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Effectiveness of motion graphic-based narrative therapy with a cognitive-behavioral approach in reducing fluoride varnish therapy anxiety for six-year-old children

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Abstract:

BACKGROUND: Fluoride varnish therapy (FVT) is a dental caries preventive service that its effectiveness has been well documented. A lot of children, especially the five-year-old and six-year-old ones, are suffering with anxiety during this service and do not readily allow it. The present study aimed to cast light on the effect of motion graphic-based narrative story with a cognitive-behavioral approach in reducing FVT anxiety among six-year-old children.

MATERIALS AND METHODS: This study was an intervention trial type that was conducted in Ardabil city and among school students. Five children suffering from FVT anxiety were randomly selected for the intervention. First, Venham and Gaulin-Kremer's anxiety scale was completed for them. The motion graphic-based narrative therapy was implemented for six weeks. Session 1 was assigned to filling the questionnaire and collecting data. The motion graphic-based narrative therapy started from the second session. The anxiety scale was filled for the children every ten days for a total of four times. The results were analyzed by Blanchard and Schwarz's progress formula and control charts. The intervention sessions included gathering information, watching motion graphics, relaxation skills, watching the process of performing fluoride varnish therapy, teaching the advantages of fluoride varnish therapy, and in the last session performing fluoride varnish therapy with the technique of attention diversion while watching motion graphics.

RESULTS: The motion graphic-based narrative therapy by the cognitive-behavioral approach proved effective in reducing anxiety. At the end of the intervention sessions, the level of anxiety decreased from 8 to 2.2 and the statistical control chart of the process shows that the intervention process is stable and the stability in order to reduce anxiety and the results are within the control limits.

CONCLUSION: The results show that motion graphic-based narrative therapy can be a psychotherapy method for reducing the symptoms of dental anxiety among children.

Keywords:

Art therapies, cognitive behaviour therapies, dental anxieties, narrative therapies

Introduction

Dental caries is a common disease among children throughout the world[1] including Iran. Many factors are responsible for it.[2] A national plan to control dental caries is the nation-wide fluoride varnish therapy project for all children aged 3-14 years.[3,4] The phobia of dental services is estimated at 20-50% among children and adolescents.[5,6] Crying, anger, and non-cooperation with dental service providers are prevailing representations in the children who are suffering from anxiety

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with dental services.[7] Consequently, dental anxiety is one of the challenges of providing children with dental services.[8] The environmental setting where dental services are provided is an important factor in creating anxiety.[9] Therefore, preparing children and reducing their anxiety in dental healthcare setting are basic actions to cope with children's anxiety.[10]

Various techniques and methods are used to alleviate children's anxiety. Attention deviation is a well-known method to control patients' anxiety and pain when they are subject to dental interventions.[11] This can be performed by different tools and methods.

Identifying factors affecting anxiety and fear of dental treatments has been considered effective in its prevention.[12] In addition to identifying effective factors, various methods are used to control fear and anxiety in children's dental services. Storytelling, especially in the form of animation, is a powerful method of communicating to change behavior, but to prove its effectiveness, it is suggested that more studies be conducted.[13]

On the other hand, storytelling in the form of illustrated books has been used to reduce anxiety in children before surgery and also to divert children's attention.[14] The use of animation showed that it is a good way to create critical thinking in education[15], and it can provide many contents in more detail to get a better understanding of the subject.[16] It provides a good opportunity for distance learning and self-learning in the field of education.[17] But storytelling in the form of motion graphics has been seen less in studies and animation is different from motion graphics and actually provides a more natural environment for education, and for this reason, it is thought to have a more effective role in improving cognitive skills, and for this reason, the present study uses motion graphics, which have a special attraction for children, as a new method to strengthen the child's cognition and to perform attention diversion techniques. The anxiety of fluoride varnish therapy (FVT) has been observed in many children. The present research used attention deviation methods to reduce anxiety by the cognitive-behavioral approach with the aid of motion graphics for the control of anxiety in children. Since this is the first research on the use of this method by narrative and motion graphics, it was conducted as a case study so that its results can be employed to design studies with larger samples.

