



The effect of distraction (Balloon Inflating) on pain level during the venous blood sampling in Children

Somaeh Salehi Sarbijan¹, Roghayeh Mehdipoor Rabori², Esmat Nouhi^{3*}

¹ M.Sc. Neonatal Nursing, Nursing research Center. School of Nursing & Midwifery, Kerman University of Medical Sciences, Kerman, Iran

² PhD, Assistance Professor, Medical Surgical Nursing Department, Nursing research Center of Kerman University of Medical Sciences, Kerman, Iran

³ PhD, Associate Professor, Medical Surgical Nursing Department, Nursing research Center & Physiologic research Center of Kerman University of Medical Sciences, Kerman, Iran

Abstract

Background: Every day a large number of children are subject to measures for prevention, diagnosis, and treatment of disease that most of these measures are associated with venous blood sampling. Painful measures such as blood sampling in children in addition to the physical and emotional annoying effect could cause wider negative consequences on childhood age and physical, behavioral and social disorders in children. This study aimed to determine the effect of distraction by inflating a balloon on the amount of pain during taking blood samples from children between the ages of 4 to 7.

Methods: The study was an intervention clinical trial that was conducted on 80 children admitted to the pediatric department of Imam Khomeini Hospital in Jiroft- Kerman province and had the inclusion criteria after obtaining their parent's consent. Children were randomly grouped into the test (n = 40) and control (n = 40) groups that in the test group children's pain was measured during the venous blood sampling during inflating a balloon and their pain was measured in the control group without any intervention during blood sampling. Wong-Baker FACES questionnaire was used for pain assessment.

Results: The results showed that the majority of participants were 4-7-year-old girls (60 percent). Average pain scores for children in the two groups showed no significant difference before the intervention but the average pain scores after the intervention in the test and control group were 1.38 ± 2.56 and 4.2 ± 1.58 ; there was a significant difference between pain in both test and control groups after the intervention (p-value < 0.05).

Conclusion: Using the method of distraction by inflating the balloon during venous blood sampling reduces pain in children.

Keywords: pain in pediatrics, venous blood sampling, inflating balloons

1. Introduction

Pain is a mental feeling and reaction caused by the perception of the nerves in different parts of the body against the internal or external stimuli and it is one of the most common symptoms of discomfort and emotional experience of each person ^[1]. Pain could lead to physiological changes such as raising heart rate and breathing, sweating, skin redness, reducing blood oxygen saturation, dilated pupils, restlessness and hypertension ^[2]. Pain is one of the most important defense and protection mechanisms in the body that appears under abnormal conditions ^[3]. Because of too much importance of pain and its control, The Pain American Academy has stated it as the fifth vital sign and states that whenever pain is controlled as seriousness as other vital signs are monitored, the treatment team will be able to provide better drug and non-drug treatments ^[4]. Children are not alien to pain and experience it since their first days of life by blood sampling and vaccination and during childhood, they feel it by common childhood disease or painful accidents ^[5]. Pain is defined as one of the health problems in children. Hospitalized children undergo painful procedures. Most children consider such procedures as the most stressful ways and one of the most

Damaging aspects of hospitalization; they cry and fear in these situations and try to refuse those ^[3]. Following the frequent experience of pain, permanent changes such as autonomic nervous system stimulation occurs that could cause disruptions in neurodevelopment, learning ability and behavioral problems in children. Response to pain in children is derived from the complex effect and interaction of factors such as genetics, experience, and evolutionary factors. The role of private life experience that results in differences in response cannot be ignored. These components increase response to pain potentially, thus, the medical staff should pay attention to their important role ^[1]. One of the objectives of the nurses and the patients' rights is to control and reduce pain, and hospitalization of children is the most important cause of the emergence of anxiety in them ^[6, 7]. On the other hand, if the pain is not controlled, the child's negative response and mental suffering lead to more problems and less successful treatment ^[3]. On the other hand, the unnecessary pain leads to the child's lack of confidence on the nurses and care providers while confidence is a necessary condition for the existence of a relationship and accepting the remedial measures and inadequate pain relief in children leads to undesirable

