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Effect of Evidence-based Nursing Intervention on Pain Management for Children Undergoing Abdominal Surgery

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Abstract: **Pain is a multidimensional phenomenon with sensory, physiological, cognitive, affective, behavioral and spiritual components. The evidence-based nursing practice supports the use of non-pharmacologic interventions to relieving acute postoperative pain. Aim of Study: this study aimed to evaluate the effect of evidence-based nursing intervention on pain management for children undergoing abdominal surgery. Research Design: A quasi experimental design was utilized in this study. Research Setting: this study was conducted at Pediatric Surgical Departments in two university hospitals namely; Children's Hospital affiliated to Ain Shams University and Specialized Pediatric Hospital affiliated to Cairo University .Research Subjects: A purposive sample 100 children undergoing abdominal surgery were selected according to predetermined inclusion criteria. Children were randomly assigned to equal 2 groups (control 50 and study 50). Study Tools: Child's assessment sheet to assess children's characters, Pain assessment sheet to assess children's physiological & physical parameters and Word-Graphic Rating Scale to assess children's pain. Study Result: there was statistical significant difference between children in control and study groups regarding to Physiological parameters, General manifestations, GIT manifestations at the 1st and 2nd day post-operative. There was statistical significant difference between children in control and study groups regarding to pain intensity at 1st and 2nd day post-operative. There was no statistical significant difference between level of pain intensity and age for both control and study groups. There was no statistical significant difference between children's level of pain intensity and gender for both control and study groups. Conclusion: The selected evidence based nursing interventions used in this study were reading story, reflexology and massage, carton video and music techniques that did work in reducing postoperative pain intensity among children undergoing abdominal surgery. Recommendation: Set pain scale measuring as a part of routine measurement like Vital sings especially post- surgery to measure pain. Using evidence based nursing intervention as a routine care for the children undergoing abdominal surgery.**

Keywords: **Pain – Post operative pain- Abdominal surgery- Evidence-based nursing intervention-Pain management.**

1. INTRODUCTION

Pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Pain is a multidimensional phenomenon with sensory, physiological, cognitive, affective, behavioral and spiritual components ***(World Health Organization (WHO), 2012).***

Postoperative pain is a consequence of tissue damage from surgical incision. Immediately after tissue damage, sensory nerve endings are suddenly exposed to a variety of cellular breakdown products and inflammatory mediators that trigger acute nociceptive activity. These chemical mediators generate local pain sensation. The pain message reaches the brain through dorsal horn, where the pain sensation is recognized and interpreted. Perception of pain is the end result of the neural activity of pain transmission ***(Chanif et al., 2013& Mohy, 2015).***

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Abdominal surgery involves a surgical operation on organs inside the abdomen. This may include surgery on the small intestine, large intestine (colon), spleen and appendix. Reasons for abdominal surgery such as obstruction, congenital anomalies and inflammatory bowel disease ***(Sutter Health, 2016).***

Acute postoperative pain needs to be managed. The modalities used in relieving acute postoperative pain include pharmacologic and non-pharmacologic management. Pharmacologic medications have side effects that can be life threatening. So, Non-pharmacological pain management has the potential to palliate acute postoperative pain ***(Chanif et al., 2013 & Vakili et al., 2015).***

The evidence-based nursing practice supports the use of non-pharmacologic interventions in relieving acute postoperative pain. Non-pharmacological therapy aim to treat and reduce the pain behavior and focused pain level to improve the activity level and functional capacity and reduces stress and anxiety. This include physical (massage, reflexology and positioning), cognitive behavior (reading), physical psychological (progressive muscles relaxation and abdominal breathing exercise) and psychological (imagery guided or visual and music therapy) ***(Demir & Khorshid, 2010).***

Evidence-based practice (EBP) is the conscientious and judicious use of current best evidence, including research results, expert opinion, in conjunction with children preference to guide health care decisions. There are strong incentives to making health care much more evidence-based and cost effective in every world- wide healthcare setting. However, EBP is still not well adapted in nursing practice. ***(Hong., 2014)***