Materials and Methods

Study design and setting

This study was an intervention trial type that was conducted in Ardabil city and among school students. The present study aimed to cast light on the effect of motion graphic-based narrative story with a cognitive-behavioral approach in reducing FVT anxiety among six-year-old children. This intervention was performed during the months of October to December 2018 at Ayeneh Counseling Center.

Study participants and sampling

Based on the formulas presented in the book of sample size in health studies of the World Health Organization[18], the number of samples required with a power of 90% and a significance level of 5% has been calculated as 5 people. Therefore, 5 random samples were selected among the children who had anxiety during fluoride varnish therapy and were selected for the present study. Five students from Martyr Jedi Boys' Elementary School in Ardabil who did not cooperate in receiving fluoride varnish therapy due to anxiety were referred to solve the problem of anxiety. After obtaining consent, a special intervention was performed for this study. The inclusion criteria were 6-year-old children who after talking to them twice about the safety of fluoride varnish therapy service and also seeing their service received by their peers, still refused to receive the service for fear of it. Exclusion criteria were parents who did not sign a consent form for counseling under the new protocol.[18]

Data collection tool and technique

Five sample children who were suffering from the FVT anxiety were selected for intervention. Venham and Gaulin-Kremer's anxiety scale was completed for them. Then, they were subjected to motion graphics-based narrative therapy for six weeks [Table 1]. The first session was assigned to questionnaire filling and data collection. The motion graphics-based narrative therapy was carried out from the second session on. The anxiety questionnaire was completed for the children four times every ten days.

The research instruments included Venham and Gaulin-Kremer's anxiety test (Venham, 1979) and the demographic questionnaire composed of the variables of age, gender, history of receiving dental services, family size, parents' literacy level, and parents' occupation.[19]

For the validity of the questionnaire, after translating the questionnaire into Farsi and re-converting it to English by two translators who had full knowledge of English and Farsi, it was approved by a panel of experts including the research team, translators and experts in Persian translation.Then, for each of the items of understanding the concepts, wrong perception and communication, four mental health experts who work in the field of children's mental health in the health system were asked for their opinion on the convenience and ease of using the visual questionnaire by children, and

the impact score was For each of the items of difficulty in understanding concepts, ambiguity and inappropriate perceptions, appropriateness and relevance of items, the impact score was estimated, and in each case, the score of the impact score was higher than 1.5, so the questionnaire has good validity. Regarding the reliability of the questionnaire using the test-retest method, it was reported as 0.70 and the coefficient of internal uniformity of the questionnaire was reported as 0.838 using the Kuder-Richardson method, which means that the questionnaire has acceptable reliability and validity.[19]

In Venham self-reported picture test, eight cards, each containing an anxious and a non-anxious picture, are shown to the child and she is asked to express her feeling based on the pictures. If the child selects the anxious picture, she is scored 1 and if she selects the non-anxious picture, she is scored zero. The total score can range from 0 to 8. Children with a score of >4 are considered anxious.

Wong–Baker Faces Pain Rating Scale was used to measure pain.This scale consists of a combination of images and numbers. The faces in this scale are determined to be between a smiling face and a sad and screaming face. It has 6 faces and a numerical score is specified for each face. Faces are graded on a Likert scale from 0 to 10. A score of 0 indicates no pain and a score of 10 indicates the highest amount of pain. Its reliability coefficient was determined by Cronbach's alpha method (0.93).[20] For anger, the Nilson and Fenage anger scale was used, which includes four cartoon faces with a four-point scale that is graded for the state of anger. 1 = none, 2 = a little, 3 = a lot, and 4 - very much. The reliability of this test has been determined by Kudrichardson method (0.96).[21] The coefficient of reliability of this questionnaire for children's anxiety has been considered 0.7. The research was registered with an ethics code of IR.ARUMS.REC.1398.654 and a code design of 3220 by the Ethics Committee at the Medical University of Ardabil.

Intervention sessions

A sample story

A sample story in the motion graphic

Dara was sitting on the stairs to the yard and was crying silently. Then, a butterfly flew and landed in front of him. The butterfly asked Dara sadly, "Hey Dara, why are you crying?"

Dara looked down, wiped his eyes with his hand, and replied, "Sure you want to say I don't like me and my teeth, too."

