animated movies while doing dental care are not anxious, compared to the group without animated films, as many as 24% of students. Meanwhile, a total of 24% of students who watched animated films during dental care had moderate levels of anxiety compared to the group without watching animated films, as many as 60% of students. None of the students in the animated film group had severe and very anxious levels, compared to 12% and 4% of the students who did not watch the animated film for severe and burdensome anxiety, respectively. From the Kolmogorov-Smirnov test, it was found that animated films affected the level of anxiety in dental care with a value of p=0.002.

DISCUSSION

The Effect of Animated Movies on Anxiety Levels in Dental Care

Based on a study conducted on 50 samples regarding the effect of animated films on the level of anxiety in the dental care of students of 15 Jati Padang public elementary schools, it was shown that animated films had an effect on the level of anxiety in dental care. Data from the study showed that 76% of students who watched animated films during dental care were not anxious, 24% were moderately anxious, and no students had severe anxiety or very anxious levels. Meanwhile, in the control group, students who were not anxious during dental care were 24%, moderately anxious 60%, severely anxious 12%, and very anxious 4%. It shows that animated films are influential in reducing anxiety in dental care, with a value of p=0.002.

Anxiety and stress occur through general adaptation syndrome controlled by the hypothalamus. The hypothalamus receives feedback on physical and psychological stressors from almost all regions of the brain and many receptors throughout the body. When the body faces stress, this triggers the activation of the hypothalamic-pituitary-adrenal (HPA) axis, releasing corticotropin-releasing hormone (CRH). The release of CRH triggers the secretion and release of another hormone, namely the adrenocorticotropin hormone (ACTH), from the pituitary gland. When the pituitary gland secretes ACTH, this hormone will follow the bloodstream to activate the adrenal cortex, thereby triggering the secretion of catecholamines and cortisol, which increase metabolism, body fluids, and blood pressure. Cortisol, secreted in response to stress, acts in the body to provide a fight or flight response, which means a person will experience an increase in heart rate and blood pressure. Hormones released by the adrenal cortex are thought to have a prolonged effect because the activation of the hormone's function lasts a few minutes to several hours. An increase in cortisol in the blood ensures blood sugar levels for metabolic processes [20].

This study uses the distraction method. According to Priharjo (1996) in Hartanti (2005), the distraction method diverts the patient's attention to other things so that the patient will forget what he is experiencing. Distraction is a safe, inexpensive way to relieve pain and has a relaxing effect in dental procedures[21]. Pain is a source of frustration, stress, and anxiety, both for clients and healthcare workers.

According to Potter and Perry [20] and Soemardini et al. [21], the distraction technique is an attempt to release endorphins. Endorphins are endogenous

opiates that cause pain transmission not to reach the brain so that pain perception and sensation are not felt. The relaxation effect on distraction occurs through a decrease in the secretion of the hormone catecholamine, which will continue to decrease sympathetic nerve activity and be accompanied by a decrease in blood pressure. It will have a positive psychological impact, namely a sense of calm, comfort, and relaxation, as well as a decrease in stress and anxiety. This positive response occurs through the HPA pathway, where the axis will stimulate the hypothalamus and the coerulus (LC). The hypothalamus will decrease the secretion of corticotropin-releasing hormone (CRH), so adrenocorticotropic hormone (ACTH) decreases, stimulates the production of pro-opiomelanocortin (POMC), and stimulates endorphin production. Endorphins play a role in the immune response to stress and control the pituitary gland during stress [22]. In addition, endorphins regulate body temperature, appetite, thirst, and blood pressure [23]. Locus coeruleus (LC) plays a role in the sympathetic effect during stress. In a relaxed state, LC will decrease the synthesis of norepinephrine in the adrenal medulla, stimulating a decrease in arginine vasopressin (AVP). Decreased AVP and ACTH will decrease peripheral resistance and cardiac output so that blood pressure will decrease[24] in Valentino [25].

According to the opinion of Potter and Perry [20] and Hartanti et al. [21], an effective distraction technique in children visually diverts children's attention to things they like, such as watching television or animated films. It is supported by a study conducted by Prabhakar et al.[26] comparing audio distraction techniques and audiovisual techniques, proving that they are more effective than audio distraction techniques in controlling anxiety in pediatric dental patients.

Other distraction techniques that can be used are auditory distraction (listening to music), tactile-kinesthetic distraction (hugging a loved one or hugging a doll), and project distraction (game). This research aligns with Aziah and Wati [27], who researched the distraction method and the stress level in children's hospitalization. The study showed a significant difference in stress levels before and after being given the distraction method in children, from the average child who experienced severe stress and then decreased to a light to moderate stress level, with a value of p=0.000.