Pain management is a very important aspect of nursing care of the pediatric patient. Pain management standards require the providers to be educated in the assessment and management of pain and recognize the right of pediatric patients to appropriate assessment and management of pain. The role of the nurse in pain management encompasses the entire nursing process. The nurse assesses for the presence of pain, plans pharmacological and non-pharmacological pain management strategies with the medical team, implements the plan, and evaluates the effectiveness of the interventions ***(Stanley & Pollard, 2013).***

Significant of the study

Pain is a common sequel of surgery worldwide, unrelieved or poorly managed pain is a burden on the child, the health-care system and society. The Canadian Pain Coalition's Pain in Canada Fact Sheet (2012) mentioned that one in five Canadians have moderate to severe persistent, and one-third of those children have the significant impact of post-operative pain on their health and quality of life (***Mohy, 2015***). Postoperative abdominal pain which children suffer is due to various reasons, but not limited to poor health practices or lack of knowledge for the pediatric specialists concerning effective methods that use to relieve post-operative pain. The pediatric nurse can apply evidence-based intervention (non-pharmacological pain management) to relieve children's pain post abdominal surgery to improve and maintain child health and wellbeing.

Aim of the study

This study aims to evaluate the effect of evidence-based nursing intervention on pain management for children undergoing abdominal surgery.

Research Hypothesis*:*

Application of the evidence-based nursing intervention will affect positively on pain management for children undergoing abdominal surgery.

2. SUBJECTS & METHODS

The subject and methods of the current study was discussed under four main designs as the following:

I. Technical design.

II. Operational design.

III. Administrative design.

IV. Statistical design.

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I - Technical Design:

The technical design includes research design, setting, subjects and tools of a data collection.

Research design:

A quasi experimental design was utilized in this study.

Research Setting:

This study was conducted at Pediatric Surgical Departments in two university hospitals, Children's Hospital affiliated to Ain Shams University that includes 1 room containing 8 beds & 4 beds at ICU. And the specialized pediatric Hospital affiliated to Cairo University that includes 5 rooms containing 24 beds & intermediate ICU containing 8 beds. The researcher selected these two hospitals due to its highly flow rate of admission, and specialization in management of children with rare and critical conditions.

Research Subjects:

A purposive sample that consisted of 100 children undergoing abdominal surgery based upon predetermined inclusion criteria. 45 children from Specialized Pediatric Hospital affiliated to Cairo University and 55 children from Children's Hospital affiliated to Ain Shams University. Children were randomly assigned into two equal groups (control 50 and study 50), the children in study group received the evidence-based nursing intervention to reduce pain post-operative abdominal surgery (including reflexology, massage, reading stories, music and videos); in addition to the routine hospital care. Each child was asked to select only one intervention. While the children in control group received only the routine hospital care in analgesics post abdominal surgery. Children were selected according to a predetermined

Inclusion criteria:

Children aged 6-16 years, from both genders and undergoing abdominal surgery.

Exclusion criteria:

Children whose are suffering from chronic illness and children who are suffering from postoperative abdominal surgical complications.

Tools of Data Collection:

The data was collected through the following tools

I: Child's Assessment Sheet: that was designed by the researcher after reviewing the related literature (***Wong 2015, Mohy 2015 & Journal of Pain and Symptom Management, 2106***) to gather data. In relation to characteristics of the studied sample (child's name, age, gender, child's ranking in the family, academic year and child's diagnosis). And type of abdominal surgery, date of surgery, type of analgesic and name, dose, frequency and route of administration of medication post abdominal surgery).

II: Pain Assessment Sheet: It was adopted from ***Wong et al., (2015)*** to gather data in both of the control group post abdominal surgery and pre-post evidence-based nursing intervention techniques in study group at 1st and 2nd day post abdominal surgery. It was composed 4 parts to assess physiological parameters (heart rate, respiratory rate, blood pressure and temperature), physical parameters (gastrointestinal tract and general manifestations of both groups), and child's behavior (verbal behavior, facial expression and body movement). And type and site of pain.