The butterfly moved his antennae with surprise and asked, "Don't you like yourself?"

Dara looked up and gulped. "Of course I do like me, but this baby sparrow says 'I like me, but you don't. I don't do anything harmful to my health or wound me or make me ill, and if you like yourself too, you should take care of your teeth.'"

Table 1: Intervention sessions and data collection

Week	Session	Objectives	Subject	Patient's assignment at the end of the session
1	1	Data collection for diagnosis	Filling the anxiety questionnaire	Watching a movie on how to perform FVT at home with the help of a parent
2	2 and 3	Training the self-love life skills by motion graphics-based narration	Watching a motion graphic	Watching a motion graphic and responding to questions of self-attention skill after watching the motion graphic under the supervision of a parent
3	4 and 5	Attention-deviation practice	Counting the green balls in the motion graphic	Watching the motion graphic and the story of Dara's toothache [Pic 1] for the first time and watching it for the second time to count the red balloons and filling the questionnaire of the patient's score
4	6	Relaxation training	Showing the procedure of FVT and training relaxation to the child and giving prize based on the total score in the game	Watching a movie on FVT under the supervision of parents at home and counting the number of red balls in the story [Pic 1]
5	7 and 8	Training of FVT advantages and consequences and self-awareness	The procedure of FVT and watching a motion graphic	Watching the FVTmovie at home and giving prize based on the score; Watching the motion graphic and responding to the question sheet about self-attention [Pic 2] after watching the motion graphic under the supervision of the parents
6	9	Attention deviation practice and training of the advantages of FVT	Counting the green balls in the motion graphic; The procedure of Varnish Fluoride Therapy	Watching the motion graphic and story of Dara's toothache [Pic 2] for the first time and watching it for the second time to count the red balloons and filling the patient's score questionnaire
	10	The follow-up of the protective phase	Summarizing the activity and how the families and relatives can support in the future	Post-test, how families can protect and create a warm, stress-free environment for the child; recommendation for planning for suitable exercises for the child

Pic 1: The animation of training how to enhance the self-awareness skill and the practice of attention-deviation

When the butterfly listened to Dara, she caresses his face and said, "You like yourself and you should like yourself too. But think what caused your toothache."

Dara said, "I said that it itself started to ache."

The butterfly asked, "Do you brush your teeth every night?"

Dara looked up and said, "Every night? No!"

The butterfly asked, "Do you clean your teeth after you eat candy or chocolate?"

Dara laughed, "After candy and chocolate, I don't like to brush my teeth."

The butterfly asked, "By the way, do you break hazelnuts, almonds, and pistachios with your teeth?"

Dara remembered that a few days ago, he had broken a lot of pistachios with his teeth.

The butterfly asked again, "Are you careful not to eat cold and hot foods after each other?"

The butterfly continued, "Do you go to a dentist every other time?"

Then, the butterfly looked at him. Dara answered, "You know that I don't like doctors."

The butterfly said, "Now I want to ask my last question: will you allow rubbing fluoride on your teeth to protect them against caries?"

Dara asked, "Should I do all these to keep my teeth healthy?"

The butterfly said, "So the baby sparrow was right. You don't like yourself and your teeth. I adore my beautiful wings. So, I don't fly too far because my wings are fragile

Pic 2: The movie of how to do FVT and attention-deviation practice

and get tired soon. I don't sit on thorny plants because they may damage my wings. I don't sit on dirty places to keep my wings clean. After all, I love me, so I never injure my wings."

Dara listened to the butterfly. He remembered what dangerous things he had done to his teeth. He started to understand the baby sparrow. He asked, "My dear butterfly, what should I do not to have toothache again?"

The butterfly moved her wings and answered, "It's very easy. Just try to love yourself, your teeth, and other parts of your body. If you start to love yourself truly, you won't do anything harmful to yourself and you will be careful to be healthier and happier. To keep your teeth healthy, you should brush them every morning and night and you should visit a dentist to put varnish on them." Then, the butterfly flew away.

Now, Dara was so happy for the new things he learned.

The questionnaire of work progress and prizes based on the child's progress

Dear parents,

Please ask your child the following questions and activities and send us his/her exact words and activities.

