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The efficiency of vein viewing on pain and anxiety of children during peripheral cannula intervention: A randomized controlled study

Dilek Bayram[1] | **Aysel Topan**[2]

[1]Zonguldak Bülent Ecevit University, Health Application and Research Center, Zonguldak, Turkey

[2]Zonguldak Bulent Ecevit University, Faculty of Health Sciences, Dept. of Nursing, Zonguldak, Turkey

Correspondence
Aysel Topan, Faculty of Health Sciences, Department of Nursing, Pediatric Nursing, Zonguldak Bulent Ecevit University, Zonguldak, Turkey.
Email: aysel.topan@beun.edu.tr

Abstract

Aim: The purpose of this research is to estimate the efficiency of vein viewing device on 9–12 year-old children's pain and anxiety.

Methods: The research has been designed as an experimental study including pre-and post-test and control groups. Data were collected with personal information form, facial expressions rating scale, state anxiety scale, vein viewing device and a peripheral cannula. Both groups were applied to the state anxiety scale before and after the procedure while the facial expressions rating scale was applied during the procedure.

Results: Statistically significant difference was found between experimental and control groups regarding processing time, number of transaction attempts and facial expressions rating scale score averages. While there was no difference regarding the state anxiety scales average points of children in experimental and control groups before the procedure, a statistically significant difference was found in an advanced level regarding post-processing state anxiety levels.

Conclusions: Usage of vein viewing device during peripheral cannula intervention reduces children's pain and anxiety levels and shortens the durations of the initiative.

KEYWORDS

anxiety, blood vessels, catheterization, children, pain

1 | INTRODUCTION

Getting ill and hospitalization are experiences and stress factors that affect children's lives in terms of various aspects, increase their concerns and anxiety and negatively affect routine living activities (Er, 2006; Gönener & Pek, 2009; Morris, 2016). As in all age groups, school-age children are also negatively affected by the experiences of getting ill and hospitalization. School-age children, who miss their beloved friends and social activities while in the hospital environment, also want their parents at their side; but they feel uncomfortable if this is known since they are afraid of seeming dependent. Due to the characteristic of this age group, hospitalization is a restrictive condition for energetic and moving children, and this restriction leads to an increase in anxiety. At the same time, they have to live through this period including painful procedures, temporary separations and full of disease (Başbakkal, Sönmez, Celasin, & Esenay, 2010; Beytut, Bolışık, Solak, & Seyfioğlu, 2009; Er, 2006). Responses of children against disease or hospital are often associated with painful medical interventions. Medical treatments cause an increase in anxiety level with pain among the children. One of the procedures frequently performed on hospitalized children is

peripheral vein access which increases their anxiety level (Özyazıcıoğlu & Arıkan, 2007; Uman, Chambers, McGrath, & Kisely, 2006).

Peripheral cannula treatments are performed to maintain fluid-electrolyte balance, total parenteral nutrition and infusion of blood and blood products, antibiotics, painkillers, chemotherapeutic agents and other medications. Peripheral cannula is inserted in more than 80% of patients in the hospital. Peripheral vein cannulation is the most frequently used vein access in children, and it is easy and has relatively fewer complications. However, peripheral vein cannulation may become increasingly difficult among children whose peripheral circulation is poor and who underwent previously failed vein access interventions. Difficulty of the insertion of the cannula needs three or more trials. Since sclerosis occurs in the veins or veins are injured following the numerous venous interventions, future venous procedures may be difficult. The success of vein access technique may be associated with the type of cannula, the condition of the vein, patient's compliance during the procedure and the ability of the person performing the procedure. Intravenous cannula placement should be performed by an experienced healthcare professional (Emergency Healthcare Services, 2011).

This procedure is a difficult and distressing process especially in pediatric patients (Chapman, Sullivan, Pacheco, Draleau, & Becker, 2011; Hosokawa, Kato, Kishi, Kato, & Shime, 2010). Vascular structures of children are thin and they lack subcutaneous fatty tissue; therefore, peripheral cannula interventions become difficult and need many attempts (Szmuk et al., 2013). Repeated failed catheterization interventions may cause pain, anxiety, tissue injury, and vessel lesions in children (Chapman et al., 2011; Sun et al., 2013). From the nurses' point of view, unsuccessful attempts may lead to frustration, anxiety, and loss of self-confidence and damage the trust in the relationship between the patient and the nurse. The vein viewer may help to mitigate these challenges.