III. Word-Graphic Rating Scale [Figure1]: adopted from ***Tesler, et al., (1991)***. It is a self- report pain scale; used for pain intensity measurement, it uses descriptive words to denote varying intensities of pain, applicable for children aged 4-17 years. Words were used to describe how much pain the child has, ranged from No pain to worst possible pain explained to child "this is a line with words to describe how much pain the child may have. This side of the line means no pain, and over here the line means worst possible pain", point with the child's finger where no pain is and run finger along the line to worst possible pain as the child says it " if the child has no pain, would mark like this" "if the child has some pain, would mark somewhere along the line, depending on how much pain the child has" " the more pain that child has, the closer to worst pain would mark the worst pain possible is marked like this".

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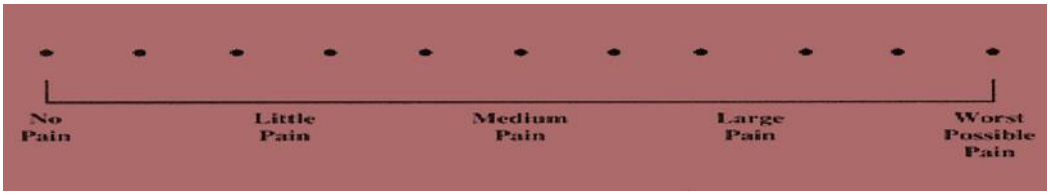

Figure (1) Word-Graphic Rating Scale

Wong, D., Hockenberry, M., J., and Wilson, D. (2015): Wong's Essentials of Pediatric Nursing. 9th ed., Jeff Patterson, United States of America. Pp 154-155.

II- Operational Design:

The operational design for the present study included: preparatory phase, content validity and reliability, pilot study and field work.

A) Preparatory phase:

A review of past, current, local and international related literature to cover the various aspects of the research problem using articles, periodicals, journals, text books and internet to get acquainted with various aspects of the research problem and to develop the study tools.

b) Content validity and reliability:

It was ascertained by a group of (3) experts in pediatric nursing field, their opinions were elicited regarding the format, layout, consistency, accuracy and completeness. Reliability refers to the accuracy and consistency of the measuring tool. The test, retest method was used to establish the reliability of structured tool. The reliability coefficient was found to be r=0.9 (P<0.001).

C) Ethical considerations:

Prior to the pilot study, ethical approval was obtained from the Scientific Research Ethical Committee of Faculty of Nursing affiliated to Ain Shams University. An oral informed consent was obtained from each participant (children and their accompanying mothers). The researcher explained the aim of the study to children included in the study. In addition, the children were assured that the study is harmless, anonymity and confidentiality would be guaranteed and they have the right to withdraw from the study at any time without any reason.

D) Pilot study:

A pilot study was applied on 10% (n=10) of the studied sample (100) to test applicability and clarity of the tools, as well as to estimate the time needed to fill each tool. The studied sample included in the pilot study was not excluded from the study sample.

E) Field of the work:

The actual fieldwork was carried out during the period from January to August 2018 where the researcher was available 2 days per week for each study setting from 8.30 am to 4-6 pm to gather data and implementation of evidence-based nursing intervention techniques using the previously mentioned designed tools. The researcher met the children and their accompanying mothers to obtain their oral consent; and provided explanation for them about evidence-based nursing intervention techniques, type, the applying way, time. Data was gathered from each child and his/her accompanying mother who were interviewed individually where necessary.

Procedure

Researcher received a training course on foot massage and using reflexology techniques in the International Academy for Applied Sciences in cooperation with Encyclopedia of Arab Africa Economic Integration Sponsor (African union- league of Arab states). The training course included 45 credit hours.

Evidence-based nursing intervention techniques for pain management were designed by the researcher in the light of ***Keilman, (2015)***. The researcher was assessed the child one hour before 2nd dose of analgesic post abdominal surgery and monitor the pain before and after the intervention.

