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The Effect of Finger Play on Pain and Anxiety During Peripheral Vascular Opening Attempts in Preschool Children: Randomized Controlled Study

Okul Öncesi Dönem Çocuklarında Periferik Damar Yolu Açma Girişimi Sırasında Uygulanan Parmak Oyununun Ağrı ve Anksiyeteye etkisi: Randomize Kontrollü Çalışma

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ABSTRACT

Finger puppet play is an effective method that can be used to reduce pain and anxiety in children. Thanks to this method, nurses try to distract children and reduce their feelings of pain and anxiety. Our study was carried out in a randomized controlled manner to examine the effect of finger puppet play on pain and anxiety while establishing peripheral vascular access in preschool children who applied to the emergency department. The research population consisted of children aged 4-6 years who applied to the pediatric emergency department of a hospital in Türkiye between 25 May and 25 June 2022. The sample consisted of 97 children (49 in the control group, 48 in the finger puppet group) who met the research criteria between these dates. Stratification and block randomization methods were used to determine the experimental and control groups. The data were collected with the Questionnaire Form developed by the researcher, Child Fear and Anxiety Inventory (CFAI), and Wong-Baker Facial Expression Rating Scale (WB-FAS). During the application, the finger puppet game was shown to the experimental group. During the procedure, the child's pain and anxiety were evaluated by the child, the parent, and the researcher. It was determined that the children in the finger puppet play group experienced significantly less pain and anxiety than the children in the control group ($p<0.05$). According to the findings of the study, finger puppet application during peripheral vascular access to children aged 4-6 is effective in reducing pain and anxiety.

Keywords: Anxieyt, Child, Finger Puppet, Pain, Vasculer Access.

ÖZ

Parmak kukla oyunu, çocuklarda ağrı ve anksiyeteyi azaltmak için kullanılabilecek etkili bir yöntemdir. Hemşireler bu yöntem sayesinde çocukların dikkatini dağıtarak, ağrı ve anksiyete hislerini azaltmaya çalışırlar. Çalışmamız acil servise başvuran okul öncesi dönem çocuklarına periferik damar yolu açılırken parmak kukla oyununun ağrı ve anksiyete üzerine etkisini incelemek amacıyla randomize kontrollü olarak yürütüldü. Araştırma evrenini, Türkiye'de bir hastanenin çocuk acil servisine 25 Mayıs-25 Haziran 2022 tarihleri arasında başvuran 4-6 yaş arası çocuklar oluşturdu. Örneklemini ise bu tarihler arasında araştırma kriterlerini karşılayan 97 çocuk (49 kontrol grubu, parmak kuklası grubunda 48) oluşturdu. Deney ve kontrol gruplarının belirlenmesinde tabakalama ve blok randomizasyon yöntemleri kullanıldı. Veriler araştırmacı tarafından geliştirilen Anket Formu, Çocuk Korku ve Anksiyete Envanteri (ÇKAE) ve Wong-Baker Yüz İfadesi Derecelendirme Ölçeği (WB-YİDÖ) ile toplandı. Uygulama sırasında deney grubuna parmak kukla oyunu gösterildi. İşlem sırasında çocuğun ağrı ve anksiyetesi çocuk, ebeveyn ve araştırmacı tarafından değerlendirildi. Parmak kukla oyunu grubundaki çocukların kontrol grubundaki çocuklara göre anlamlı derecede daha az ağrı ve anksiyete yaşadıkları saptandı ($p<0,05$). Araştırmada elde edilen bulgulara göre 4-6 yaş grubu çocuklara periferik damar yolu açılması sırasında parmak kukla uygulanması ağrı ve anksiyeteyi azaltmada etkilidir.

Anahtar Kelimeler: Ağrı, Anksiyete, Çocuk, Damar Yolu, Parmak Kukla.

Ethical approval was obtained from Gümüşhane University Research Ethics Committee (Approval number: 2022/03). This study was accepted with the number E-95674917-108.99-92836.