- How do Dara, the baby sparrow, and the butterfly feel?
- Can they depict their feelings (with painting, role play, etc.)?
- Who do you know can help Dara's toothache?
- What clinics do you know Dara can visit to heal his toothache?
- How do the butterfly's wings help her?
- Why should Dara like his teeth?
- What should Dara do to keep his teeth healthy and painless?

- How can Dara help his friends to keep their teeth healthy?

Please ask your child the following questions and record their answers in the Table 2.

At the end of the interventions, Blanchard and Schwarz's formula was used to check the changes in anxiety level[22]: [(Mean pre-intervention score) – (mean post-intervention score)]/(mean pre-intervention score).[23,24]

Additionally, the X-R control chart was used to examine the child's progress in reducing anxiety. This is used for numerical data when the sample size is smaller than 10, in which the mean and range of variations are used to plot the graph and check the variations. The process flow diagram or the control chart is a suitable tool to study a phenomenon over time and to examine a process. It has recently been used extensively to study the improvement of health skills or the progress of treatments at an individual or organizational level.[25]

Results

Table 3 presents the mean pre-intervention and post-intervention scores of five participants. The scores of pain, anxiety and anger of the samples along with the amount of changes are given in Table 3. So that 70% reduction in anxiety, 64% reduction in pain and 50% reduction in anger from fluoride varnish therapy based on Blanchard and Schwarz's formula shows the effectiveness of the intervention.

Table 4 shows a 70% decline in anxiety, a 54% decline in pain, and a 50% decline in anger among the children receiving FVT. To prepare the X-R control chart, we have to calculate the range of change and standard deviation for the data related to the samples in order to use the X-R control chart for analysis. Table 4 shows the data at the beginning and the first to fourth weeks of the intervention along with the scope of its changes. This chart is used when the data can be measured and the number of samples is between 2 and 10 people.

Figure 1 show the control chart was developed for pre-intervention and post-intervention anxiety of five children selected by convenience sampling. The data reveal that the consulting and training conditions during the intervention were similar for all subjects, and no variable was included during the consulting process.

Figure 2 show the consultation and training process flow diagram shows a decrease in anxiety. The last point under the low control threshold points to a specific factor during the implementation of the consultation program, i.e., consultation with the aid of motion graphics and narrative therapy.

Discussion

Based on the results, animation-based narrative therapy, which is based on the positive cognitive-behavioral principles, can reduce anxiety of children when they are receiving dental preventive services. The use of educational material and attractive educational methods for different age groups and the representation of the concerns of the characters as to how to protect

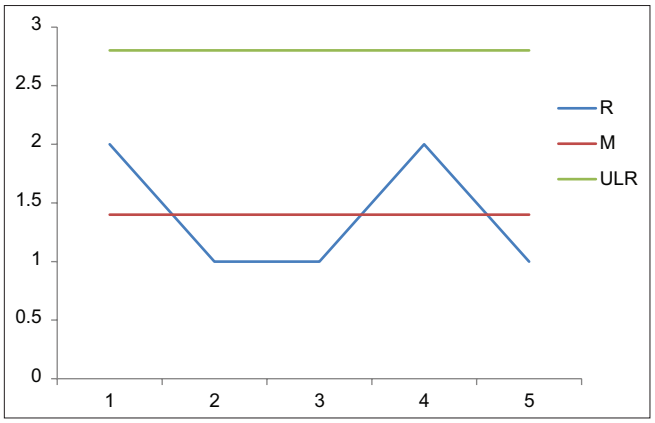

Figure 1: The X-R control chart to check the program progress by determining the graph of variations range

Table 2: Key questions and the related answers

What should be done to keep teeth healthy?	What should a child do?	What should parents do because the child is unable to do?	What should dentists do for the child?

Note: Please only record the child's answer. You can use more rows if necessary.

Table 3: The scores of five children in three tests taken before and after the intervention

Variable	Person 1		Person 2		Person 3		Person 4		Person 5		Mean		Variation %***
	PrIn*	PoIn**	PrIn	PoIn	PrIn	PoIn	PrIn	PoIn	PrIn	PoIn	PrI	PoIn	
Anxiety	8	2	6	2	7	2	7	2	7	2	7	2.2	-0.70
Pain	8	3	6	2	6	3	6	2	8	2	6.8	2.4	-0.64
Anger	3	2	4	2	2	2	3	1	4	1	3.2	1.6	-0.5

*PrIn=Pre-intervention, **PoIn=Post-intervention, ***Percent variations based on Blanchard and Schwarz's formula. (The minus sign shows a decrease in the variable, reflecting an improvement in the patient's mental state.)