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Assessment phase

During this phase, the researcher selected the child according to eligibility criteria identified and recruited. The researcher greeted, introduced herself to the child and accompanying mother, and explained the technique & purpose of the research. The researcher asked the child and his accompanying mother to select one of evidence-based nursing techniques according the child preference. And baseline data was collected, which included characteristics, basic physical assessment data about diagnosis, type of abdominal surgery and analgesics then the child entered to operation room according his rank and the researcher waiting him/ her till for the time of 2nd dose of analgesic to measure pain and apply selected based nursing intervention.

The children in control group received analgesic and routine hospital care only; the research used pain scale to measure postoperative pain (one hour before 2nd dose of analgesic). On the other hand the children in study group received analgesic and routine hospital care and received evidence-based nursing intervention for pain management was done as follows: Cognitive behavior (reading stories), Physical (massage, reflexology) and Psychological (carton movies presentations and music therapy). The researcher applied one of those selected evidence based nursing intervention for one session (20-30) minutes, and applied this selected method pain (one hour before 2nd dose of analgesic) (when the child starts feel of pain, 4-6 hours after surgery) at the first day and second day post- operative. The researcher measured Post- operative pain before and after applying the methods, at first day and second day post- operative.

Implementation phase

This phase included the implementation of evidence-based intervention as a following:

1) Cognitive behavior (reading)

Pain and child assessment was used before starting intervention then the child read books (story-novel) for 20-30 minutes, the book was selected specific for children 6-16 years with simple statement, illustrated pictures and clear font. The environment was prepared by good, simple light, some-times help the child to read when he can't read clearly. Then, pain intensity was measured, immediately after intervention at first and second day post-surgery, also in the control group pain intensity was measured in times similar to study group.

2) Physical (reflexology)

The child was assessed using child and pain assessment tools. Reflexology technique was applied for 20-30 minutes, divided into 10-15 minutes for each foot in the first and second day after surgery. The researcher applied it using her thumb and index finger to work on the child's feet reflexes point using map areas of reflex point according to type of surgery and reflex point to reliving pain like adrenal gland, pituitary gland and neurological solar plexus figure(2). Two sessions were done, one at the first day of operation and second one at the second day of operation. Assessment of pain intensity was done before and after the technique at two days. The researcher followed 5 steps once; A. Relaxation exercise to loosen the feet up. B. Working the ball of the foot to enhance the function of the diaphragm muscle and physiological parameters, keep lung open. C. Working on the mid-section of the foot to decrease post-operative abdominal pain and tension. D. Working the inside of the foot to provide relaxation for entire body. E. Working the top of the toe by thumb to stimulate the corresponding body parts and enhance their function, as well as to relax tension and decrease pain. Then, pain intensity was measured, immediately after intervention at first and second day post-surgery, also in the control group pain intensity was measured in times similar to study group.

3) Physical methods (Massage):

The child and pain assessment tools were evaluated, the researcher started session at 1st and 2nd day post-surgery for 20-30 minutes by this way; Still- gentle Touch placed the hand on the child's head and the other on its back gently. It include fingertip stroking, resting a hand, containment and massage. Stroking/ massage intervention, the hand was moved gently and slowly over specific body part to accomplish one massage step (rubbing or kneading the skin with the hand to produce many strokes that provide soothing and relaxing effect. Stroking/ massage combing with kinesthetic stimulation, consisting of passive flexion/ extension movement of the limbs or range of motion exercise. Then, pain intensity was measured, immediately after intervention at first and second day post-surgery, also in the control group pain intensity was measured in times similar to study group.

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4) Psychological (carton film presentation and music therapy)

Pain intensity was measured before starting intervention (baseline). Then, the child listened to non-speech music (nature sounds such as sounds of water, birds, ocean and etc.) and some-times speech music (children's songs) for 20-30 minutes, used Mp3 player and headphones (for masking environmental sounds). The music selected was light, and soft rhythm with 50-60 beats per minute and videos (carton- short movies). Then, pain intensity was measured, immediately after intervention at first and second day post-surgery. Also, in the control group, pain intensity was measured in times similar to music group.

