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Original Article

Effects of Distraction Methods on Pain Perception and Anxiety Levels in Children during Blood Collection

Kan Alma Sırasında Uygulanan Dikkati Başka Yöne Çekme Yöntemlerinin Çocuklarda Ağrı Algısı ve Anksiyete Düzeyine Etkisi

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ABSTRACT

Objective: This study was conducted to investigate the effects of music, kaleidoscope, and video methods on children's pain perception and anxiety level during the blood collection procedures.

Material and Methods: This study is a randomized controlled trial. The study was carried out with 134 children in the 5-10year age group in the pediatric blood collection unit of a training and research hospital between August and December 2018. In this study, nonpharmacological methods were applied to the children in the experimental groups (music group [n=33], kaleidoscope group [n=36], and video group [n=31]). The routine blood collection procedure was used for the children in the control group (n=34). The data were collected using the Information Form, Children's Fear and Anxiety Scale, and the Wong-Baker Faces Pain Rating Scale.

Results: Pain perceptions and anxiety levels in the music, kaleidoscope, and video groups were found to be significantly lower than the control group, according to the children's, parents,' and observer's statements ($p<0.001$). There was no statistically significant difference between the use of music, kaleidoscope, and video methods in reducing pain perception and anxiety level during the blood collection procedures ($p<0.05$).

Conclusion: The methods of music, kaleidoscope, and video can be used to reduce the children's perception of pain and anxiety levels during the painful medical procedures, such as blood collection. Distraction methods, such as music, kaleidoscope, or video, can be used to reduce pain perception and anxiety of children during medical procedures.

Keywords: Anxiety, blood collection, children, nursing, pain

ÖZ

Amaç: Araştırma kan alma işlemi sırasında uygulanan müzik, kaleydoskop ve video izleme yöntemlerinin çocuklarda ağrı algısı ve anksiyete düzeyine etkisini incelemek amacıyla yapıldı.

Gereç ve Yöntem: Araştırma, bir eğitim ve araştırma hastanesinin çocuk kan alma biriminde Ağustos-Aralık 2018 tarihleri arasında 5-10 yaş arası 134 çocuk ile randomize kontrollü deneysel bir çalışma olarak gerçekleştirildi. Araştırmada deney gruplarındaki çocuklara (müzik grubu (n=33), kaleydoskop grubu (n=36), video grubu (n=31) kan alma işlemi sırasında ilgili grubun nonfarmakolojik yöntemi uygulandı. Kontrol grubundaki çocuklara (n=34) rutin kan alma işlemi yapıldı. Veriler toplanmasında "Bilgi Formu", "Çocuk Korku Ölçeği" ve "Wong-Baker Yüz İfadelerini Derecelendirme Ölçeği" kullanıldı.

Bulgular: Araştırmada çocuk, ebeveyn ve gözlemci ifadelerine göre müzik, kaleydoskop ve video grubundaki çocukların kan alma işlem sırasında ağrı algısı ve anksiyete düzeylerinin, kontrol grubuna göre daha düşük olduğu saptandı ($p<0,001$). Kan alma işlemi sırasında ağrı algısı ve anksiyete düzeyini azaltmada müzik dinleme, kaleydoskop ve video izleme kullanımı arasında istatistiksel olarak anlamlı farklılık olmadığı bulundu ($p<0,05$).

Sonuç: Müzik, kaleydoskop ve video izleme yöntemleri kan alma işlemi gibi ağrılı tıbbi girişimler sırasında çocukların ağrı algısı ve anksiyete düzeyini azaltmada kullanılabilir.

Anahtar Kelimeler: Ağrı, anksiyete, çocuk, hemşire, kan alma

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Introduction

Medical procedures, such as blood collection and vaccinations, especially the ones performed using injectors, are one of the children's greatest sources of pain, fear, and anxiety (1-3). Unmanaged pain and anxiety during the medical procedures can result in greater perception of pain, injector phobia, and rejection of medical care in children (4, 5). Lack of proper management caused by medical procedures is an indication that it can cause long-term psychological and physiological effects in children. Therefore, pain perception and anxiety caused by medical interventions in children need to be managed effectively (6, 7). Nonpharmacological methods can be used to reduce pain perception and anxiety levels during the interventions. Studies show that nonpharmacological methods reduce the perception of pain and anxiety levels during invasive procedures (8, 9). However, it is important to conduct studies, with a high level of evidence, comparing these methods with each other in children of different age groups. Given this information, this study was performed on the effects of distraction methods (music, kaleidoscope, and video) on children's pain and anxiety levels during the blood collection procedures.