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INTRODUCTION

Needle procedures, such as peripheral vascular access (PVA) and blood collection, are the most common painful procedures used on hospitalised children.[1] PVA is one of the most common intravenous (IV) procedures in paediatric emergency departments and is a serious source of anxiety for children and their families.[2-5] These procedures, which cause anxiety as well as pain, may adversely affect the interaction between the child and the health personnel, create psychological trauma in the child, and make it difficult to comply with the treatment.[2,6]

Appropriate pain control must be provided to improve patient care. Pharmacological and non-pharmacological methods are used to provide pain control in intravenous interventions such as peripheral vascular access in pediatric emergency services.[4] Therapeutic play has recently been used as a non-pharmacological method. Therapeutic play is a type of play applied by a trained professional according to the child's age to eliminate the fear and anxiety that result from the child having an unfamiliar experience.[7] Puppets are among the therapeutic play materials used as a play activity for children in the hospital setting.[8,9] They contribute to the emotional, social and personal development of children and provide an opportunity for them to express their feelings freely.[10] By using puppets, nurses can establish healthy relationships with children and understand their feelings during painful medical procedures.[7,11] A research of children diagnosed with cancer reported that puppet play helped their fight against the disease by allowing them to express their feelings and thoughts.[12]

Four- to six-year-old children mostly play with hand and finger puppets. Thanks to finger puppets, children express their feelings with the happiness of putting the puppets on their fingers, feeling safe and secure.[13–15]A research conducted to examine the effect of finger puppet play on the relief of postoperative pain in children showed that it was effective.[9] A similar research found that finger puppet play reduced children's fear of surgery.[13]

There is a need for randomised controlled studies examining the effect of finger puppet play on pain and anxiety during intravenous procedures in preschool-age children. In the study, it is thought that puppet play applied may also be effective during intravenous intervention. This research examined the effect of finger puppet play during attempts at peripheral vascular access for preschool-aged children in the emergency room.

Hypothesis of the research

The hypothesis of the research were as follows:

H_1. Finger puppet play applied during the attempt to open a peripheral vascular access in the paediatric emergency room reduces the pain level of children.

H_2. Finger puppet play applied during peripheral vascular access in the paediatric emergency service reduces children's anxiety level.

MATERIAL AND METHOD

Design

This study is a randomised controlled experimental research.

Setting and Sample

The research sample consisted of children who applied to the Emergency Paediatric Service of the University Health Research and Application Hospital and diagnosed with PVA between 25 May and 25 June 2022. Ninety-seven children met the research criteria. Verbal consent was obtained from the children participating in the study, and written consent was obtained from their families. To estimate the sample size, a power analysis was performed before the start of the research, and it was found that the research should be performed with at least 62 children to obtain 80% power at the 0.05 significance level and

95% confidence interval. As a result of this research, it was planned to have a total of 100 children, 50 in the control group and 50 in the experimental group; however, the control group consisted of 49 children and the experimental group of 48 for reasons such as an inability to open a vascular access at once or the separation of the mother or the child from the research . To calculate the adequacy of the sample size, a post hoc power analysis was performed at the end of the research (n1=49, Mean1=5.67, SD=2.14; n2=48, Mean2=2.48; SD=2.12). According to the power analysis, the Cohen's d effect size is 1.49, with a 95% confidence interval and a significance level of 0.05.

The inclusion criteria were as follows: having no vision, hearing, mental and neurological impairments, aged 4–6 years, no chronic disease, not hospitalized, no history of use of narcotic substances, tranquilizers and analgesia twenty-four hours before the admission and no febrile illness at the time of admission. Verbal consent was obtained from the children participating in the study and their families. Written consent was obtained from their families

Data Collection Instruments

Data were collected using three questionnaires. These included a researcher-developed demographic questionnaire, the Child Fear and Anxiety Inventory (CFAI), and the Wong-Baker Facial Expression Rating Scale (WB-FAS).

Demographic Questionnaire

The questionnaire prepared by the researcher consisted of 10 questions aiming to reveal the characteristics of the child and their families (age, income status, gender, social security status, family age and education level, fear of interference and family type).

Child Fear and Anxiety Inventory

In 2011, McMurtry et al.'s scale was created to measure children's fear and anxiety levels.[16] There are five facial expressions in the scale between 0 and 4 points. The child is asked to choose one of these facial expressions. This scale can be applied by the child, families and researcher to measure anxiety and fear before and during the procedure. The value of '0' in the scale indicates 'no fear and anxiety' and a value of '4' indicates 'highest fear and anxiety'. Evaluation of the scale is as follows:

- '0' → 'neutral expression (without anxiety)'
- '1' → 'little fear (little anxiety)'
- '2' → 'some fear (some anxiety)'
- '3' → 'more fear (more anxiety)'
- '4' → 'highest possible fear (severe anxiety)'.

Wong-Baker Rating Scale for Facial Expressions

This scale was developed by Wong and Baker in 1981 and revised in 1983. The scale is used to measure pain in children aged 3-18 years. There are six faces on this scale, from left to right and from zero to five, representing progressively increasing pain intensity. The rightmost face represents the tearful face, which indicates the most severe pain, while the leftmost face represents the smiling face, which indicates a painless state. Six facial expressions from left to right are scored between 0-5 points (0 point = very happy/no pain, 5 points = indicates the most severe pain).