More than one failed intervention of vein access may need usage of techniques such as warming and ultrasound that aid better palpation of vein access. Clinical studies have shown that cannula was placed successfully at a single trial in only 53–76% of children and more than two interventions were required in 5–33% (Chapman et al., 2011; Kim et al., 2012; Szmuk et al., 2013). Vein viewing system is used for making the veins more visible by infrared light that is reflected onto the skin, and concentrated and regained from the tissue surrounding veins. Light reflecting onto the skin has no side effects. The most ideal viewing is performed at 15 cm distance perpendicular to the skin manually or by fixing; and has the ability to image veins that are nearly at 10 mm distance underneath the skin (Aulagnier et al., 2014; Kaddoum et al., 2012).

Pediatric nurses should be able to use healthcare technologies effectively for improving the quality of treatment and patient care (Chiao et al., 2013). Vein viewing technology has been rapidly developing in recent years. In addition to reducing the pediatric patient's pain and anxiety, an increased rate of success of peripheral venous catheterization after the use of vein viewing technology may have other benefits such as an increase in the nurses' self-confidence and a better use of time and opportunities (Demir & İnal, 2019).

This study was performed to determine the effect of using vein viewing device on vein access of children and their pain and anxiety.

2 | MATERIALS AND METHODS

2.1 | The aim of the study

The placement of peripheral venous cannula for pediatric patients is a challenging process compared with the adults due to causes such as smaller vessel diameters, difficulty in palpating veins, and reduced visibility. Pediatric nurses should therefore use techniques that increase the success rate or shorten the duration of peripheral venous cannula placement. The aim of the study was to determine the effect of using vein viewing device on vein access, pain and anxiety among the children.

2.2 | Hypotheses of the study

H1: Pain of the children whose vein access is established by vein viewing device during the procedure is low.

H2: State anxiety levels of the children whose vein access is established by vein viewing device are low.

H3: Vein viewing device shortens the duration of peripheral cannula intervention.

2.3 | The type of study

This is an experimental study including pre-test–post-test and control groups.

2.4 | Place and time of the study

This study was carried out with 9–12-year-old children who were treated in Children's Health and Diseases

Clinic of Zonguldak Bülent Ecevit University, Health Application and Research Center between March 2015–March 2016.

2.5 | The study population and sample of the study

The study population of the study was composed of 1,156 pediatric patients between 9–12 years old who were treated in Children's Health and Diseases Clinic of Zonguldak Bülent Ecevit University, Health Application and Research Center between March 2015–March 2016.

Based on the power analysis, sample size was calculated as 80 patients including 40 in the control group and 40 in the experimental group within a confidence interval of 80% and an error rate of 5% (±) using the literature (Chapman et al., 2011; Kim et al., 2012; Strehle, 2010). Eighty children constituting the sample were randomly selected as experimental and control groups. To define the samples' two (experimental and control) groups, sample IDs from 1 to 80 were randomly distributed into two groups avoiding the repetition of numbers. Finally, 40 children were included in the experimental group and 40 children were included in the control group during the study. The selection criteria of children both in experimental and control groups were as follows:

- children must be between 9 and 12 years old,
- both children and their parents must volunteer to join the research,
- children must not have fever and dehydration symptom,
- children must not have pain and did not receive analgesics for the last 6 hr.

2.6 | Data collection instruments

Informed consent form, personal information form, faces pain scale, state anxiety scale for children and vein viewing device were used to collect data.

2.6.1 | Personal information form

This was developed by the researcher reviewing the literature. The form consists of 20 questions about sociodemographic characteristics of the children and their parents, and also previous experiences of the children regarding peripheral cannula placement.

