

How to Cite:

Kumari, A., Memchoubi, K., & Jogdeo, B. (2022). A quasi-experimental study to assess the effectiveness of squeezing ball on pain during insertion of intravenous cannula among children in selected hospitals of Pune City. *International Journal of Health Sciences*, 6(S5), 5964–5970. <https://doi.org/10.53730/ijhs.v6nS5.10010>

A quasi-experimental study to assess the effectiveness of squeezing ball on pain during insertion of intravenous cannula among children in selected hospitals of Pune City

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Abstract---Hospitalized Children suffer pain from various hospital procedures, trauma, and other illnesses. A wide variety of tools for treating pediatric pain appropriately is beneficial i.e., play therapy, distraction, relaxation, and coping skills. Aim of the study: Assess the effectiveness of squeezing ball on pain during insertion of intravenous cannula among children. Material and method: in the present study, the researcher adopted a Quantitative Approach and Quasi-experimental research design. It was carried out on 60 hospitalized children. The non-probability purposive sampling technique was used for the selection of samples, data were collected using demographic profiles and squeezing ball was given to 30 children of the experimental group. The assessment of pain was done using FLACC Pain Scale and Wong Bakers Pain Scale. The reliability of the tool was found “ $r=0.8$ for FLACC scale and $r=1$ for Wong-Baker scale. The pilot study was done on 10 children, the study was found feasible. Result: The study shows that the mean pain score in the experimental group was 5.33 (Wong Bakers Pain Rating Scale) and 4.3 (FLACC Scale), whereas the mean score of the control group was 7.46 (Wong Bakers Pain Rating Scale) and 6.46 (FLACC Scale). The unpaired t-test was used for the effectiveness and found that squeezing ball is effective in reducing the level of pain during the insertion of IV cannula among children. Conclusion: The study

concluded that the squeezing ball is effective to reduce pain during intravenous cannula insertion among children.

Keywords---Pain, squeezing ball, IV cannulization, children.

Introduction

Pain is a highly unpleasant physical feeling, that may be due to a prick, ache, burn, sting, or tingle. The international association for the study of Pain (IASP) defines pain as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" (Merskey and Bogduk, 1994). The JCAHO (joint commission on accreditation of healthcare organization) regulations regard pain as "the fifth vital sign".¹ Paediatric patients in the hospital experience many different medical procedures. It is the major responsibility of the health care provider to ensure that every step should be taken to protect children from unnecessary healthcare-induced trauma and distress. Paediatric Intravenous cannulation is a basic part of modern medicine and the most common procedure in every Paediatric hospital. It is essential for the installation of fluids and medications in hospitalized children. Intravenous cannulization is a process in which a cannula is inserted in a vein to provide venous access, that allows administration of fluids, medication, chemotherapy, parenteral nutrition, as well as administration of blood products. Sometimes when multiple 3 punctures are required before venous access is done, especially the procedure becomes too traumatic to the child, that as a result can cause a lifelong fear for needles.²

Over a billion peripheral intravenous cannula are inserted each year in hospitalized patients worldwide and that influences children physically and mentally. Anxiety, pain, distress, and needle phobia are related to repeated attempts at intravenous access; appropriate preparation can minimize the distress caused by the cannulization. It is important to explain the requirement of the procedure and combine it with blood sampling if needed. Some children are at higher risk of decompensation with repetitive IV attempts, e.g., congenital heart disease child and single ventricle physiology. Cannula inserted over the joints, in areas of flexion or lower extremities are more likely to fail than those in the hand or the upper arm.³ A wide variety of tools for treating paediatric pain appropriately is beneficial such as play therapy, distraction, relaxation, and other coping skills. The alternative forms of pain management include relaxation techniques, education, hypnosis, guided imagery, acupuncture, biofeedback may aid in managing children with acute pain.⁴ Distraction can provide patients with a positive alternative focus which can help to reduce the perception of pain during an intervention. Distraction should be engaging, interactive, and suit the developmental level of the patient. Distraction should be best done by one person in a room or procedure room to help create a calm and quiet environment. Some of the suggested distractions for children are bubbles, exploring novelty toys, singing or listening to a favourite song, Books with the noisy buttons of finding it books, non-procedural talk, and humour. Distraction is not meant to trick a patient; it is a tool to help patients cope with medical procedures, procedural pain, or interventions.⁵

