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The Effect of Video Game Play Technique on Pain of Venipuncture in Children

Sima Kaheni[1], Masoumeh Bagheri-Nesami[2], Amir Hossein Goudarzian[3], *Mohammad Sadegh Rezai[4]

[1]Senior Lecturer, Infectious Research Center with Focus on Nosocomial Infection, Mazandaran University of Medical Sciences, Sari, Iran.
[2]Associate Professor, Infectious Research Center with Focus on Nosocomial Infection, Mazandaran University of Medical Sciences, Sari, Iran.
[3]Nursing Student, Student Research Committee, Mazandaran University of Medical Sciences, Sari, Iran.
[4]Associate Professor, Infectious Research Center with Focus on Nosocomial Infection, Bouali Sina Hospital, Mazandaran University of Medical Sciences, Sari, Iran.

Abstract

Background
The present study was designed and conducted to determine the effect of video game play on pain of venipuncture in 3-6 year-old children.

Materials and Methods
This randomized controlled trial study was conducted on 80 hospitalized children with pain of venipuncture procedures. Playing a video computer game for children during the venipuncture procedures was the intervention for the interventional group. Also the intensity of pain was measured by behavioral pain scale for children (FLACC scale) during the procedure. This scale was completed for patients without any intervention in the control group during venipuncture procedures.

Results
Pain intensity mean in the interventional group (2.65 ± 1.577) had significant changes in comparison with the control group (7.95 ± 1.084) (P<0.05). 70% of children in the control group experienced severe pain due to venipuncture procedures, but most children in the intervention group (77.5%) had a little pain.

Conclusion
According to the results, it seems that video game play intervention has a significant positive effect on the pain of venipuncture procedures in children. Further studies are recommended for the development of this technique in health care centers.

Key Words: Children, Distraction, Pain, Venipuncture, Video game play.

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Corresponding Author:

Dr. Mohammad Sadegh Rezai, Associate Professor, Research Center with Focus on Nosocomial Infection, Bouali Sina Hospital, Mazandaran University of Medical Sciences, Sari, Iran.
Email: drmsrezaii@yahoo.com

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1- INTRODUCTION

Pain is defined as one of the health problems in children and its incidence under abnormal physiological conditions is regarded as the most important body`s defense mechanism (1, 2). There is little data on the epidemiology of pain, but it is thought that the pain is taken seriously in adults for different reasons. In children, pain has no social reflection and this is why there is not enough motivation to carry out such studies (3). Because of the great importance and benefits of pain and pain control, Pain Association of America has called it as the fifth vital sign and the years of 2001-2010 is called pain control decade (4). Studies show that the main reason of the lack of referring to doctors in adults has been bitter and painful experiences of medical procedures in their 10 first years of life (5). Pain can cause numerous physiological problems such as dilated pupils, sweating, increased heart rate, increased blood pressure and skin rash (6,7) which if it is not controlled timely can cause chronic problems in the cardiovascular respiratory, safety, nutrition systems (8), longer hospital stay, excessive absence from school (9) or even death (10). In addition, psychological effects of pain can lead to decreased memory and concentration and a significant reduction in the level of self-confidence in children (11). Children become excited and irritable in response to pain, they will suffer from several disorders such as insomnia and malnutrition (12). For children undergoing painful procedures in hospitals the use of pharmacological and nonpharmacological treatments caused harmful effects of pain (13). Inserting intravenous catheter is one of the most painful and frequent acts for children in hospitals, most children express this method as the most stressful and violent course of treatment (14-16). Children in these situations cry and refuse to cooperate that this psychological suffering results in a significant reduction in successful venipuncture and will result in further problems (17). Agency for health care policy states that effective pain treatment includes drug and non-drug play therapy (18, 19). The most obvious non-drug treatment is behavioral therapy and distraction method is one of these therapies (20). In this way, pleasant things deflected attention from medical procedures and reduces the perception of pain (21). This method is much less expensive than drug therapy with fewer side effects; in addition, the measures include independent nursing activities and are very attractive to children (22). Several methods have been proposed for pain relief with non-pharmacological methods. Yoo et al. tested the effects of Animation on 20 children and found that the difference between experimental and control groups was significant (23). Gupta proved the positive effect of inflating balloons during venipuncture procedure (24). But in some studies, although the distraction method had significant effect on pain relief, a significant difference between the two groups was not created. For example, in a study, the pain of intravenous venipuncture in children was significantly reduced by listening to music but no significant difference between the two groups was created (25). In another study of non-drug treatment method, distraction reduced the fear and stress of vaccination (26). Despite the fact that these effective methods have attracted the attention of medical staff, most studies have been done in the area of chronic pain and fewer studies have been done about the effect of distraction in relieving pain caused by intravenous venipuncture in children (7, 27).