Table 4: Variations in the children's mean anxiety score and standard deviation after intervention in each week

Subject	Time				
	Beginning	Week 1	Week 2	Week 3	Week 4
1	8	6	5	3	2
2	6	5	4	2	2
3	7	6	5	3	2
4	7	6	5	4	2
5	7	5	4	3	3
X	7	5.6	4.6	3	2.2
S	1.18	0.54	0.54	0.7	0.4
r	2	1	1	2	1

themselves, as well as the measures they can take to supply their health, can encourage children to improve their own health and select proper methods to solve their behavioral and health problems. By watching people in different roles in an attractive environment, children can learn how they can tackle these problems. Our results are consistent with the results of Unsteinsdottir's study[26] about the use of narrative therapy for alleviating children's behavioral problems and facilitating their emotional growth. Children's growth with narrative therapy has also been reported by Arad. The introduction of a child in an appealing role in an story can be an excellent source of training for children's growth as to the selection of a proper method to solve similar problems. Cantor showed how narrative therapy can help children solve their medical issues.[26–28] Animation is the interface between science and art,[29] which was formed on the basis of Walter Disney's animation platform. There are many animations in the Walter Disney Studio about mental health, and today this method is also used for health training.[15,30,31]

Alsaadoon showed in her study that the use of dental story book is effective in reducing the anxiety of 6-8 year old children.[32] The use of audio-visual techniques to divert children's attention in pain control and similar to the results of our study can be seen in the study of Bergomi *et al*.[33] The improvement of children's self-efficacy using animation can also be seen in the study of Yaghoubi *et al*.[34] Fan *et al*. study on the effect of animation on improving children's executive performance pointed to further study of the effects of animation on children's executive performance in the future.[35]

According to the studies carried out similar to the present study and only with the difference of replacing motion graphics with animation, it can be said that the present study was similar to the results of other studies, and it can create a good opportunity for diversity of intervention techniques to reduce anxiety in children for dental services.

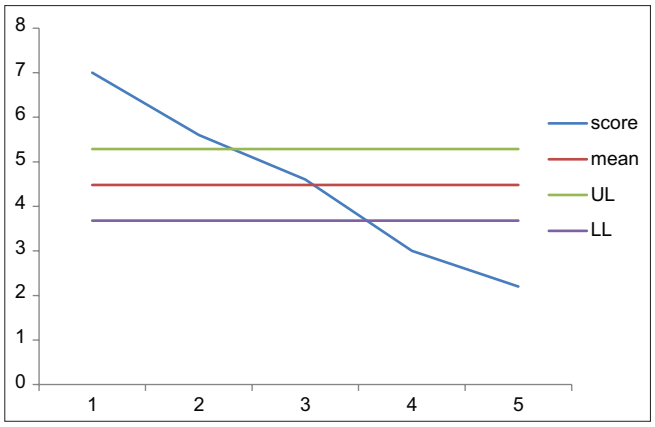

Figure 2: The X-R control chart to check the program progress process by determining the graph of means

Conclusion

Based on the results, animation-based narrative therapy with a positive cognitive-behavioral approach can be effective in reducing children's anxiety of dental services. This, however, requires designing clinical trials with an adequate sample.

Limitation and recommendation

Limitations include problems for parents to get the child to the counseling center, and it is best to provide such services, even on a trial basis, at the school. In order to solve this problem, in the school health memorandum between education and the University of Medical Sciences, it has been suggested for promotion that due to the presence of counselors in the school, the training of counselors and the use of this motion graphics and its special program with the same conditions of obtaining consent A letter from the parents and the same intervention program should be carried out at the school.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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The research was registered with an ethics code of IR.ARUMS.REC.1398.654 and a code design of 3220 by the Ethics Committee at the Medical University of Ardabil.

Conflicts of interest

There are no conflicts of interest.

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