immediate and long-term consequences^[8]. Pain that is not relieved enough increases a child's anxiety during the treatment procedure and will have undesirable physiological consequences. It will also increase the fear and avoidance of medical procedures^[8]. Other harmful effects of pain on the lives of children include interference with the child's normal performance, failure to perform the family and social role and retrogression to the past development stages and treatment phobia or fear and in younger children, the negative memory of painful treatment leads to the negative perception of clinical care^[1, 9]. The American Academy of Pediatrics and The American pain society suggest reducing stress and pain to a minimum level in treatment procedures^[4]. Agency for health care policy states that the effective treatment of pain includes the use of drug and non-drug methods. The most important non-drug pain relief intervention in behavior therapy which includes distraction. In this method, the individual is distracted from painful stimuli and attracted to the pleasant one which reduces pain perception. In addition to fewer or no complications compared to drug oriented methods, this method is less costly. Also, it has no devastating physical and psychological effects on children. It is easily applicable and does not require much training, it does not require a lot of time for implementation and more importantly, it is among the independent nursing actions that are attractive for young children^[10]. Therefore to reduce the psychological and physical effects of painful interventions and to prevent the long-term effects of pain in children the nurses should be able to handle painful procedures^[11]. Audio techniques such as music and audio-visual techniques such as television are used as the most common types of passive distraction in sick children^[12]. Various distraction methods are used for pain relief in children; for example, Gupta *et al* (2006) studied reducing pain associated with venous opening using balloon inflating distraction the results of which presented a statistically significant difference between the group with distraction techniques and the group without any certain measure to relief pain^[6]. Kleiber *et al* (2001) studied the amount of pain and anxiety caused by venous opening by self-reporting on 4-7-year-old children. They used the distraction technique in the intervention group and their results showed that there was a statistically significant difference between the amount of pain and anxiety in two intervention and control groups^[13]. Caprilli *et al* who conducted their study on the effect of music on children's distress and pain during blood sampling showed that pain intensity was significantly lower in the test group than the control group^[14]. Wang *et al* (2008) conducted a study on the school-age children who were hospitalized in the pediatric department and were subject to venipuncture in China and conducted audiovisual distraction in the intervention group and the results indicated a significant difference between the intervention and control groups^[15]. Mutlu *et al* (2015) conducted a study on 9-12-year-old children who were hospitalized in Istanbul and were subject to blood sampling; in this study, the effect of balloon inflating and deep inhalation were studied on venous blood sampling the results of which indicate a statistically significant difference between the intervention and control groups^[4]. Esmaili *et al* (2006) examined the effect of two methods of breathing exercises and music to reduce

Venipuncture pain during the blood transfusion, their results showed that the amount of pain was reduced due to the use of distraction and relaxation (practicing regular breathing and the use of music). Here music was more effective in reducing pain so that after completion of the study the patients requested to use headphones during venipuncture^[16]. Shahabi and Kalani (2008) in a hospital in Shiraz studied the effect of topical local anesthetic ointment (EMLA) and distraction (music) on pain caused by venipuncture in school students the results of which indicate that the use of EMLA ointment and distraction has significantly reduced pain during venipuncture^[17]. Sadeghi (2010)^[18] investigated the effect of a balloon inflating on pain caused by venous opening the results of which indicated pain reduction in the intervention group compared to the control group^[18]. Mehdipour *et al* (2010) studied the effect of distraction on venipuncture pain in children with strabismus the results of which showed that the average pain intensity was not significantly different in the two distraction groups of touching and play therapy but pain level was significantly different between these groups and the control group and the results showed that pain was reduced by distraction^[3]. Razeghi (2012)^[9] studied the effect of distraction (bubble maker) and touching on pain of venipuncture in 5-10-year-old children the results of which showed that there was a statistically significant difference between the distraction (bubble maker) and touching and normal methods but there was no statistically significant difference between the distraction (bubble making) and touching methods^[9]. Bagherian *et al* (2011) studied the effect of distraction (rhythmic breathing and bubble making) on pain and anxiety caused by injection practices among the school-age children with Thalassemia in Kerman and based on the results of this study the distraction methods can reduce injection pain in children^[19]. Rostami *et al* (2014)^[20] in Kerman addressed the Hugo point ice massage on pain from venipuncture in children with Thalassemia in Kerman; the results indicate a statistically significant difference between the mean score of behavioral reactions caused by venipuncture in children in the intervention and control groups and pain was decreased in the intervention group^[20]. According to the results of these studies and the fact that pain reduction in sick children is one of their rights, and nurses should use any right measure for their pain relief, this study was conducted to study the effect of distraction (balloon inflating) on pain caused by blood sampling in 4-7-year-old children.