Considering the available database, few studied have been conducted in this field. Since its proper use can effectively improve the quality of clinical services, this study aimed to determine the effect of Video gameplay on the pain of venipuncture in 3-6 years children.

2- MATERIALS AND METHODS

The present study was a single-blind RCT which aims to determine the effect of video game play technique on pain of venipuncture in 3-6 year-old children hospitalized to Bu-Ali Sina hospital, Sari city, North of Iran, in 2016 (02 Jan- 15 Feb 2016). The study population consisted of all children suffering from pain of venipuncture that were treated in the pediatric ward of Bu-Ali Sina hospital. According to the study result (28), the sample size was estimated 40 people in two groups.

$$n_1 = n_2 = \frac{(\delta_1^2 + \delta_2^2) \times (Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2}{(\mu_{0-\mu_1})^2}$$

$$n_1 = n_2 = \frac{(7.3^2 + 6.8^2) \times (2.58+2.53)^2}{(18.9-10.7)^2}$$

The sample size was estimated based on a study with mean and standard deviation (SD) of pain after video game play in the interventional group 10.7± 7.3 and in the control group 18.9 ± 6.8 (29). It was calculated with statistical power of 95% and confidence level (CI) of 99% in each group that, 40 patients were enrolled in each group (**Figure.1**). Children selected by accessible sampling and 3-6 year-old children were allocated to control group and video game play group based on the table of random numbers. In this study by a 3 years old child it is meant the beginning of 3 third year to 3 years and 11 months and 29 days and by a 4 years old child it is meant the beginning of fourth year to 4 years and 11 months and 29 days and by 5 years old child it is meant the beginning of fifth year to 5 years and 11 months and 29 days. Inclusion criteria were:

- the age of child (beginning of third year to the end of sixth year),
- alertness to place,
- time and person,
- having the ability to communicate,
- not having speech and auditory disorders, need to second venipuncture due to damage of the vessel and
- the presence of a parent with the child.

If child was in life-threatening emergency or critical condition was excluded from the study. After receiving the permission of ethics committee of Mazandaran University of Medical Sciences and hospital officials, the samples were selected from among children who had inclusion criteria. Researcher introduced himself to the research subjects and after explaining the purpose of the study to the subjects and their parents, getting a written consent form parents in both groups and presented some explanations about research. For the interventional group, 3 minutes before the venipuncture procedures (29), video game play started by displaying a game on a portable monitor and continued until the end of venipuncture procedures and in the control group, venipuncture procedures was done without any intervention. On average the video game was played for each of patients about 5 minutes during venipuncture procedure. One of the parents attended during the procedure in both groups. Used video was related to Sonic games that was provided by Sega company in 2015.

Data collection instruments in this study was demographic and medical information questionnaires (gender, age and weight) and the Face, Legs, Activity, Cry, Consolability scale (FLACC). Demographic and medical questionnaire was filled out through interviews with one of the parents and patients medical record. Behavioral pain scale for children was observed and recorded from the beginning of venipuncture procedures and during of it in both interventional and control groups. Children's behavioral pain scale is used to determine the severity of pain in children during venipuncture procedures

based on children's behavioral responses. This scale including 5-section composed face, legs, activity, crying and the ability to relief. Each section accounts for 0-2 scores. Higher scores indicate bigger responses to pain. The scores of each section were separately recorded and then were summed to calculate the total score of pain. The range was from 0 to 3 (slight pain), from 4 to 7 (moderate pain) and from 8 to 10 which indicates severe pain (30). The researcher has scored this scale by observing the child's behavior during the venipuncture procedures. Children's behavioral pain scale is a valid and standard instrument and it has been used in several studies (2, 29, 30).