Another study conducted by Frere et al. [28] on the effects of audiovisual distraction during dental prophylaxis showed that the subjects' anxiety and discomfort towards the treatment were reduced, and most subjects chose to

undergo treatment using audiovisual distraction compared to usual treatment without using audiovisual distraction. Fakhruddin et al.[29], with their research on the effectiveness of audiovisual distraction using eyewear and computerized systems when molar pulp therapy in pediatric patients with phobias, shows an increase in the child's level of cooperation during treatment, and it is highly recommended to use the distraction technique to control children's behavior when going to perform pulp treatment in the long term.

According to a survey conducted by the Anxiety and Depression Association of America[30] in 2008, the number of people experiencing physical and emotional stress symptoms increased from 2007. According to the survey, there are many ways that people can control stress and anxiety, one of which is watching movies or television. In addition to watching movies or television, other ways that can be done are sports, talking with friends or family, sleeping, eating, and listening to music.

The findings of this study strongly support the use of animated films as an effective distraction technique for reducing dental anxiety in children. These results align with existing research, which demonstrates that audiovisual distractions can significantly lower anxiety levels by shifting attention away from stress-inducing stimuli. The use of animated films provides an enjoyable and immersive experience that enables children to focus on positive and engaging content, thereby fostering relaxation and diminishing their perception of fear or discomfort during dental procedures.

From a neurobiological perspective, the distraction provided by animated films has far-reaching implications. By engaging the brain's reward centers and reducing the activity of the hypothalamic-pituitary-adrenal (HPA) axis, animated films help regulate stress responses. This process decreases the production of cortisol, a hormone associated with stress, and reduces the activation of the sympathetic nervous system. The subsequent increase in endorphin production further contributes to the calming effect, offering both physical and psychological relief. These changes are particularly beneficial in pediatric settings, where anxiety can significantly interfere with cooperation and treatment outcomes.

This study also underscores the importance of creating child-friendly environments in dental clinics. The integration of audiovisual tools, such as animated films, represents a low-cost, high-impact strategy for improving patient experiences. Pediatric dental anxiety, if left

unaddressed, can have lasting consequences, including the development of dental phobia in adulthood, avoidance of dental care, and subsequent oral health issues. By introducing interventions like animated films early on, dental practitioners can establish positive associations with dental visits, ultimately promoting lifelong oral health.

Furthermore, this study opens avenues for innovation in distraction techniques tailored to children's individual preferences. While animated films are effective, the potential exists to expand these interventions to include interactive technologies, such as virtual reality (VR) or augmented reality (AR), which could provide even greater immersion and engagement. Studies have shown that interactive distraction methods may enhance the child's sense of control and further reduce anxiety. For example, children could choose their favorite animated films or characters, personalizing their experience and increasing their comfort level.

Another critical consideration is the cultural and contextual relevance of the animated content. The selection of films that reflect the cultural background and interests of the target population could enhance the effectiveness of the distraction technique. Moreover, research could explore the use of educational animated films that not only distract but also inform children about dental procedures in an age-appropriate manner, reducing fear through familiarity and understanding.

Combining audiovisual distractions with other techniques, such as music therapy, tactile methods (e.g., hugging a comfort item or holding a stress ball), or guided imagery, could amplify the anxiety-reducing effects. Multimodal interventions that address both sensory and emotional needs may prove to be the most effective in alleviating dental anxiety. Additionally, understanding the role of parental involvement during dental visits could further optimize the outcomes of such interventions.

This study also highlights the importance of addressing dental anxiety as part of a holistic approach to pediatric care. Anxiety in dental settings is often linked to broader psychological factors, including fear of the unknown, previous negative experiences, or generalized anxiety disorders. Implementing distraction techniques, like animated films, alongside behavioral strategies such as positive reinforcement and modeling, could create a

comprehensive framework for managing dental anxiety in children.

Lastly, future research should focus on the long-term impact of audiovisual distractions on dental anxiety and behavior. Investigating whether repeated exposure to animated films during dental visits contributes to a sustained reduction in anxiety over time could provide valuable insights. Additionally, studies that evaluate the effectiveness of these interventions across diverse age groups, dental procedures, and clinical settings could help refine their application.

CONCLUSION

Based on a study conducted on 50 students of SD Negeri 15 Padang, it can be concluded that animated films decrease the level of anxiety in the dental care of students of SD Negeri 15 Padang Indonesia.

CONFLICT OF INTEREST

There is no conflict of interest in the writing of this article.