Need of the study

Procedure-related pain is a frequent and distressing component of medical care for children, their families, and hospital staff. (Cummings et al).⁶ Repeated interventions are often required and the level of pain and memory of the first procedure affects the pain and distress associated with subsequent procedures (Chen et al).⁷ One observational study says that four out of five children require cannulization. According to the report of 2006, there were around 503,300 hospital stays with intravenous cannulized patients and identified an increase of approximately 80% since 1993. Among them, more than 90% of the patients had an intravenous cannula inserted in the general ward and in the postoperative ward, 100% of patients had intravenous cannula. In comparison, 56.5% are male patients and the rest of them were female and children.⁸ A study was conducted to describe the experience of pain in children in response to venipuncture and intravenous cannulation. Data on different parameters such as physiological, behavioural, subjective response were gathered from 90 children, aged 1-12 months, 1-3 years, 4-6 years, and 7-12 years. Changes in behaviour were seen in all four groups although the toddler showed significant physiological changes. The subjective parameter showed that the children were able to identify their pain intensity and sites of pain.⁹ As per the above studies and evidence the researcher felt that sponge ball may have a beneficial effect on the reduction of pain and the perception of the pain of the hospitalized child. Squeezing a sponge ball during insertion of the intravenous cannula can be an affordable, easily assessable, low-cost, and effective method to reduce pain among children. It is one of the nonpharmacological methods of pain reduction in children.

The present study statement

“A quasi-experimental study to assess the effectiveness of squeezing ball on pain during insertion of intravenous cannula among children in selected hospitals of Pune City.”

Material and Methods

A Quasi-experimental research design was adopted to conduct the study. The non-probability purposive sampling technique was used for the selection of samples. It was carried out on 60 (4-7 years) children admitted in the pediatric ward of the selected hospitals. In the study instrument, section I consist of demographic variables and section II consist of pain assessment tool. Data were collected using demographic profile, in that selected aspects were age, gender, purpose of IV cannulization, specific diagnosis, site of IV cannulization and squeezing ball was given to 30 children of the experimental group. The assessment of pain was done using FLACC Pain Scale and Wong Bakers Pain Scale during the insertion of IV cannula. The tool was content validated by experts which was only in English language and it was collected by researcher itself. The reliability of the tool was established by using the inter-rater observation method and it was measured by ‘Cohen’s Kappa’, the obtained values were “ $r=0.8$ (almost perfect) for FLACC scale and $r=1$ (almost perfect) for Wong-Baker scale. The pilot study was done on 10 children, the study was found feasible. The average time taken by each sample for

was 10-15 minute. Data analysis was done mainly using both descriptive and inferential statistics.

Result

This section was divided into three parts. The first part includes demographic data of the participants. Second part includes assessment of pain score & third part is related to the effectiveness of squeezing ball.

Section I: Demographic Data

Findings related to children's age, i.e. majority 12 (40%) of children belong to the age group of 6-7 years in the experimental group and 17 (57%) of the children belong to the age group of 6-7 years in the control group. Distribution related to the gender of children, i.e. majority **19 (63%)** in both the control and experimental group respectively. Findings related to the purpose of IV cannulization, i.e. majority 18 (60%) in the experimental group were with the purpose of IV fluids and 21 (70%) of the children in the control group were also with the purpose of IV fluids. Finding of children according to the specific diagnosis, i.e. majority 13 (43%) of children's diagnosis was thalassemia in the experimental group and 7 (23%) of children's diagnosis were thalassemia in the control group. Distribution of children according to the site of IV cannulization , i.e. majority 27 (90%) children were cannulized in the cephalic vein in the experimental group and 26 (87%) children were cannulized in a cephalic vein in the control group.

Section II: To assess the pain score in the experimental and control group by the pain assessment tool (Wong Baker's Scale and FLACC pain rating scale) among children in selected hospitals of Pune City.

Table No. I: Distribution of children as per pain score measured by Wong Bakers Rating Scale in the experimental group and the control group.

Interpretation of pain score during IV canulization	Number of children (4-7 years) N=60			
	Experimental group (n=30)		Control group (n=30)	
	Frequency	Percentage %	Frequency	Percentage %
No hurt =0	00	00	00	00
Hurt little bit =2	06	20	01	03
Hurt little more=4	09	30	03	10
Hurt even more=6	07	23	08	27
Hurt whole lot=8	05	17	09	30
Hurt worst=10	03	10	09	30
Total	30	100	30	100

In regard to the pain score the Table No. I reveals that 09 (30%) of children had hurt little more, 07 (23%) had hurt even more, 06 (20%) had hurt little bit, 05 (17%) had hurt whole lot, 03 (10%) had hurt worst and No children had experienced no hurt in the experimental group whereas that 09 (30%) of the children had hurt whole lot, as well as 09 (30%), had hurt worst, 08 (27%) had hurt even more, 03 (10%) had hurt little more, 01 (03%) had hurt little bit and No children experienced no hurt in the control group.