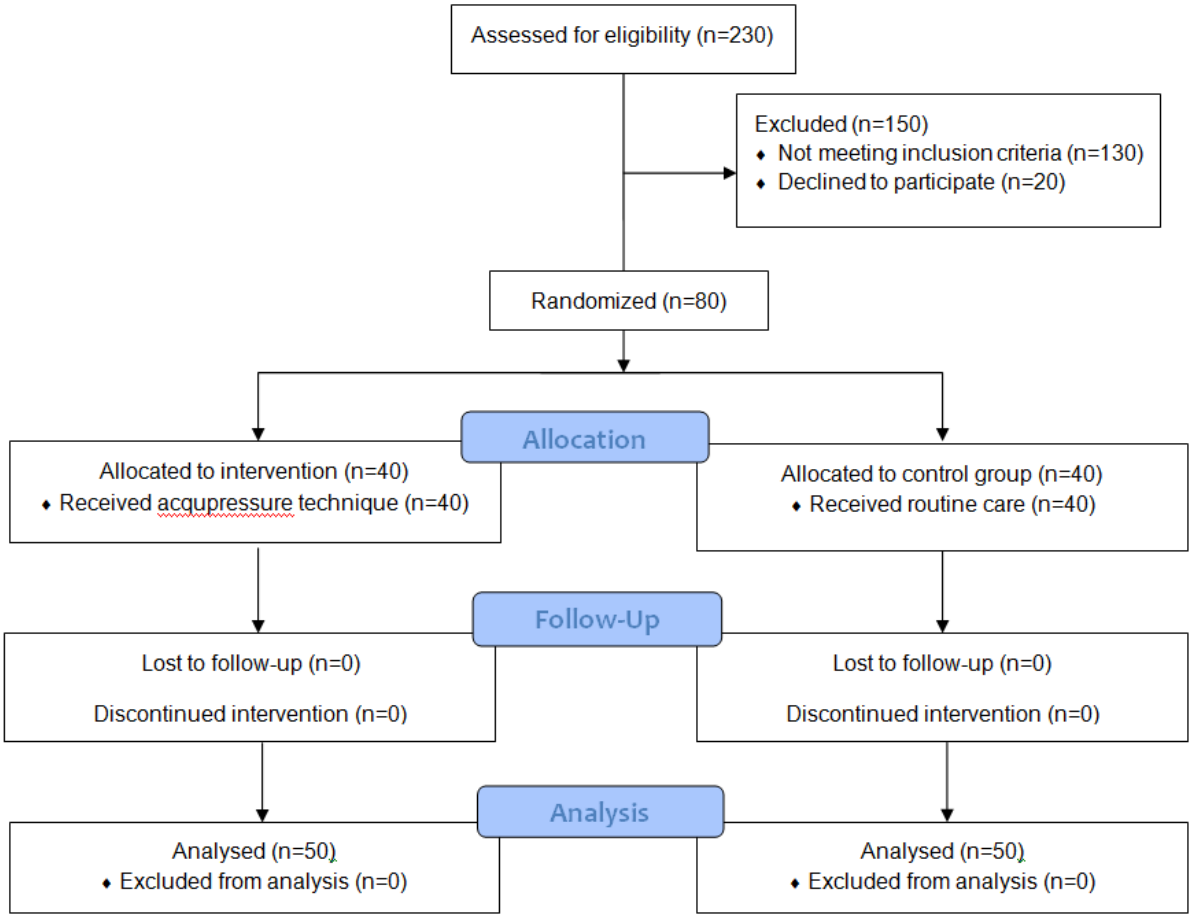

Fig1: Consort diagram

2-1. Ethical consideration

This study was conducted according to the Helsinki Statement (31) and has been approved by the ethics committee of Mazandaran University of Medical Sciences (IR.MAZUMS.REC.94-1806).

2-2. Statistical analysis

Data was analyzed using SPSS, 21.0 (released 2007; SPSS for Windows, SPSS Inc., Chicago, IL, USA). Mean and SD were used to evaluate the quantitative variables (age) and absolute and relative frequency was used to evaluate the gender. Independent T-test was used to assess changes in mean pain between the two groups. The Chi-square test was used to compare pain intensity between the two groups. In this study, a significant level of $P<0.05$ was considered.

3- RESULTS

The present study was conducted on 80 hospitalized children with demographic data presented in (**Table.1**). Age, gender and among children were not significant different in the intervention and control groups (P>0.05) (**Table.1**). The mean and standard deviation of the score of behavioral responses to pain in the control and intervention group were 7.95 ± 1.084 and 2.65 ± 1.577, respectively (**Table.2**). There was a significant difference between the two groups in terms of pain (P<0.001). Also, 70% of children in the control group experienced severe pain, but most children in the intervention group (77.5%) had a little pain. There was a significant difference found by Chi-square test in terms of pain intensity in both groups (P<0.001) (**Table.3**).