As the score obtained from the scale increases, pain increases, and as the score decreases, pain decreases. The child is asked to choose the face that best reflects her feelings. While applying the scale to the child, it is explained that each face belongs to a person; There are sad faces that feel a little or more pain on the scale, and happy faces that feel no pain at all.[17,18]

Intervention Tool Used in the Research

Child Finger Puppets

The researcher used finger puppets as an intervention tool. Different finger puppets were made for each finger. The puppets are visually striking, colourful and made of felt as they can be washed if desired, thus minimizing the risk of infection. The puppets

were attached to five of the researcher's fingers, starting just before the PVA procedure. During the procedure, the child sings songs in accordance with the child's age, which attracts the child's attention. The finger game songs were chosen by the child development specialist in accordance with the age of the child. Also, the researcher received training from a child development specialist to use finger puppetry.

Ethical Approach

Ethical approval was obtained from the necessary institutions to conduct the research. The parents and children participating in the research were informed, and verbal consent was obtained from the children and written consent was obtained from the families. Those who accepted the research were informed that they could withdraw from the research at any time and their information would be kept confidential.

Data Collection Procedures

Data were collected from children who came to the paediatric emergency department between 25 May and 25 June 2022. The researcher observed three days in the emergency room before collecting the data. An introductory questionnaire was filled out by the researcher face-to-face interview with the children and families who agreed to the research criteria and accepted the research. Stratification and block randomization methods were used in the assignment of the experimental and control groups. When the literature is examined, it has been revealed that fear of interventional procedures and gender are among the factors affecting the pain and anxiety experienced by children during interventional procedures.[19–21] Based on this information, the variables of gender and fear of interference were used in this research in the stratification of children. Randomization with blocks was applied, stratified as male and female for the gender variable and as afraid and not afraid for the variable of fear of the PVA procedure. In the research, 50 children were included in each of the research groups by ensuring that the layers were repeated five times (2 × 2 × 5). The closed envelope method was used to prevent bias in the assignment of stratified children to the experimental and control groups. To prevent a child in one group from being affected by the procedure applied to the other group in the research, the data from the other group were collected after the data of one group were completed. The data collection order of the groups was determined using the closed envelope method. The researcher introduced the measurement tools (CFAI and WB-FAS) to be used by parents and children. The process took five minutes.

All research was carried out by the same paediatric nurse who had five years of experience in the field to reduce the errors caused by the nurse during the procedure. In the research, there was a condition in which the opening vascular access was provided at once. Vascular access that could not be opened in one turn was not included in the research.

Control Group (n=49)

Before the PVA procedure, the child in the control group was scored by the parent and researcher on the CFAI and WB-FAS. The nurse came to the intervention room with her supplies for PVA procedure. Vascular access was established according to the routine practice of the clinic. After the procedure, the children, parents and researcher filled out the CFAI and WB-FAS.

Experimental Group (n=48)

Before the PVA procedure, the child was scored by the parent and researcher on the CFAI and WB-FAS. The nurse came to the intervention room with her materials for the PVA procedure. The researcher put finger puppets on their fingers and sang songs according to the characteristics of the finger puppets to attract the attention of the child. After the procedure, the children completed the CFAI and WB-FAS with their parents and the researcher.

Data Analysis

The data were evaluated in the computer environment using the Statistical Package for Social Sciences (SPSS) 22.0 package programme. Analysis of variance, mean,

percentage distributions, chi-square test, standard deviation and t-test for independent groups were used in the analysis of the data. The researcher's findings were evaluated at $p<0.05$ significance level and 95% confidence interval.

Limitations

The limitations of this research are as follows: Since the research was conducted in only one public hospital in Türkiye, the results cannot be generalized to other Turkish children who had peripheral vascular access in other pediatric emergency departments.

RESULTS AND DICCUSSION

Key participant features

Table 1. Comparison of the Groups According to the Descriptive Characteristics of the Children

Features	Control Group (n=49)		Experimental Group (n=48)		Test and p
	n	%	n	%	
Age (Mean±SD*)	4.63±0.80		4.91±0.84		t=1.690 p=0.94
Gender					
Girl	22	44.9	13	27.1	χ2=3.337 p=0.68
Male	27	55.1	35	72.9	
Fear of interference					
Afraid	35	71.5	39	81.2	χ2=1.293 p=0.255
Not afraid	14	28.5	9	18.8	
Total	**49**	**100.0**	**48**	**100.0**	

**Mean±Standard Deviation*

In this research, age (t=1.690, p=0.94), gender (χ2=3.337, p=0.68) and fear of intervention (χ2=1.293, p=0.255, Table 1) of the children were recorded in the control and experimental groups. It was found that the two groups were similar to each other according to the descriptive characteristics of the children between the control and experimental groups (p>0.05, Table 1).