Material and Methods

Design

This study was performed in a training and research hospital between August and December 2018. This randomized controlled study was carried out to investigate the effects of music, kaleidoscope, and video methods on children's perceived pain and anxiety levels during the blood collection procedures.

Setting and Sample

This study was conducted with 134 children between the ages of 5 and 10 years, who were admitted to the hospital for health control and were sent by the physician to the blood collection unit. The research inclusion criteria included being healthy, able to express himself/herself verbally, no analgesic taken in the last 6 hours, and having no visual or auditory problems. The reason for the inclusion of children in the 5–10 year age group in the study is that the validity and reliability of the children's fear scale are valid only in this age group.

The sample size was determined according to the study conducted by Kunjumon and Upendrababu (2018) on the effect of the kaleidoscope on pain perception during the blood collection in children. According to the study results, Wong Baker Faces Pain Rating Scale (WB-FPRS) scores in children were 2.8±2.6 in the kaleidoscope group and 8.5±1.8 in the control group. In the study carried with 30 children (experimental group, n=15; control group, n=15), the effect size was calculated as d=2.549 in 95% confidence range at α=0.05 level (10). In this regard, considering that there may be data losses during the research process, it was decided that the research should be carried out with 160 individuals by assigning 40 individuals in each group.

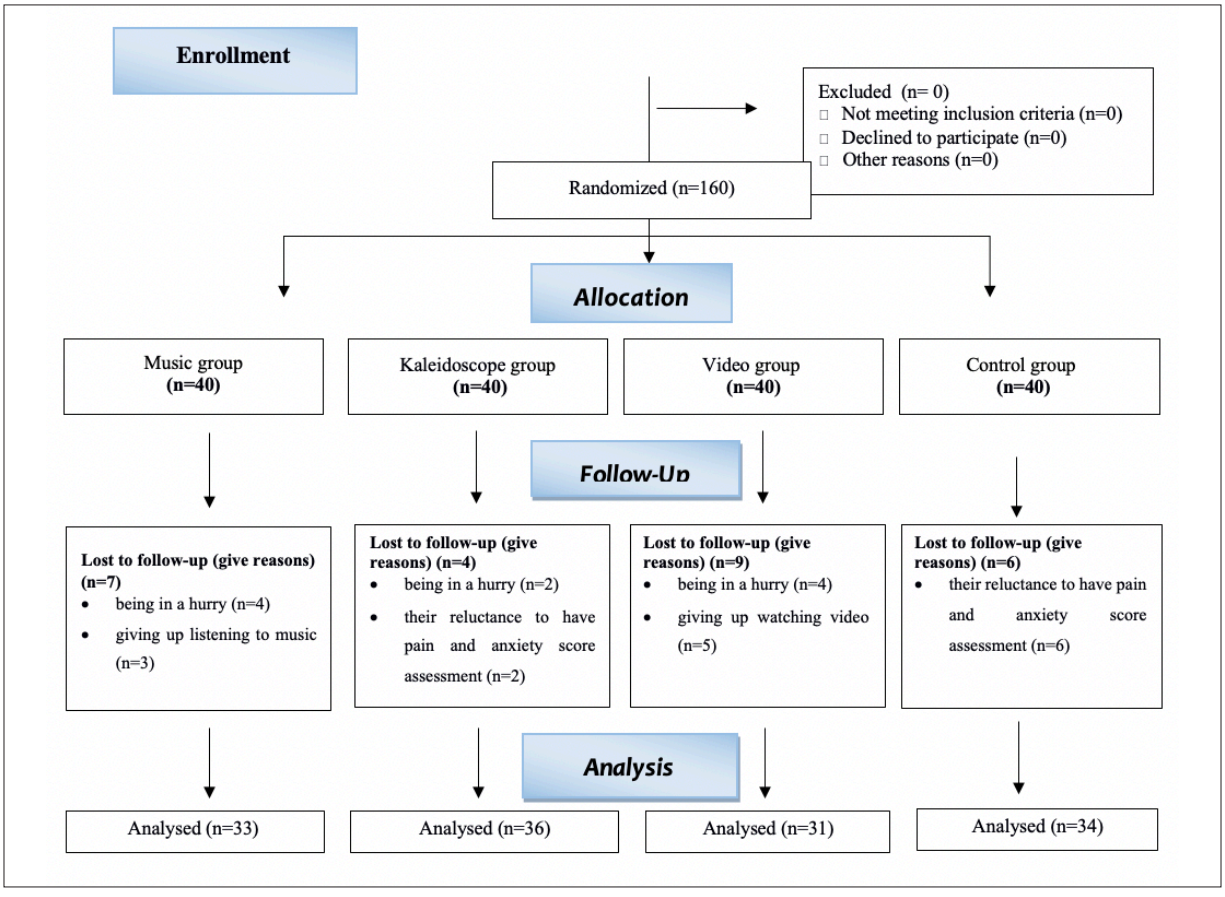

Figure 1. Flow diagram of consolidated standards of reporting trials

The 160 children in the sample were randomly assigned to the control and experimental group (music, kaleidoscope, and video). Groups of the children were determined by a randomization program (http://www.randomization.com/). To provide the distribution of numbers to the groups, numbers from 1 to 160 were randomly assigned to 4 groups, assuming that Set 1 represents the Music Group, Set 2 represents the Kaleidoscope Group, Set 3 represents the Video Group, and Set 4 represents the control group.

In the groups, 26 children were excluded because of various reasons (music group: for being in a hurry [n=4]; for giving up listening to music [n=3]; kaleidoscope group: for being in a hurry [n=2]; for their reluctance to have pain and anxiety score assessment [n=2]; video group: for being in a hurry [n=4]; for giving up watching video [n=5]; control group: for their reluctance to have pain and anxiety score assessment [n=6]). Therefore, a total of 134 children were included in the study, including 33 children in the music group, 36 children in the kaleidoscope group, 31 children in the video group, and 34 children in the control group (Figure 1).

Measurement

The data were collected using the Information Form, Children's Fear and Anxiety Scale, and Wong-Baker Faces Pain Rating Scale.

Children's Fear Scale (CFS): It was developed by McMurtry et al. (1). It is a scale of 5 facial expressions used to assess the anxiety level of children in the 5-10-year age group. The level of anxiety is assessed by the numbers "0" to "4" corresponding to each facial expression. A score of "0" indicates "no anxiety," whereas a score of "4" indicates "severe anxiety."