2.6.2 | Faces pain scale

This scale was developed by Donna Wong and Connie Morain Baker in 1981 and revised in 1983. This scale has been used for the diagnosis of pain among 3–18-year-old children. In this scale, a pain score is determined based on the numerical values given to the faces. The lowest score is "0" while the highest score is "5." As the score obtained from the scale increases, pain tolerance is decreased, and tolerance is increased as the score decreases. During the implementation of this scale, it is explained to the children that "each face in the form belongs to one person, and a happy face has no pain or sad faces feel some or more pain". A statement is made by marking faces as follows:

"0" is very happy because has no pain,
"1" has little pain,
"2" has some more pain,
"3" has more pain,
"4" has pretty more pain,
"5" has the highest pain that you can imagine.

2.6.3 | State anxiety scale for children

This inventory was developed by Spielberger in 1973, and its translation into Turkish, and validity and reliability were performed by Özusta (1995) with 615 healthy children between 9–12 years old. She found that Cronbach alpha values were .82 for the state anxiety scale. Children are asked to mark one of three options regarding how they were feeling themselves at that moment. The scale including 20 items aims to evaluate emotions associated with stress, nervousness and panic. The highest score "3" is given when the presence of these emotions is stated by the child as "high"; and the lowest score "1" is given when they are stated to be absent. The lowest score that can be obtained from state anxiety scale is 20, and the highest is 60. Utilization permit was received from Özusta (1995).

2.6.4 | Vein viewing device

Vein viewing device was AccuVein AV 400. It was transportable and had the capacity to image veins at nearly 10 mm underneath the skin. Since this device is held 10 cm above the skin, there is no contact with the skin (Figure 1).

2.6.5 | Peripheral cannula

Cannula no 22 (blue) was used to establish vein access during the study. [Correction added on 4 September

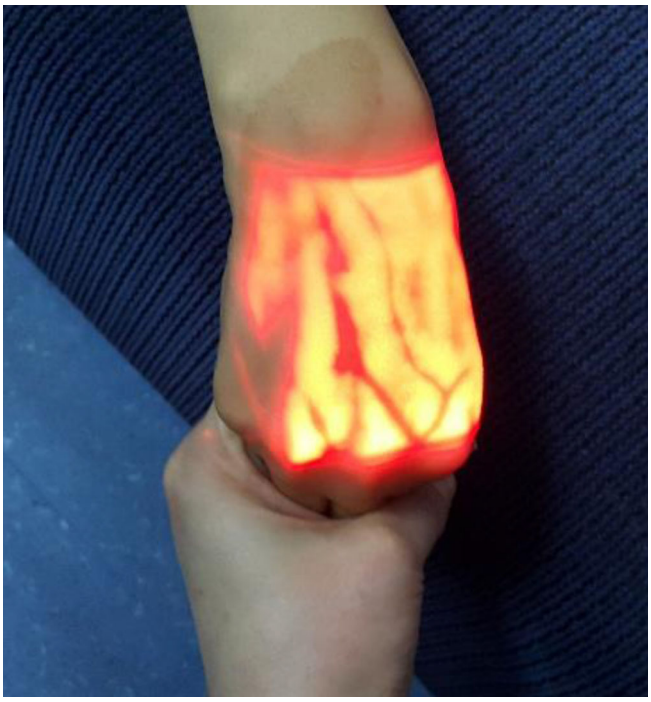


FIGURE 1 Appearance of a vein before the procedure

2020, after first online publication: the sub-header 2.6.4 was deleted and the subsequent sub-sections renumbered.]

2.7 | Implementation of the study

This section outlines the implementation of study (Figure 2).

2.7.1 | Pre-implementation phase

Pre-implementation was performed with 30 pediatric patients who were not enrolled in the sample group between 02.01.2015 and 03.02.2015. Based on the results obtained from pre-implementation, a personal information form was re-organized. The children included in pre-implementation were not enrolled in the study group. During this phase, children were selected for the sample group based on the determined criteria, and consent for the study was taken from all parents with an informed consent form.