Table 2. Comparison of Groups According to Families' Descriptive Characteristics

Features	Control Group (n=49)		Experimental Group (n=48)		Test and p
	n	%	n	%	
Family type					
Nuclear family	38	77.6	41	85.4	χ2=0.993 p=0.319
Extended family	11	22.4	7	14.6	
Table 2. (Continued)					
Mother education status					
İlliterate	7	14.3	0	00.0	
Primary school	13	26.5	16	33.3	χ2=8.449 p=0.133
Middle school/ High school	21	42.9	20	41.7	
University	8	16.3	12	25.0	
Father's education					
İlliterate	6	12.3	0	00.0	
Primary school	12	24.5	8	16.7	
Middle school/ High school	23	46.9	23	47.9	χ2=12.113 p=0.33
University	8	16.3	17	35.4	
Social Security					
Yes	43	87.7	47	97.9	χ2=3.739 p=0.053
No	6	12.3	1	02.1	
Income status					
High	8	16.3	15	31.2	χ2=3.505 p=0.173
Middle	35	71.4	30	62.5	
Poor	6	12.3	3	06.3	
Total	**49**	**100.0**	**48**	**100.0**	

In Table 2, the educational status of the mother (χ2=8.449, p=0.133), father's education level (χ2=12.113, p=0.33), social

security ($\chi2$=3.739, p=0.053), family type ($\chi2$=0.993 belonging to a family, p=0.319) and income status ($\chi2$=3.505, p=0.173) are given. The demographics of the control and experimental groups were similar to each other; there is no statistically significant difference between them (p>0.05, Table 2).

Anxiety and pain levels before the procedure

Table 3. Comparison of Children's Preprocedural CFAI and WB-FAS Mean Scores

Evaluation	Control Group (n=49)	Experimental Group (n=48)	Test and p
	Mean±SD*	Mean±SD*	
CFAI			
Child	2.73±1.07	2.37±0.78	t=1.875 p=0.063
Parent	1.65±0.90	1.62±0.70	t=0.171 p=0.865
Researcher	1.95±1.77	1.93±0.75	t=1.093 p=0.277
Test and p	F:0.785 p:0.425	F:0.796 p:0.464	
WB-FAS			
Child	2.08±0.91	2.10±0.86	t=1.179 p=0.268
Parent	1.96±0.83	1.89±0.92	t=0.416 p=0.614
Researcher	1.88±0.78	1.91±0.72	t=0.317 p=0.793
Test and p	F:0.838 p:0.394	F:0.865 p:0.358	

**Mean±Standard Deviation*

Pre-procedural CFAI and WB-FAS mean scores were compared between the groups by the child, parent and researcher. No difference was found between the control and experimental groups by any of the three evaluators. In the control and experimental groups, the pre-procedural CFAI and WB-FAS scores were similar. In addition, it was revealed that the mean score of the CFAI and WB-FAS scales was similar among the in-group evaluators (child, parent, researcher) before the procedure (p>0.05, Table 3).

Finger game puppets for pain reduction

Table 4. Comparison of Children's Mean Order of Procedure WB-FAS Scores

Evaluation	Control Group (n = 49)	Experimental Group (n=48)	Test and p
	Mean±SD*	Mean±SD*	
Child	3.06±0.92	2.14±0.77	t=5.297 p = **0.000**
Parent	1.83±0.77	1.43±0.71	t=2.644 p = **0.000**
Researcher	2.26±0.81	1.37±0.89	t=5.152 p = **0.000**
Test and p	F:0.742 p:0.480	F:0.768 p:0.475	

**Mean±Standard Deviation*

WB-FAS score averages were repeated for the child (t=5.297, p=0.000), parent (t=2.644, p=0.000) and researcher (t=5.152, p=0.000, Table 4) during the control and experimental groups attempting PVA procedure. There was a statistically significant difference between the groups by all three evaluators (p<0.05). According to these results, finger puppetry was found to reduce pain. In addition, ıt was revealed that the mean score of the WB-FAS scale was similar between the in-group evaluators (child, parent, researcher) during the procedure (p>0.05, Table 4).