Table No. II: Distribution of children as per pain score measured by FLACC Scale in experimental group and control group

Interpretation of pain score during IV canulization	Number of children (4-7 years) N=60			
	Experimental group (n=30)		Control group (n=30)	
	Frequency	Percentage %	Frequency	Percentage %
Relaxed/comfortable (0)	01	03	00	00
Mild discomfort (1-3)	11	37	04	13
Moderate discomfort (4-6)	11	37	09	30
Severe discomfort/pain/both (7-10)	07	23	17	57
Total	30	100	30	100

In regard to the pain score Table No. II reveals that 11 (37%) of children had mild discomfort, as well as 11(37%), had moderate discomfort, 07 (23%) had severe discomfort, 01 (03%) were relaxed/comfortable in experimental group whereas 17 (57%) of children had severe discomfort, 09 (30%) had moderate discomfort, 04 (13%) had mild discomfort, and no children were relaxed/comfortable in the control group. Section III: To associate the findings with selected demographic variables.

This section shows that there was an association between pain score and selected demographic Variable (age of child) only in the experimental group of Wong Bakers Pain Scale, others are not significantly associated with pain score as p-value is more than 0.05 level of significance.

Discussion

The findings of the study are supported by a similar study conducted by Mr. Waseemakram Almel. The title of the study was to assess the effectiveness of squeezing ball on reduction of pain during insertion of intravenous (IV) cannula among hospitalized preschool children in selected hospitals at Vijayapur". The objectives of the study were to train the children regarding squeezing ball before iv cannula insertion in the experimental group, to assess the pain level in the experimental group and control group after IV cannula insertion., to compare the pain level in the experimental group and control group after IV cannula and to find out the association between pain scores with selected demographical variables of the experimental and control group. The method chosen by the researcher was a true- experimental post-test-only control group design. The sample was drawn from a random sampling technique and it consist of 50 samples whereas 25 in each experimental and control group. The assessment of pain was done by using

the Wong Bakers Faces Rating Scale and the effect of the same is found out when compared with the control group.

In the above study, the data were analysed by using descriptive and inferential statistics like frequency, percentage, mean, range, standard deviation, unpaired t-test, and chi-square test. The mean pain score level in the experimental group was 2.96 whereas in the control group was 6.8. It indicates that the pain score levels were higher in the control group than the experimental group that provides the effectiveness of squeezing ball on reduction of pain. The unpaired 't' test ($t_{48} = 71.1$, $df_{48} = 2.024$) shows that there is a significant difference between the experimental group and the control group. So, the study concluded that there was enough evidence that squeezing ball is effective and helps in reducing pain levels during insertion of IV cannulization.

The findings of the study are supported by one similar study conducted by Mr. Shimmaa Moustafa. The study was to identify the effect of pressing a softball on children's behavioral response and pain level during and after iv catheter insertion. The design chosen by the researcher was quasi-experimental. The study was conducted at the pediatric surgical ward, Zagazig University Hospital. The 100 samples of aged 4-10 years were taken by convenient sampling technique. The four different tools were used for the collection of data i) demographic data child's age, gender, birth order, and cause of surgery. ii) vital signs sheet (respiratory rate and heart rate) measured before and after iv cannula insertion in both experimental and control groups. iii) Behavioural Response scale FLACC iv) Wong Bakers Faces pain rating scale. In the above 46%, the experimental group experienced moderate pain whereas it is 56% in the control group. A significant correlation was found between children's behavioural response and pain score in both groups ($p = 0.001$, $p = 0.01$). A statistically significant correlation was found between respiratory rate and children's face rating scale in the experimental group ($p < 0.001$). The study concluded that pressing softball is an effective and accessible technique to reduce pain at the time of IVCI.¹⁰

Conclusion

The main focus of the study was to evaluate the effectiveness of squeezing ball on pain during insertion of intravenous cannula among children in selected hospitals of Pune city. Descriptive and inferential statistics were used for the analysis of collected data. After analysis, the findings revealed that the mean experimental group score was 5.33 (Wong Bakers Pain Rating Scale) and 4.3 (FLACC Scale), whereas the mean control group score was 7.46 (Wong Bakers Pain Rating Scale) and 6.46 (FLACC Scale). It signifies that the pain score levels were higher in the control group than in the experimental group showing the effectiveness of squeezing ball on pain level. At 29 degree of freedom, the tabulated t-value is 2.05 and the calculated t-value is 3.46 and 3.38. This shows that the calculated t-value is more than the tabulated t-value ($3.46 > 2.05$) and ($3.38 > 2.05$). Chi-square showed that there was an association between pain score and selected demographic Variable (age of child) only in the experimental group of Wong Bakers Pain Scale, other than that no association was found with selected demographic variables and the groups. The squeezing ball helps in reducing pain levels during the insertion of an intravenous cannula.

Acknowledgement

Most sincerely I convey deep sense of gratitude to my research guide and Bharati Vidyapeeth College of Nursing, Pune for remarkable guidance and academic support during this study. At last, I am grateful about the support and help I got throughout the research study from the principal, teachers, participants, and parents who have contributed to accomplishing the research study successfully.

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