III -Administrative Design:

Administrative approval to carry out the study was obtained through an issued letter directed to administrators of the previously mentioned study setting. The agreement consent (oral approval) was obtained from the children and their accompanying mothers.

IV - Statistical Design:

Data were revised, coded, tabulated, analyzed and presented using the Statistical Package for Social Sciences (SPSS V24). Inferential statistics was used to answer research hypotheses. Frequencies, percentages, arithmetic mean and standard deviations were used for quantitative variable using (Minitab V17), Chi-Square test used for quantitative variable; Student T-test and Z-test were used for comparisons. The qualitative data were analyzed applying appropriate statistical methods to determine whether there was a statistically significant difference or not. A statistically significant difference considered at Level of significance threshold at 0.05 (P> 0.05 = insignificant, P< 0.05 = significant and P < 0.001 = highly significant).

Limitations of the study

Limited number of relevant national studies and references related to the effect of evidence-based nursing intervention on management of post- operative pain specially (reading, massage therapy).

Few numbers of beds lead to decrease of pediatric patients numbers flow in the children's Hospital affiliated to Ain Shams University. So, the researcher added Specialized Pediatric Hospital affiliated to Cairo University to research settings.

3. RESULTS

Table (1): Characteristics of the control and study groups (n=100)

Characteristics	Control group (n=50)		Study group (n=50)		Z-test	P-Value
	No.	%	No.	%		
1. Age (year): 6-<10	34	**68.0**	28	**56.0**	1.25	0.213
10- <13	11	22.0	19	38.0	1.77	0.076
13-≤16	5	10.0	3	6.0	0.74	0.460
$\bar{X}$ ±SD	9.7±3.54		10.13±3.54			
2. Gender:						
Male	31	**62.0**	33	**66.0**	0.42	0.677
Female	19	38.0	17	34.0	0.42	0.677
3. Child's ranking in the Family: 1st	23	**46.0**	25	**50.0**	0.40	0.689
2nd	13	26.0	21	42.0	1.71	0.087
3rd	8	16.0	2	4.0	2.04	0.092
4th	3	6.0	2	4.0	0.46	0.646
5th	3	6.0	0	0.0	1.79	10.074

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4. **level of education** Primary	42	**84.0**	46	**92.0**	1.24	0.215
Preparatory	4	8.0	4	8.0	0.00	1.000
Secondary	4	8.0	0	0.0	2.09	0.037*

- *Homogeneity P> 0.05
- Z = relation between study and control group

Table (1) as seen from this table, there was homogeneity between control and study groups in relation to age, gender, child's ranking in family and level of education (P-value= 0.213, 0.677, 0.689,0.037) respectively. Since the mean age of the control group was 9.7±3.54years, and study group was 10.13± 3.54 years. As

regard gender of studied children, it was observed that, 62%, 66% of control and study groups were males respectively. 46%, 50% of control and study groups were ranked as the 1st respectively as well. It was clear also that the majority (84%) and (92%) had a primary level of education for control and study groups respectively.

Table (2): Number and percentage distribution of the control and study groups according to their diagnosis (n=100)

Child's diagnosis	Control group (n=50)		Study group (n=50)	
	No	%	No	%
Intestinal obstruction	12	24.0	6	12.0
Urological obstruction	5	10.0	8	16.0
Appendicitis	17	**34.0**	25	**50.0**
Biliary atresia	0	0.0	1	2.0
Severe abdominal pain	5	10.0	5	10.0
Hernia	2	**4.0**	1	**2.0**
Gall stone	6	12.0	2	4.0
Congenital spherocytosis	3	6.0	2	4.0

As noticed in this table (2), appendicitis was the common diagnosis among the studied children as 34% and 50% for control and study groups respectively.

only 4% and 2% of the control and study groups were diagnosed as hernia respectively.