2.7.2 | Implementation phase

Children who were enrolled in the experimental group during the study were given a personal information form and state anxiety scale for children before the procedure between March 2015–March 2016. The duration of the procedure was recorded with a cell phone chronometer. Peripheral cannula intervention was performed with vein viewing device during the procedure, and faces pain scale was implemented at the same time. All these items were performed by the first author.

Children in the control group filled in the personal information form and state anxiety scale for children before the procedure between March 2015 and March 2016. As above, the duration of the procedure was recorded with a cell phone chronometer. Routine peripheral cannula placement was performed during the procedure and faces pain scale was implemented at the same time. All these items were performed by the first author.

The difference between those two implementations was that the vein viewing device was used only for the experimental group. The same arm and vein (dorsal meatcarpal venler) were chosen during the venous access to prevent the variation of pain and anxiety in both groups. A time delay between starting or ending the timer and the cannula intervention occurred, and this delay was ignored for both groups. At post-test phase following the procedure, state anxiety scale for children was performed in both experimental and control groups.

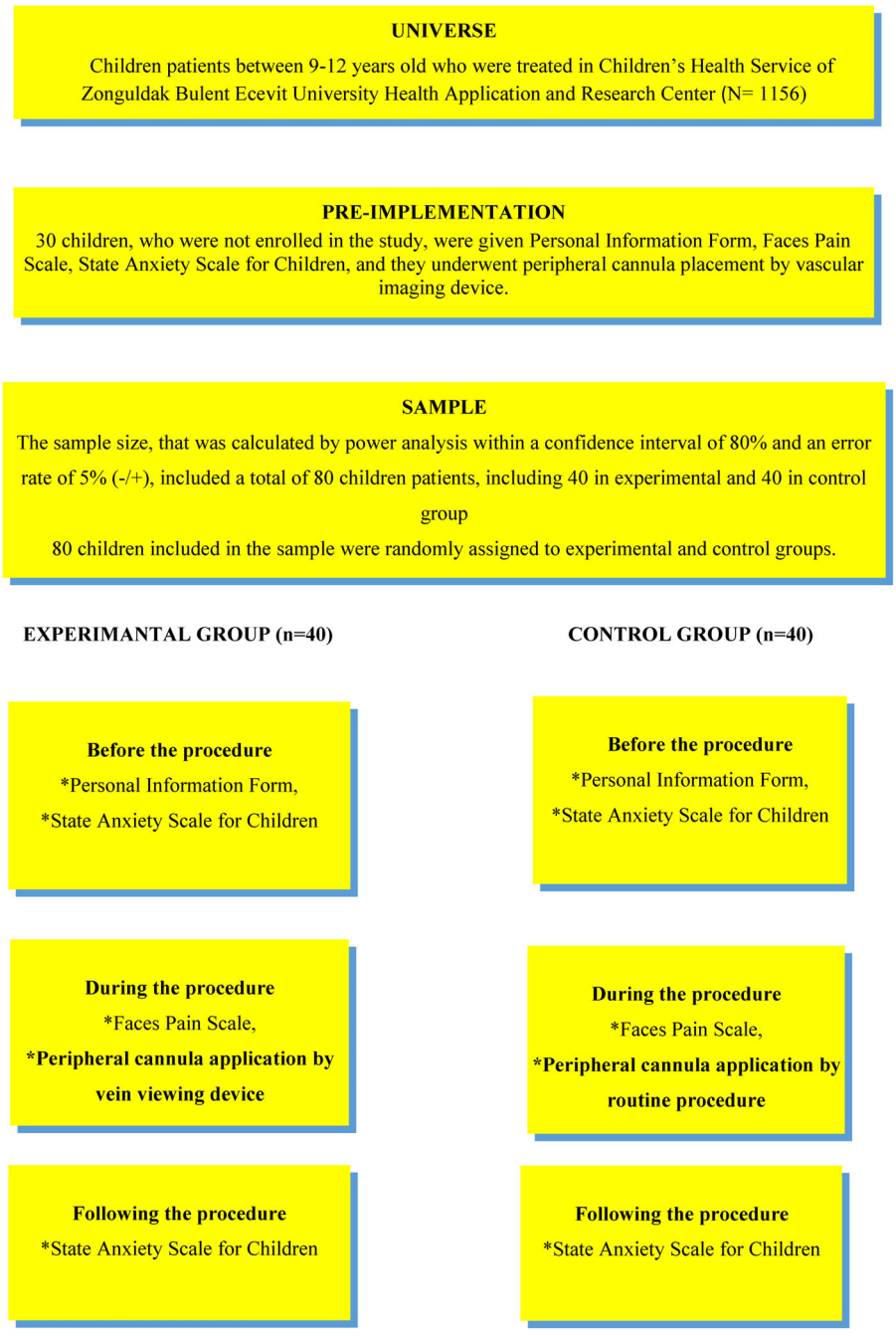
2.8 | Ethical aspect of the study

Written and verbal consent were taken from the children and parents enrolled in the study. Consent was taken from an ethics committee for the implementation of the study. All required permissions were obtained from the Clinical Research Ethics Committee of Zonguldak Bülent Ecevit University. Date and number are 07.07.2015 and 2015-40-09/06, respectively. Utilization permit was provided for the state anxiety scale for children.

2.9 | Analysis of data

To evaluate the results obtained in the study, statistical analyses were performed. Besides descriptive statistical methods (frequency, percentage, mean, and standard deviation) used to analyze the data, Kolmogorov–Smirnov test was preferred to investigate the presence of normal distribution. For the comparison of qualitative data, Pearson Chi-square test and Fisher exact test were used. Since parametric test assumptions were provided for numerical variables, Mann–Whitney *U* test was used to compare both groups. Independent samples *t* test was used to compare parameters between both groups for quantitative data. Paired samples *t* test was used for intra-group comparisons of the parameters. Results were evaluated within a confidence interval of 95% and at a

FIGURE 2 Implementation scheme