Methods

This research was as an intervention clinical trial with the registration number IRCT2016111329817N2, which was conducted to determine the effect of the intervention program of a balloon inflating on pain during blood sampling 4-7-year-old children hospitalized in the pediatric department of Khomeini hospital in Jiroft- Kerman in 2016. Researchers after obtaining the written consent of parents and verbal consent of the children performed sampling and classified the children who had inclusion criteria randomly or by throwing coins into the test or control groups. The inclusion criteria consisted of 4-7-year-old children, filling the written consent to participate in the study by the parents, first reference for blood sampling, lack of known

hypersensitivity to plastic materials in children, no specific disease in children (thyroid disorder, epilepsy, and cardiovascular disease and hyperactivity) and no specific illness or medication that would reduce the level of consciousness. Moreover, children who did not have clear arteries and the ones with a history of hospitalization were excluded [9]. To reduce the effect of confounding interventions the needles, cottons, and alcohol with the same brands were used and blood sampling was performed by a skilled person between 7 and 9 a.m. and all conditions were the same during the study in both groups and the applied balloons were similar in green color (the green color has a calming effect in inflammatory conditions of the body and it repairs the body cells; it is also effective on the sympathetic nervous system) [21]. Before blood sampling, the children's pain level was measured by Wang -Baker questionnaire. Children pointed to the image that was the most representative of their pain and the researcher marked it and then she talked to the children in the intervention group and showed them how to blow a balloon and she was assured that they could blow a balloon and the necessary explanations about blood sampling were presented to the children. In the intervention group, the child was given a balloon and was asked to blow it during the blood sampling (maximum 10 seconds) and in the control group, blood sampling was conducted without any intervention. The elbow veins were used due to their visibility. In both groups, a questionnaire including demographic variables (age, gender, disease, birth order, etc.) was completed by the children's parents and they were asked to remain by a child during blood sampling and during training, the questions asked by the parents and children were responded. Then the questionnaire was administered to children and pain was measured. Wong-Baker pain questionnaire is the visual questionnaire grading pain scale the validity and reliability of which is approved in the previous studies [22]. In Iran, this tool has been used in many studies. In the study conducted by Nikfarid, its correlation coefficient is obtained as 82 % (23, 24). After data collection, the data were presented by absolute distribution, percentage, central indices, and scattering tables and were calculated by SPSS version 18. Based on similar studies with the test power of 80%, a significance level of 0.05, maximum type I error 1.96 and type II error 1.28 and similar studies the sample size of 40 patients for each group was calculated [9]. A sample of 30 subjects per group was calculated ignoring the loss and 10 additional subjects were considered in case of loss. So the number of samples in each group was 40. The following formula was used to determine the sample size:

$$n = (z_{1-\alpha/2} + z_{1-\beta})^2 (s_1^2 + s_2^2) (\mu_1 - \mu_2)^2$$

Morally, in this study, the approvals, code of ethics, license to study, explaining the objectives of the research for parents, obtaining their written consent and providing the physical and mental comfort conditions of participants were taken into account. The participants could be excluded at any time they desired.

Results

Analysis of the results showed that 80 patients participated in the study the 40 subjects were in the control group and 40 subjects were in the test group. The highest mean age of children was 7. The highest frequency was associated with

girls with 47 patients (60 percent). No significant difference was observed between the two groups in terms of demographic variables. Table 1 shows the most important demographic variables of the participants. Table 2 shows that there is no significant difference in the intensity of pain before the intervention in control and test groups but there was a statistically significant difference after the intervention (p-value <0.05). Data analysis indicated that the mean pain intensity in the control group before and after intervention was 2.65 ± 1.38 and 4.2 ± 1.5 that had no statistically significant difference (p-value >0.05) but the mean pain intensity in the test group before and after intervention was 3.32 ± 1.28 and 2.78 ± 1.18 that was statistically significant (p-value <0.05).