Wong Baker Faces Pain Rating Scale: It is used to assess the level of pain in children in the 3-18-year age group. Pain score is determined based on the numerical values given to faces on the scale. The lowest score is "0," and the highest score is "10." As the score taken in the scale increases, pain tolerance decreases.

Procedure

In the first phase of the study, children who met the sample selection criteria were determined. A total of 134 children and parents who met the data collection criteria were informed about the research and asked whether they wanted to participate in the research. The children who agreed to participate in the study were divided into 4 groups: music, kaleidoscope, video groups, and control group.

Age and sex of the children were recorded in the Information Form. Before randomization, the child and family were shown the Children's Fear and Anxiety Scale and WB-FPRS and were informed about how to fill these scales. Before the blood collection, the child was asked to mark his/her own anxiety level on the scale. The parent and researcher both assessed the child's anxiety level before the blood collection procedure. After randomization, the child and the family were informed about the distraction method to be applied.

Music group

The children in the music group were asked about the music they wanted to listen to before the blood collection. The children in the music group were allowed to listen to the music they wanted, starting 2 min before the blood collection until the end of the procedure.

Kaleidoscope group

Children in the kaleidoscope group were informed about kaleidoscope. The children in the kaleidoscope group were shown shapes through kaleidoscope, starting 2 min before the blood collection until the end of the procedure. The children were asked about the colors and shapes they saw on the kaleidoscope.

Video group

The children in the video group were asked which cartoon they wanted to watch before the blood collection. The children in the video group were shown cartoons suitable for their developmental level and age, starting 2 min before the blood collection until the end of the procedure.

Control group

No distraction method was applied to the children in the control group.

The blood collection was performed in the same room for all the children and by the same pediatric nurse. The nurse had 5 years of blood collection experience. During the blood collection, the families stayed with their children but did not act to calm their children. Blood collection was performed on all the children's left arm, using a 21 g×1½-thick needle tip with a vacuum tube. The blood was collected on the first try in children. Anxiety levels and pain perceptions of children during the blood collection were assessed independently by the children, parents, and researcher.

Statistical analysis

The IBM The Statistical Package for Social Sciences version 22.0 software (IBM Corp.; Armonk, NY, USA) program was used for analyzing of the data. The normality of the data was evaluated with skewness and kurtosis values. If the skewness value is within ±1 and the kurtosis value is within the range of ±2, the data are considered to be normally distributed (11, 12). In the study, it was found that skewness values of the data were between ±1 and kurtosis values were between ±2 ($p>0.05$). The data of the introductory characteristics were analyzed using the chi-square and t test. One-way analysis of variance was used to compare the anxiety and pain variables. The Bonferroni test was used in post-hoc analyses. The level of significance was $p<0.05$.