Table (3): Number and percentage distribution of the study group according to their selected evidence-based nursing intervention to relive pain post abdominal surgery (n=100)

Evidence-based nursing intervention	Study group (n=50)	
	No.	%
1.Cognitive behavior (reading)		
Reading story	10	**20.0**
2.Physical		
Body Massage	8	**16.0**
Reflexology	11	**22.0**
3.Imagery guided video		
Carton film presentation	8	**16.0**
4. music therapy		
Listing songs	13	**26.0**

As seen from table (3) it was observed that, 20%, 22% and 26% of the studied children were selected reading story, reflexology and listening songs respectively.

While only 16% and 16% were selected body massage and carton film presentation respectively.

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Table (4): Physiological parameters of the control and study groups at the 1st and 2nd day post abdominal surgery compared with their normal peers (n=100)

Physiological parameters	Control group (n=50)				Z-t (1) P value	Study group(n=50)								Z-t (2) P value	Z-t (3) P value
	1st day post-surgery		2nd day post-Surgery			1st day post-surgery				2nd day post-surgery					
						Pre-session		Post-session		Pre-session		Post-session			
	No	%	No	%		No	%	No	%	No	%	No	%		
1.Respiratory rate	26	**52.0**	25	50.0	0.841	36	**72.0**	38	76.0	43	86.0	43	**86.0**	0.199	**0.000***
Normal	24	48.0	25	**50.0**	0.841	14	28.0	12	24.0	7	14.0	7	14.0	0.199	**0.000***
Abnorma															
2.Blood pressure	(n=15)*		(n=15)*			(n=12)*		(n=12)*		(n=12)*		(n=12)*			
Normal	11	**73.3**	13	86.7	0.639	8	**66.7**	8	66.7	12	100.0	12	**100.0**	0.443	0.817
Abnormal	4	26.7	2	**13.3**	0.398	4	33.3	4	33.3	0	0.0	0	0.0	0.037	0.149
3.Heart rate															
Normal	30	**60**	29	**58.0**	0.839	37	**74.0**	39	78.0	47	94.0	47	**94.0**	0.018	**0.000***
Abnormal	20	40	21	**42.0**	0.839	13	26.0	11	22.0	3	6.0	3	6.0	0.018	**0.000***
4.Temperature															
Normal	33	**66.0**	29	58.0	0.408	44	**88.0**	44	88.0	48	96.0	48	**96.0**	0.136	**0.000***
Abnormal	17	34.0	21	42.0	0.408	6	12.0	6	12.0	2	4.0	2	4.0	0.136	**0.000***

- *Significant statistical differences P< 0.05 and insignificant statistical differences P> 0.05
- *Total number is not mutually exclusive
- Z 1= relation between 1st and 2nd day in control group
- Z 2= relation between 1st and 2nd day in study group
- Z 3= relation between 2nd in control group and 2nd day in study group
- Pre-session= one hour before 2nd dose of analgesic
- Post-session= immediately after evidence-based intervention
- 1st & 2nd day control group = one hour before 2nd dose of analgesic

As regard physiological parameters. Table (4) showed that, There was significant statistical between control &study groups at 1st and 2nd day post-abdominal surgery regarding to respiratory rate, heart rate and temperature (P-value=0.000*,0.000*,0.000*) respectively. Compared with there was no significant statistical between control &study groups (P-value= 0.817) at 1st and 2nd day post- surgery regard to blood pressure.