Discussion

This study investigated the effect of distraction (balloon inflating) on the severity of pain in children during blood sampling. This study showed that the mean score of pain in the test group was lower than the control group which indicates that balloon inflating distraction has been effective in pain relief during blood sampling. Similar studies also confirm this result such that Abuelkheir *et al* (2014) conducted a study to evaluate the effect of EMLA ointment on pain relief of children's vaccination and stated higher pain in the control group [25]. Pourmovahed *et al* (2008) compared the effect of EMLA ointment and music on the intensity of pain during venipuncture in children and the results showed that the use of drug and non-drug method is effective in venipuncture pain relief and pain severity in the test group was lower than the control group [26]. In similar research, Nikfarid *et al* conducted a comparative study on the use of EMLA ointment and ice in reducing venipuncture pain in children hospitalized in the urology unit of Children's Medical Center that pain severity was lower in the test group [24]. Razeghi (2012) [9] studied the effect of distraction and touching on pain of venipuncture in 5 children which indicated the proper application of bubble maker and touching in reducing venipuncture pain in children [9]. Sadeghi used pain behavioral tools to assess pain and the amount of reported pain in the control group was higher [18]. All studies show that pain is not relieved in the control group with no alleviation measure and terms of the positive impact of non- drug method in venipuncture pain, it is not consistent with this study and although none of the above studies was conducted on blood sampling since blood sampling, as well as venipuncture, is one of the invasive procedures that cause pain in children [19] and pain prevention and relief in children is very important [17]. and the number of children who refer to blood sampling is more than the ones referring to other procedures, it is important to use a method to relieve their pain. But studies have shown that nursing and laboratory personnel rarely use pain control methods, thus adequate training to use distraction alone to create an experience without fear and pain for children who practice venipuncture and blood sampling as a necessary part of their treatment is necessary. These non-drug methods are important due to low cost, availability, and absence of drug-based methods [24]. Since blowing the balloons is desired by children and it is safe and low cost, it can be used as a game to relief pain in children. The problem and limitations in this study included: First of all providing

Inadequate or false responses to the questions by some parents, to solve this problem the research purpose and significance were explained to the parents. Second, the impact of factors such as fatigue and mental engagement affected responding the questions, by choosing the appropriate time and allocating enough time to complete the questionnaire the limitation was resolved and third the inability of personnel to carry out successful blood sampling for the resolution of which skilled personnel were employed.

Implications for Practice:

Acknowledgments

This research was as an intervention clinical trial with the registration number IRCT2016111329817N2. Hereby the cooperation of children and parents who participated in the study as well as the collaboration of Kerman University of Medical Sciences' research council and the officials and staff in Khomeini Hospital of Jiroft is appreciated.

Conflict of Interest

None declared.