Finger puppet play reduces anxiety

Table 5. Comparison of Children's Mean Order of Procedure CFAI Scores

Evaluation	Control Group (n=49)	Experimental Group (n=48)	Test and p
	Mean±SD*	Mean±SD*	
Child	2.28±0.79	1.64±0.63	t=6.019 p=**0.000**
Parent	1.55±1.52	1.14±0.58	t=1.732 p=**0.008**
Researcher	1.69±0.82	1.12±0.86	t=3.319 p=**0.001**
Test and p	F:0.865 p:0.346	F:0.814 p:0.378	

**Mean±Standard Deviation*

In the research, the level of anxiety experienced by the children during the PVA procedure was re-evaluated by the children (t=6.019, p=0.000), their parents (t=1.732, p=0.008) and the researcher (t=3.319, p=0.001, Table 5) using the CFAI. A statistically significant difference was found

between the control and experimental groups. According to this research, finger puppetry reduces anxiety in children. ($p<0.05$, Table 5). In addition, ıt was also revealed that the mean score of the CFAI scale was similar between the in-group evaluators (child, parent, researcher) during the procedure ($p>0.05$, Table 5).

In this research, the effect of finger puppet play on pain and anxiety in children during the attempt for PVA procedure in the pediatric emergency service was examined and the results of the research were interpreted and discussed by the researcher in line with the relevant literature.

The control and experimental groups were compared according to the introductory characteristics of the children (gender, average age, fear of the procedure) and their families (parental education level, family type, social security status, income status) and it was found that the groups were similar in terms of the variables listed. The similarity of the groups according to these variables has the potential to affect children's pain perceptions and response levels; it is important in terms of showing the effect of the finger puppet game applied during the PVA procedure on the pain and anxiety level of children.

In this research, the level of pain and anxiety was evaluated by the child, parent and researcher before the PVA procedure. As a result of the evaluation, no difference was found between the control and experimental groups. Both groups experienced pain and anxiety similarly. The fact that the pre-procedure groups had similar levels of pain and anxiety is an important result for measuring the effectiveness of this finger puppet game.

In this research, the pain point averages of the finger puppet game applied during the PVA procedure in the pediatric emergency service were evaluated by the child, parent and researcher. The mean child pain scores of the experimental group were found to be significantly lower than those of the control group. This result supports the H_1 hypothesis that 'finger puppet play applied during peripheral vascular access attempt in the pediatric emergency service reduces the pain level of children." The results of this research support similar studies in the literature. Puppets were shown to children aged 7–11 by Suzan et al. during circumcision surgery. It was found that it reduced the pain that occurred during and after circumcision in the experimental group in which the puppet show was performed.[22] Kurt and Seval found that finger puppet play reduced postoperative pain in 90 children aged 1–5 years who had undergone surgery.[9] In another research, it was reported that puppet shows performed for children with peripheral vascular access reduced pain.[23] In studies conducted on children of different age groups, therapeutic games applied in painful procedures have been found to be effective in reducing the child's pain.[24,25]

Anxiety levels were evaluated by the child, parent and researcher during the PVA procedure. As a result of the evaluation, the anxiety level of the control group was found to be higher than that of the experimental group. These results support the H_2 hypothesis that 'finger puppet play applied during peripheral vascular access in the pediatric emergency service reduces the anxiety level of children'. The results of previous studies are like ours. In a research conducted to examine the anxiety levels of children who had undergone surgery, it was determined that puppet play and therapeutic play groups experienced less anxiety than the control group.[26] In the research conducted by Manalu et al., a difference was found between the level of anxiety before and after the blood transfusion of the hand puppet game played during the blood transfusion of thalassemia patients aged 3–6. Anxiety levels were found to be lower in the puppet play group.[27] In other studies, it was found that distraction applied during the peripheral vascular access procedure in pediatric emergency services reduces the level of anxiety in children.[28–30]

In this study found that finger puppet play applied during peripheral vascular access to children in the pediatric emergency service reduced the child's pain and anxiety levels. The pain scores of the children in the

intervention group were significantly lower than those in the control group. Similarly, anxiety levels were also found to be low. Based on these results, we conclude that finger puppet play reduces pain and anxiety.

CONCLUSION AND RECOMMENDATIONS

The results of this research showed that the finger puppet game, which was applied during the opening of vascular access in the pediatric emergency service, was effective in relieving the pain and anxiety of preschool children. The findings of this research suggest that it could also be tested in other fields, such as pediatrics.

Randomized controlled studies can be conducted in the future with different age groups and different intravenous applications, such as blood collection. Since emergency nurses work hard, they can get help from a child development specialist for finger puppet play during the peripheral vascular access.

It will be possible to make finger puppet play routine in children aged 4–6 years who have vascular access in pediatric emergencies. Due to the positive results, pilot tests are warranted as complementary therapy in nursing, especially in pediatrics and other areas. Nurses can be trained in finger puppet play.

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