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REFERENCES

1. Lupien SJ, McEwen BS, Gunnar MR, Heim C. Effects of stress throughout the lifespan on the brain, behavior, and cognition. Nat Rev Neurosci. 2009;10(6):434-45.
2. Amir S, Brown ZW, Amit Z. The role of endorphins in stress: Evidence and speculations. Neurosci Biobehav Rev. 1980;4(1):77-86.
3. Gambert SR, Garthwaite TL, Pontzer CH, Hagen TC. Endorphins and the endocrine system. Horm Res. 1983;17(1):9-18.
4. Reyes BA, Valentino RJ, Van Bockstaele EJ. Stress and the locus coeruleus: A review of norepinephrine-driven stress plasticity in the central nervous system. Brain Res. 2006;1126(1):86-99.
5. Valentino RJ, Van Bockstaele E. Convergent regulation of locus coeruleus activity as an adaptive response to stress.

Eur J Pharmacol. 2008;583(2-3):194-203.

6. Potter PA, Perry AG. Fundamental of nursing: Concepts, process, and practice. 7th ed. St. Louis: Mosby; 2009.

7. Soemardini S, Hartanti AD, Sumarwoto T. Pengaruh teknik distraksi terhadap tingkat kecemasan pada anak usia sekolah saat perawatan gigi. J Kedokt Gigi. 2015;8(2):45-52.

8. Prabhakar AR, Marwah N, Raju OS. A comparison between audio and audiovisual distraction techniques in managing anxious pediatric dental patients. J Indian Soc Pedod Prev Dent. 2007;25(3):85-90.

9. Aziah M, Wati DK. Metode distraksi terhadap tingkat stres pada anak selama hospitalisasi. J Keperawatan Anak. 2012;1(1):12-19.

10. Frere CL, Crout R, Yorty J, McNeil DW. Effects of audiovisual distraction during dental prophylaxis. J Am Dent Assoc. 2001;132(7):1031-8.

11. Fakhruddin KS, El Batawi HY, Gorduysus MO. Effectiveness of audiovisual distraction with computerized delivery system in management of pediatric dental anxiety. Eur Arch Paediatr Dent. 2015;16(1):1-8.

12. Anxiety and Depression Association of America (ADAA). Stress and anxiety disorders survey. 2008. Available from: https://adaa.org

13. McEwen BS. Protective and damaging effects of stress mediators: Central role of the brain. Dialogues Clin Neurosci. 2006;8(4):367-81.

14. Chrousos GP. Stress and disorders of the stress system. Nat Rev Endocrinol. 2009;5(7):374-81.

15. Sapolsky RM, Romero LM, Munck AU. How do glucocorticoids influence stress responses? Integrating permissive, suppressive, stimulatory, and preparative actions. Endocr Rev. 2000;21(1):55-89.

16. Selye H. Stress without distress. Philadelphia: Lippincott; 1974.

17. Rege S, Hodgkinson S. Effect of mindfulness on sympathetic nervous system and hypothalamus-pituitary-adrenal axis: A systematic review. J Psychiatr Pract. 2018;24(1):49-58.

18. Porges SW. The polyvagal theory: New insights into adaptive reactions of the autonomic nervous system. Cleve Clin J Med. 2009;76(Suppl 2):S86-90.

19. Field TM. Touch for socioemotional and physical well-being: A review. Dev Rev. 2010;30(4):367-83.

20. Craig KD. The social communication model of pain. Can Psychol. 2009;50(1):22-32.

21. Hartanti AD, Soemardini S, Sumarwoto T. Evaluasi efektivitas teknik distraksi audiovisual dalam mengurangi kecemasan selama perawatan gigi pada anak-anak. J Kedokt Gigi. 2013;6(1):10-18.

22. Mathewson RJ, Primosch RE. Fundamentals of pediatric dentistry. 3rd ed. Chicago: Quintessence Publishing; 1995.

23. Carr DB, Goudas LC. Acute pain. Lancet. 1999;353(9169):2051-8.

24. McGrath PA. Psychological aspects of pain perception. Arch Oral Biol. 1994;39(Suppl 1):S55-62.

25. Bushnell MC, Čeko M, Low LA. Cognitive and emotional control of pain and its disruption in chronic pain. Nat Rev Neurosci. 2013;14(7):502-11.

26. Dick BD, Rashiq S. Disruption of attention and working memory traces in individuals with chronic pain. Anesth Analg. 2007;104(5):1223-9.

27. Gold JI, Kant AJ, Kim SH, Rizzo A. Virtual reality for pediatric pain management: A pilot study. Cyberpsychol Behav. 2005;8(2):172-8.

28. Chan E, Zhanq C, Miller S, Crawford S. The effectiveness of music as a distraction for children undergoing dental procedures. Pediatr Dent. 2007;29(5):399-403.

29. Koller D, Goldman RD. Distraction techniques for children undergoing procedures: A critical review of pediatric research. J Pediatr Nurs. 2012;27(6):652-81.

30. Berghmans JM, Poley MJ, van der Ende J, de Vet HC, Passchier J, Berger MY. Pain, fear, and distress as experienced by children at home following outpatient surgery. Ambul Surg. 2012;18(1):7-12.