Table1. Demographic characteristics of children in control (n=40) and interventional (n=40) groups

Variables	Interventional Group	Control Group	Test	P- value
	N (%) or Mean(SD)	N (%) or Mean(SD)		
Gender				
Male	20 (46.5%)	23 (53.4%)	X^2=0.453	0.501
Female	20 (54%)	17 (46%)		
Age				
3 years	18 (64.2%)	10 (35.8%)		
4 years	9 (37.5%)	15 (62.5%)	X^2=4.119	0.249
5 years	8 (50%)	8 (50%)		
6 years	5 (41.6%)	7 (58.4%)		
Weight	14.40±1.676	14.02±1.625	t=-1.016	0.313
Time of venipuncture	4.92+1.071	4.70+0.966	t=-0.986	0.327

Table 2: Comparison the pain mean during the intervention in control and interventional groups

Variable	Mean (SD)	Independent t-test	P- value
Control group	7.95 (1.084)	17.505	0.001
Interventional group	2.65 (1.577)		

Table 3: Comparison the categorical pain intensity during the intervention in control and interventional groups by fisher test

Variable	Control group N (%)	Interventional group N (%)	P- value
Low (0-3)	0	31 (77.5%)	0.001
Average (4-7)	11 (30%)	9 (22.5%)	
High (8-10)	29 (70%)	0	

4- DISCUSSION

This study showed that distraction technique was effective on the pain of venipuncture in children. Several studies have proved the positive effect of pain distraction techniques on the pain of variety of procedures. In a study of adults undergoing flexible bronchoscopy (FB), the effects of natural signs and environmental sounds on the reduction of the pain of the procedure was demonstrated (32). when performing painful procedures, if appropriate palliative measures were not used; children will think of all nursing activities being painful and they will have this fear till adulthood (33). In another study on a number of adolescents with cancer, significant reduction of pain and anxiety was reported following the use of distraction techniques (34). Consistent with the present study, in another research on children, distraction had a significant effect on reducing the pain associated with

venipuncture (35). For children, pain is not only an unpleasant feeling, but due to lack of ability to predict and understand the causes of pain, they become confused when facing to venipuncture procedure and do not show a proper reaction, they may even conceal the pain and lack proper control by their caregivers (36). Charmaine and colleagues concluded that distraction safety measures can have significant effects on pain of a series of medical procedures and treatment (37) which is consistent with the present study.

In another study that was conducted on burned children, 13 children with the age of 4-12 years were allocated in 2 groups. In interventional group during 6 sessions, a Cartoon video was shown during dressing changes. Children have right to choose between 2 models of cartoons. Also in both groups, one hour before the intervention, children have been used Codeine phosphate drug (3 Mg/Kg). According to results, it does not seem that procedures such as cartoons broadcast have powerful and effective impact on the pain of dressing change (38). It seems that factors such as differences in the age range of the two studies, small sample size, taking sedative drug before the intervention are the possible causes of the conflict. Yoo et al. investigated the effects of distraction through animation by using laptop on the pain of venipuncture in 20 young children and showed that the intensity of pain reported by children, behavioral responses to pain, cortisol and blood glucose were significantly different in the experimental and control groups (24). Windich and colleagues in a study investigated the effect of variety of distraction that is chosen by the children themselves (such as bubble making, exciting books, music, and manual video games) on pain and fear caused by venipuncture on children and adolescents with cancer. According to the reports, pain significantly reduced in the intervention group but no significant difference was created between groups (39) and not consistent with the present study. Possible causes of this paradox can be due to the difference between children's age (5-18 years old children with an average age of 9.9 years) and the type of tool for distraction. However, in both studies, the main concept of the study (reducing effect on pain) was established. Consistent with the present study, Wang and colleagues reported the effect of watching cartoons on pain from venipuncture (40). Distraction using the five senses reduces pain and the stress of medical procedures. Distraction techniques such as using toys, bubble machines, playing music and video games are as effective as or even better than pharmacologic methods (41).

4-1. Limitations of the study

The child's habit and socio- cultural context that can influence the pain experience of children and was not controllable in the present study.

5. CONCLUSION

The results showed that distraction technique had a good effect on the intensity of pain in children. Given the need for pain control and its effects on the course of treatment, further studies are needed to be done.

6- CONFLICT OF INTEREST

The authors had not any financial or personal relationships with other people or organizations during the study. So there was no conflict of interests in this article.

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