significance level of $p < .050$. Reporting of analysis results adhered to the guidelines for reporting randomized controlled trials (Hopewell et al., 2008).

3 | RESULTS

Based on age of the children included in the study, 30% of them ($n = 12$) were 9 years old, 18% ($n = 7$) were 10, 33% ($n = 13$) were 11 and 20% ($n = 8$) were 12 in the experimental group; and in the control group, 33% ($n = 13$) were 9 years old, 18% ($n = 7$) were 10, 28% ($n = 11$) were 11 and 23% ($n = 9$) were 12. When the children in the study were evaluated based on gender, 58% of children in the experimental group ($n = 23$) were females and 43% ($n = 17$) were males while 55% of the children in the control group ($n = 22$) were females and 45% ($n = 18$) were males. No significant difference was found between groups in terms of gender ($p = .966$).

Children in experimental and control groups were evaluated for reasons for their hospitalization, and it was found that 45% of the children in the experimental group ($n = 18$) and 65% of the children in the control group ($n = 26$) were hospitalized due to infectious diseases. No

significant difference was found between both groups in terms of reason for hospitalization ($p = .184$).

Previous hospitalizations were evaluated for the children in control and experimental groups: 25% of the children in the experimental group ($n = 10$) and 35% of the children in the control group ($n = 14$) had a history of previous hospitalization. No significant difference was found between experimental and control groups in terms of previous hospitalization ($p = .232$). The number of previous hospitalizations ($n = 24$) were evaluated, and it was found that 60% of the children in the experimental group ($n = 6$) and 93% of children in the control group ($n = 13$) experienced 1–2 previous hospitalizations. No statistically significant difference was found between experimental and control groups in terms of the number of previous hospitalizations ($p = .097$).

Status of previous vein access of children in experimental and control groups was evaluated, and 28% of children in the experimental group ($n = 11$) and 38% of children in the control group ($n = 15$) had previous vein access. No statistically significant difference was found between the groups in terms of previous vein access ($p = .237$) (Table 1).

The control and experimental groups were compared with respect to their status of feeling pain during vein access, and it was found that 28% of children in the experimental group ($n = 11$) and 38% of children in the control group ($n = 15$) felt pain during previous vein access. No statistically significant difference was found between experimental and control groups in terms of feeling pain during previous vein access ($p = .040$) (Table 1).