References

- Babaei M, Farahani A, Norian M, Hosaingholi A, Masompour A. Pain control methods of school-age children through distraction. 2015; 10(3):71-80.
- Wong DL, Hockenberry MJ, Wilson D. Wong's nursing care of infants and children. 2011.
- mehdipour R, nematollahi M, esmaeilzadeh F. The effect of distraction on pain severity in children with strabismus to vessel. Journal of nursing and midwifery, Hamadan, Iran. 2011; 18(1):18-28.
- Mutlu B, Balci S. Effects of balloon inflation and cough trick methods on easing pain in children during the drawing of venous blood samples: A randomized controlled trial. Journal for Specialists in Pediatric Nursing. 2015; 20(3):178-86.
- Namnabati M, Abazari P, Talakob S. The experiences of nurses in pediatric pain management. Nursing Research. 2008; 3(10):75-86.
- Gupta D, Agarwal A, Dhiraaj S, Tandon M, Kumar M, Singh RS, *et al.* An evaluation of efficacy of balloon inflation on venous cannulation pain in children: a prospective, randomized, controlled study. Anesthesia & Analgesia. 2006; 102(5):1372-5.
- nohi E, karbalaieizadeh M, abazari F. The effect of family-centered care and participation on anxiety of mothers of children with gastrointestinal infections. Journal of clinical nursing and midwifery. 2014; 3(4):47-55.
- Agosto C, Farina MI, Catalano I, Coccato F, Lazzarin P, Benini F. Procedural pain in children: education and management. The approach of an Italian pediatric pain center. European journal of pediatrics. 2012; 171(8):1175-83.
- Razeghi N, Gevari A, Tatarpor P, Hosaini F. Comparison of the effect of distraction and touch on the intensity of the pain caused by the vessel-making in children aged 5-10. Journal of nursing. 2012; 25(77):50-9.
- Alavi A, Namnabati M, Abdyazdan Z, Parvin N, Akbari N, Samepor V, *et al.* How to manage children's pain by the nursing staff in the hospitals of the city of shahrekord, in 1385. Shahrekord University of medical sciences journal. 2008; 10(2):59-65.
- Hasanpour M, Tootoonchi M, Aein F, Yadegarfar G. The effects of two non-pharmacologic pain management methods for intramuscular injection pain in children. Acute pain. 2006; 8(1):7-12.
- Koller D, Goldman RD. Distraction techniques for children undergoing procedures: a critical review of pediatric research. Journal of pediatric nursing. 2012; 27(6):652-81.
- Kleiber C, Craft-Rosenberg M, Harper DC. Parents as distraction coaches during IV insertion: A randomized study. Journal of pain and symptom management. 2001; 22(4):851-61.
- Caprilli S, Anastasi F, Grotto RPL, Abeti MS, Messeri A. Interactive music as a treatment for pain and stress in children during venipuncture: a randomized prospective study. Journal of Developmental & Behavioral Pediatrics. 2007; 28(5):399-403.
- Wang Z-X, Sun L-H, Chen A-P. The efficacy of non-pharmacological methods of pain management in school-age children receiving venepuncture in a paediatric department: a randomized controlled trial of audiovisual distraction and routine psychological intervention. Swiss medical weekly. 2008; 138(39-40):579-84.
- Esmaeili K, Sadeghy S, Iranfar S, Abbasi P, Afkary B. The comparison of the effect of music and rhythmic breathing techniques on pain severity of intravenous cannulation during blood transfusion. Journal of Kermanshah University of Medical Sciences (J Kermanshah Univ Med Sci). 2008; 12(2).
- Shahabi M, Kalani D, Eghbal M, Alawi H, Abedsaeidi J. Comparison of the effect of EMLA anesthetic ointment a (EMLA) and the distraction of music on pain in school-age children the hospital vessel Ayatollah dastgheib Shahid Allah (RA) in Shiraz. nursing and midwifery college publication. 2006; 16(56):8-12.
- Sadeghi T, Nayshabori M, Solaimani M, Bahrami N. The effect of swelling the balloon on the pain caused by intravenous way children open. Scientific journal of Kurdistan University of medical sciences, Qazvin. 2010; 14(3):68-72.
- bagherian, borhani, abaszadeh. The effect of non druge on pain control methods of alleviating the pain caused by the vessel in school-age children admitted to the Centre of Thalassemia in Kerman. Journal of the Faculty of nursing and midwifery in uremia. 2013; 10(6):0.
- Rostami M, Abazari F, Pouraboli B, Jahani U, Shirzadi F. The effects of massage on pain severity with Hugo point of ice in the veins of children with Thalassemia in the specialized center of medicine, Kerman SAMEN alhojaj. Journal of surgical nursing. 2014; 3(3):157-62.
- Bakhshi F, Eslami M, Younesi M. Therapeutic effect of colors of green, yellow and Red a review article. Abstracts of the first National Conference on applied

- Research in public health and sustainable development, 2013, 1(1).
22. Voepel-Lewis T, Merkel S, Tait AR, Trzcinka A, Malviya S. The reliability and validity of the Face, Legs, Activity, Cry, Consolability observational tool as a measure of pain in children with cognitive impairment. *Anesthesia & Analgesia*. 2002; 95(5):1224-9.
 23. Alhani F, Shad H, Anoosheh M, Hajizadeh E. The effect of programmed distraction on the pain caused by venipuncture among adolescents on hemodialysis. *Pain Management Nursing*. 2010; 11(2):85-91.
 24. Nikfarid L, GHAMAR, YOUSEFI R, Namazian M, Namdar F, AZAM, *et al*. Comparison of EMLA cream versus local refrigeration for reducing venipuncture-related pain in pediatric patients of Children's Medical Center, 2010.
 25. Abuelkheir M, Alsourani D, Al-Eyadhy A, Temsah M, Meo S, Alzamil F, *et al*. EMLA® cream: A pain-relieving strategy for childhood vaccination. *Journal of International Medical Research*. 2014:0300060513509473.
 26. Pormovahed Z, Salimi T, Dehghani K, Yasini M, Shakiba M, Tavangar H, *et al*. Comparison of two anesthesia methods of music and cream emla on the severity of the pain of the vessel in children. *Journal of school of nursing and midwifery, Iran University of medical sciences*. 2008; 21(55):47-53.