Ethical considerations

The ethics permission was obtained from the ethics committee of Adıyaman University (No: 2018/2-23). The children and parents were informed about the research. Oral and written consents were obtained from children and parents through the information and consent form. They were also informed that they could leave the research at any time and did not have to specify any reason for this.

Results

There was no statistically significant difference between the age, sex, and anxiety score averages of the children in the groups (p>0.05). Children in the music, video, and kaleidoscope groups were found to be similar from the point of introductory characteristics and anxiety scores before the blood collection (p>0.05; Table 1).

Considering the anxiety score averages of children during the process of blood collection in the groups, there was a statistically significant difference between the groups in terms of children's (c), parents'(p), and researchers'(r) statements (p<0.001). The anxiety score averages of the children in the music (mean±standard deviation [$\bar{X}$±SD]=c:1.00±1.22, p:1.09±1.18, r:1.06±1.19), kaleidoscope ($\bar{X}$±SD=c:1.02±0.84, p:1.33±0.41, r:1.44±0.93), and video groups ($\bar{X}$±SD=c: 1.35±1.05, p:1.12±0.99, r:1.22±1.11) were found to be lower than the control group ($\bar{X}$±SD=c: 2.67±1.24, p:2.97±1.05, r:3.32±0.84; p<0.001; Table 2).

Considering the pain scores of children during the process of blood collection in the groups, there was a statistically significant difference between the groups in terms of children's, parents', and researchers' statements (p<0.001). The pain score averages of the children in the music ($\bar{X}$±SD=c:2.78±2.54, p:2.69±2.03, r:2.57±1.82), kaleidoscope ($\bar{X}$±SD=c:2.80±2.01, p:3.16±1.61, r:3.50±1.55), and video groups ($\bar{X}$±SD=c:2.90±1.92, p:2.70±1.50, r:3.09±1.70) were found to be lower than the control group ($\bar{X}$±SD=c:6.52±2.04, p: 7.00+2.26, r: 7.38±1.77; p<0.001; Table 2).

Discussion

Invasive procedures are children's greatest sources of fear, pain, and anxiety. These fears cause children to be reluctant to undergo painful procedures, such as blood collection, establishing vascular access, and intramuscular injections, and negatively affect the treatment and care of the children. Studies have shown that children experience anxiety and pain during these medical procedures (13, 14). Nonpharmacological methods used for pain management are known as easy to use, with no side-effects, inexpensive, and time saving and are used effectively with children. Distraction is also one of these methods (15, 16). The efficiency of listening to music, kaleidoscope, and watching video was evaluated as methods of distraction in this study.

Factors, such as age and sex, affect children's pain perception and anxiety levels during invasive procedures. There are studies showing that pain perception and anxiety levels during invasive procedures in children are affected (17, 18) and not affected (16, 19) by factors, such as age and sex. No difference was found between the age and sex in all the groups in the study. In terms of these characteristics, children in the music, kaleidoscope, video, and control group were observed to have similar characteristics. The fact that all groups are similar according to these variables, which have the potential to affect children's pain perceptions, is of importance indicating that

Table 1. The comparison of age, gender, and preprocedural fear levels of the children in the groups (n=134)

	Music group (n=33)		Kaleidoscope group (n=36)		Video group (n=31)		Control group (n=34)		Test	Value
	n	%	n	%	n	%	n	%	χ^2	p
Gender										
Male	15	21.4	21	30.0	14	20.0	20	28.6		
Female	18	28.1	15	23.4	17	26.6	14	21.9	2.358	0.502
	Mean±SD		**Mean±SD**		**Mean±SD**		**Mean±SD**		**F**	**p**
Age	7.87±1.36		8.41±1.50		8.38±1.43		8.26±1.26		1.051	0.372
Pre-procedural anxiety levels										
Child reported	2.12±1.26		1.09±1.25		1.96±1.32		2.38±1.39		0.869	0.459
Parent reported	2.63+0.89		2.38+1.17		2.09±1.39		2.64+1.09		1.623	0.187
Observer reported	2.27+1.30		2.11+1.00		2.61±1.14		2.47+1.10		1.244	0.296

SD: Standart deviation, χ^2 :Chi Square test, F: One way Anova, p>0.05

Table 2. The comparison of procedural anxiety and pain scores of the children in the groups (n=134)