Children in experimental and control groups were evaluated for status of feeling pain during peripheral cannula insertion, and 45% of children in the experimental group ($n = 18$) and 15% of children in the control group ($n = 6$) stated they did not feel pain during the procedure. No statistically significant difference was found between experimental and control groups in terms of feeling pain during peripheral cannula insertion ($p = .003$) (Table 2).

Number of trials for peripheral cannula intervention was also examined for children in experimental and control groups, and it was found that vein access was established at first trial in all children in the experimental group ($n = 40$) and 90% ($n = 36$) of children in the control group. No statistically significant difference was found between experimental and control groups in terms of the number of trials for peripheral cannula insertion ($p = .040$) (Table 2).

The duration of peripheral cannula intervention in experimental and control groups was evaluated, and it was found that median duration among children in the experimental group was 2 min (1–3 min) whereas it was 4 min (2–5 min) in the control group. A statistically significant difference was found between both groups in terms of duration of peripheral cannula insertion ($p < .001$) (Table 3).

Children in experimental and control groups were compared based on their mean scores of faces pain scale, and total median score of children in the experimental group was 2 (1–4), and it was 3 (2–4) in the control group. A statistically significant difference was found between experimental and control groups in terms of their mean scores of faces pain scale ($p < .001$) (Table 4).

Mean scores of children in experimental and control groups from state anxiety scale were evaluated, and no statistically significant difference was found between groups in terms of state anxiety levels before the procedure ($p = .766$) while a statistically significant difference was found between both groups in terms of state anxiety levels following the procedure ($p < .001$) (Table 5). Mean score of children in the control group from state anxiety scale following the procedure (37.42 ± 4.51) was found to be higher compared to the mean scores of the children in the experimental group (33.25 ± 4.01) (Table 5).

TABLE 1 Comparison of characteristics of the children regarding their previous experiences of peripheral cannula placement ($N = 80$)

	Experimental group ($n = 40$)		Control group ($n = 40$)		Total ($N = 80$)		
Characteristics	***n***	**%**	***n***	**%**	***n***	**%**	**Test values x^2; *p***
Status of previous vein access							
Yes	11	28	15	38	26	33	.91; .237
No	29	73	25	63	54	68	
Status of feeling pain during previous vein access							
Yes	11	28	15	35	26	33	.91; .237
No	29	73	25	63	54	68	
Total	40	100.0	40	100.0	40	100.0	

TABLE 2 Comparison of experimental and control groups based on their characteristics during the procedure ($N = 80$)

Characteristics	Experimental group ($n = 40$)		Control group ($n = 40$)		Total ($N = 80$)		Test values x^2; p
	n	%	n	%	n	%	
Status of feeling pain during peripheral cannula insertion							
Yes	22	55	34	85	56	70	**8.57; .003**
No	18	45	6	15	24	30	
Number of trials for peripheral cannula insertion							
First trial	40	100.0	36	90	76	95	**4.21; .040**
Two or more trials	—	—	4	10	4	5	
Total	40	100.0	40	100.0	80	100.0	

TABLE 3 Comparison of experimental and control groups based on the duration of peripheral cannula insertion ($N = 80$)

Duration of establishing vein access	n	Median (min-max)	U; p
Experimental group	40	2 min (1–3 min)	**−7.29; <.001**
Control group	40	4 min (2–5 min)	
Total	80	3 min (1–5 min)	

TABLE 4 Comparison of faces pain scale scores of children in experimental and control groups

Duration of establishing vein access	n	Median (min-max)	U; p
Experimental group	40	2 (1–4)	**−5.37; <.001**
Control group	40	3 (2–4)	
Total	80	3 (1–4)	

TABLE 5 Comparison of mean scores of children in experimental and control groups from state anxiety scale

State anxiety scale	Experimental group $\bar{x} \pm$ SD (min-max)	Control group $\bar{x} \pm$ SD (min-max)	t	p
Before the procedure	44.83 ± 4.81 (33–56)	44.50 ± 4.93 (33–51)	.30	.766
Following the procedure	33.25 ± 4.01 (26–43)	37.42 ± 4.51 (29–47)	−4.37	**<.001**
t; p	**13.811; <.001**	**8.118; <.001**		

Statistically significant difference was found in terms of the state anxiety level of children both in experimental and control groups before and after the procedure. However, decrease of anxiety level in the experimental group was more than in the control group (Table 5).

4 | DISCUSSION

Children may need to be hospitalized for diagnostic or therapeutic reasons during varied periods of their lives. Regardless of age, hospitalization may be a fearful experience that may leave negative traces on all children (Çavuşoğlu, 2004). Peripheral cannula treatments are performed for intravenous administration of medications, solutions, blood and blood products (Chapman et al., 2011).

The children enrolled in the experimental and control groups of this study were evaluated for their demographic characteristics, and no significant differences were found between both groups. Thus, the probability of being affected by the factors that might cause pain and anxiety in children such as age, gender, order of sibling, education of the parents, occupation of the parents, income status of the family and previous experiences of hospitalization was eliminated.

When children included in the experimental and control groups were evaluated for pain during peripheral cannula insertion, it was found that there was a statistically significant difference between both groups: 55% of the children who underwent peripheral cannula by viewing device felt pain while 85% of the children in the control group felt pain. In the study by Chapman et al. (2011) which was performed with 0–17 year-old children in the emergency service, peripheral cannula intervention was performed by vein viewing device and their pain states during the procedure were evaluated;

and the procedure carried out by this device was found to be less painful only for the subgroup 0–2-year-olds (Chapman et al., 2011). In their study on patients over 18 years old in the emergency service, Aulagnier et al. (2014) have evaluated the efficiency of peripheral cannula intervention and state of pain; and determined there was no difference between the groups in this age group (Aulagnier et al., 2014). Further, the number of children who felt pain during peripheral cannula intervention using this device was less than the children who underwent routine procedure; and this result was found to be similar with the results of subgroup 0–2-year-olds in Chapman et al. (2011). These results were thought to be associated with the facts that the appearance of vein while this device was used has captured the attention of the child (Figure 1) as well as it made finding the veins faster and decreased the number of failed procedures.

When the children in the experimental and control groups were evaluated based on the number of trials to establish peripheral vein intervention, it was pointed out that it was established at first trial among all children in the experimental group and among 90% of children in the control group; and no statistically significant difference was found between experimental and control groups. In the study by Strehle (2010) that was carried out with 50 children under 16 years old, the effect of vein viewing device on the interventional success of blood drawing and establishing vein access was analyzed, and reported to be significantly successful (Strehle, 2010). In contrast, it was reported that nurses' intervention rates at first trial using the vein viewing device for 0–18-year-old patients was not successful (Szmuk et al., 2013). In the comparative randomized controlled study by Kaddoum et al. (2012) that was performed with 146 children between 0–17 years old, peripheral cannula intervention was compared with routine procedure, and it was reported there was not a significant difference in terms of first trial and the number of interventions (Kaddoum et al., 2012). Therefore, some studies have reported that peripheral vein access using the vein viewing device was more successful than standard procedure, as our study presented, and peripheral vein access was successful in the first trial. Nevertheless, some studies reported no difference between the two types of procedures. The reason for this disparity between the studies depends possibly on the age groups and the number of samples which were varied. The contribution of our study to the literature is that the anxiety level of the children was evaluated during the procedure.