Anxiety and pain scores	Music group (n=33)	Kaleidoscope group (n=36)	Video group (n=31)	Control group (n=34)	Test	Value
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	F	p
CFS						
Child reported	1.00+1.22	1,02+0.84	1.35±1.05	2.67+1.24*	17.596	0.000
Parent reported	1.09+1.18	1.33+0.41	1.12±0.99	2.97+1.05*	23.710	0.000
Observer reported	1.06+1.19	1.44+0.93	1.22±1.11	3.32+0.84*	35.156	0.000
WBPS						
Child reported	2.78±2.54	2.80±2.01	2.90±1.92	6.52±2.04	25.167	0.000
Parent reported	2.69±2.03	3.16±1.61	2.70±1.50	7.00+2.26	41.026	0.000
Observer reported	2.57±1.82	3.50±1.55	3.09±1.70	7.38±1.77	55.227	0.000

SD: Standart deviation, F: One-way Anova; *Bonferroni test, p<0.05

the music, kaleidoscope, and video methods applied during the blood collection procedures have an effect on children's pain perception and anxiety levels.

Anxiety is among the most commonly reported emotional responses caused by interventions for diagnosis and treatment in children. In the literature, it has been reported that anxiety leads to negative consequences, such as susceptibility to infection, prolonged recovery time, increased pain, and increased need for painkillers (20, 21). In addition, increased anxiety level is one of the factors that negatively affect pain perception (22, 23). In this study, children in the music, kaleidoscope, video, and control groups were found to experience anxiety before the blood collection, and the anxiety score averages of children in both groups were similar ($p>0.05$; Table 1). The fact that children in all groups were similar in terms of their anxiety levels suggests that anxiety would also affect the pain felt during the procedure of blood collection at a similar level.

There are studies investigating the effects of application of music, kaleidoscope, and video methods on children's perceived pain and anxiety levels during invasive procedures. In the study by Caprilli et al. (17), 108 children aged 4–13 years were made to listen to live music before, during, and after the blood collection procedures. It was found that the blood collection performed during listening music reduces children's pain perception and anxiety levels before, during, and after the blood collection. In the study by Balan et al. (24) with 150 children aged 5–12 years, the children received local anesthesia, Emla, and were made to listen to music during the blood collection procedures. It was reported that listening to music during the blood collection significantly reduces the pain felt. In the study by Yoo et al. (13) with 40 children aged 3–7 years, the children were allowed to watch cartoons during the blood collection. In the study, pain perceptions of children in the video group were found to be significantly lower than those of children in the control group. In the study by Bagnasco et al. (25) of 203 children aged 2–5 years, the children were allowed to watch videos during intravenous catheter insertion. In their study, the pain scores of children in the video group were reported to be significantly lower. In the study by Hartling et al. (26) conducted with 42 children aged 3–11 years in the emergency room, it was reported that music played during intravenous interventions may have a positive effect on the perception of pain and anxiety levels in children. The study by Canbulat et al. (27) reported that pain and anxiety levels decreased in children who were shown distraction cards and kaleidoscope during phlebotomy. Karakaya and Gözen (28) have shown that kaleidoscope is effective in reducing the perception of pain and anxiety levels in children during the blood collection. It was also found in the study by Akgül et al. (7) that the pain scores of children who were allowed to watch cartoons during the blood collection were significantly lower. The study by Çelikol et al. (14) showed that anxiety level decreased in children who were listening to music or watched cartoons during the blood collection.

In this study, pain and anxiety score averages of children in the music, kaleidoscope, and video groups were found to be significantly lower than those of children in the control group ($p<0.000$). There was no statistically significant difference between the use of music listening, kaleidoscope, and video methods in reducing the perception of pain and anxiety levels during the blood collection procedures ($p<0.05$).

Conclusion

Music, kaleidoscope, and video reduce the pain perception and anxiety level during the blood collection in children. All 3 methods can be safely used during medical procedures, such as blood collection and establishing a vascular access. It is suggested that the use of music listening, kaleidoscope, and video monitoring methods should be a common practice in reducing pain perception during the blood collection in children. Further studies can be conducted with different age groups and cultures by comparing other methods of distraction in painful interventions. Pediatric nurses are recommended to use non-pharmacological methods to reduce the pain perception and anxiety levels in children.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Adıyaman University (No: 2018/2-23).

Informed Consent: Written informed consent was obtained from parents who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – T.K.Ö.; Design – T.K.Ö.; Supervision – T.K.Ö.; Resources – T.K.Ö.; Materials – T.K.Ö.; Data Collection and/or Processing – T.K.Ö.; Analysis and/or Interpretation – T.K.Ö.; Literature Search – T.K.Ö.; Writing Manuscript – T.K.Ö.; Critical Review – T.K.Ö.

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Hasta Onamı: Yazılı bilgilendirilmiş onam, bu araştırmaya katılan ebeveynlerden alınmıştır.

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