When children in experimental and control groups were evaluated for the duration of peripheral cannula placement, it was reported that median duration of establishing vein access was 2 min (1–3 min) in the experimental group and 4 min (2–5 min) in the control group; and there was a statistically significant difference between both groups in terms of duration of peripheral cannula application. With this result, one of the hypotheses of our study, "Vein viewing device shortens the duration of peripheral cannula insertion", was confirmed. In the study by Hess (2010) carried out with 6–12-year-old children, the success of peripheral cannula intervention with a vein viewing device was analyzed in terms of intervention and duration, and it was reported that this device caused shortened duration of the procedure (Hess, 2010). In the study by Chapman et al. (2011) investigating the efficiency of this device on 0–17-year-old children in emergency service, it was reported that the device shortened the duration of the procedure for nearly 45 s, especially among 0–2-year-old children (Chapman et al., 2011). The study by Sun et al. (2013) handled 60 critically ill children in the intensive care unit; the success of vein viewing device for the intervention and duration was examined and reported that it facilitated and shortened the procedure (126.37–383.601 s in the experimental group, 186.16–497.23 s in the control group) (Sun et al., 2013). In the study by Demir that was carried out with 3–18-year-old children in Turkey, the effect of vein viewing device-aided peripheral intravenous catheter placement on the success of the procedure was studied and it concluded that the vein viewing device significantly shortened the duration of the procedure (37.24 ± 20.07 s in the experimental group and 172.65 ± 153.21 s in the control group) (Demir, 2015). When the results of the study were compared with the literature, the duration of peripheral vein access application was found to be shorter than routine procedure; and this result was found to be similar with other studies in the literature (Chapman et al., 2011). This result is considered to be derived from the guiding effect of the vein viewing device in finding the vein network and its effect of decreasing pain and anxiety levels of the child.

Children in the experimental and control groups in this study were compared based on their mean scores of faces pain scale, and a significant difference was found between both groups. Pain perception score of the children in the experimental group was found to be significantly lower than the children in the control group (2 [1–4] in experimental group, 3 [2–4] in control group). In light of this result, one of the hypotheses of the study indicating that "Pain of the children whose vein access is established by vein viewing device during the procedure is low" was confirmed. Demir (2015) investigated the effect of vein viewing device-aided peripheral intravenous catheter placement on the success of the procedure among 3–18-year-old children in Turkey, and pain perception score of the experimental group was found to be

significantly low; and she reported that this device decreased the pain felt (Demir, 2015). Mean scores of the children in the experimental group from faces pain scale was found to be significantly lower than the children in the control group; and this result was found to be similar with other study findings (Demir, 2015). This result was considered to be derived from the fact that the vein viewing device was effective in decreasing procedure-associated pain, shortened the duration of the procedure and increased the success rate of the procedure.

Mean state anxiety scores of the children in experimental and control groups were also evaluated. No significant difference was found between both groups in terms of state anxiety levels before the procedure whereas a highly significant difference was found between groups in terms of state anxiety levels following the procedure. Mean score of children in the experimental group from state anxiety scale (33.25 ± 4.01) was found to be lower than the mean scores of children in the control group (37.42 ± 4.51). This result confirmed one of the hypotheses of our study that "State anxiety levels of the children whose vein access is established by vein viewing device are low". Since there is no existing study investigating anxiety, fear and concerns of children during peripheral vein access aided by a vein viewing device; the results of this study could not be compared with the literature.

Peripheral intravenous catheter placement is a procedure that is widely used and preferred for pediatric patients who are admitted to hospitals. This frequently used intervention makes peripheral cannula treatments difficult and requires several trials since vein structures of children are thin and they do not have subcutaneous fatty tissue. In this study that we planned due to these reasons, it was determined that children whose vein access was established by a vein viewing device felt less pain during the procedure, their anxiety level decreased, the duration of their procedures was shortened, and the number of trials was decreased.

5 | CONCLUSION

The vein viewing device decreases anxiety that occurs during and following medical procedures among pediatric patients, increases the success of the procedure and decreases the pain felt during the procedure. Common use of the device in pediatric clinics is highly recommended since it saves nurses time depending on the procedure and it has an effective role in terms of use. Considering patient satisfaction, the cost of such devices could be ignored.

CONFLICT OF INTEREST

The authors declare no conflict of interest. There is absence of any interest to disclose.

AUTHOR CONTRIBUTIONS

D.B. and A.T. designed the concept, D.B. collected the data, D.B. completed analysis, D.B. and A.T. searched the literature and D.B. and A.T. wrote the manuscript.

ORCID

Aysel Topan https://orcid.org/0000-0002-5883-0045

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