Table (5): Pain intensity of children in the control and study groups at the 1st & 2nd day post abdominal surgery (n=100)

Pain intensity	Control group (n=50)				Z-t (1) P value	Study group (n=50)								Z-t (2) P value	Z-t (3) P value
	1st day post-abdominal surgery		2nd day post-abdominal surgery			1st day post- abdominal surgery				2nd day post- abdominal surgery					
						Pre-session		Post-session		Pre-session		Post-session			
	NO	%	NO	%		NO	%	NO	%	NO	%	NO	%		
No pain	0	0.0	0	0.0	1.000	2	**4.0**	1	**2.0**	10	20.0	14	28.0	**0.000***	**0.000***
Little pain	6	12.0	12	26.0	0.114	9	18.0	10	20.0	30	60.0	28	56.0	**0.000***	**0.001***
Medium pain	15	**46.0**	14	**44.0**	0.826	26	**52.0**	26	**52.0**	10	20.0	8	**16.0**	**0.000***	**0.043***
Large pain	19	38.0	14	28.0	0.285	9	18.0	9	18.0	0	0.0	0.0	0,0	**0.001***	**0.000***
Worst pain	10	4.0	10	2.0	1.000	4	**8.0**	4	**8.0**	0	0.0	0.0	0,0	**0.037***	**0.000***

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- ***Significant statistical differences P< 0.05 and insignificant statistical differences P> 0. 05**
- **Z 1= relation between 1st and 2nd day in control group**
- **Z 2= relation between 1st and 2nd day in study group**
- **Z 3= relation between 2nd in control group and 2nd day in study group**
- **Pre-session= one hour before 2nd dose of analgesic**
- **Post-session= immediately after evidence based intervention**
- **1st & 2nd day control group = one hour before 2nd dose of analgesic**

In relation to pain intensity table (5) showed that, nearly half (46%), (44%) of the control group had medium pain at the 1st and 2nd day post- abdominal surgery respectively. Compared with the study group it was 52% and 16% of them had medium pain at the 1st pre-session and 2nd day post-session post- abdominal surgery respectively as well. There was statistical significant difference (p-value= 0.000) between children in control and study groups regarding to pain intensity.

Table (6): Relation between children's level of pain intensity and their age in the control (post- surgery) and study groups (pre-post intervention) (n=100)

Pain intensity / Age in year	Control group (n=50)										Study group (n=50)									
	No pain		Little pain		Medium pain		Large pain		Worst pain		No Pain		Little pain		Medium pain		Large Pain		Worst pain	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
6-<10	0	0.0	7	20.6	8	23.5	12	35.3	7	20.6	5	17.9	18	**64.3**	5	17.9	0	0.0	0	0.0
10- < 13	0	0.0	4	36.4	3	27.3	1	9.1	3	27.3	8	42.1	8	42.1	3	15.8	0	0.0	0	0.0
13-≤16	0	0.0	1	20.0	3	**60.0**	1	20.0	0	0.0	1	33.3	2	66.7	0	0.0	0	0.0	0	0.0
X^{2} (P- value)	**0.376**										**0.405**									

*Significant statistical differences P < 0.05 & insignificant statistical differences P> 0.05

As shown in table (6), there was no statistical significant differences (P-value= 0. 376) between level of pain intensity and age for control group compared with the study group (P-value= 0.405) where 60% of control group aged between 13-≤16 had medium pain on the other hand 64.3% of the study group aged between 6-<10 had little pain.

Table (7): Relation between children's level of pain intensity and their gender in the control (post- surgery) and study groups (pre-post intervention) (n=100)

Pain intensity / Gender	Control group (n=50)										Study group(n=50)									
	No pain		Little pain		Medium pain		Large pain		Worst pain		No pain		Little pain		Medium pain		Large pain		Worst pain	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	0	0.0	9	29.0	12	**38.7**	9	29.0	1	3.2	2	6.1	5	15.2	24	**72.7**	2	6.1	0	0.0
Female	0	0.0	4	21.0	10	52.6	5	26.3	0	0.0	0	0.0	4	23.5	12	70.6	1	5.9	0	0.0
X^{2} P- value	**0.694**										**0.688**									

*Significant statistical differences P < 0.05 and insignificant statistical differences P> 0.05

As observed from table (7), there was no statistical significant differences (p- value= 0.694) between children's level of pain intensity and gender for the control group compared with the study group (p-value= 0.688). Where 38.7%, 72.7% of control and study groups in relation to medium pain was male respectively.

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4. DISCUSSION

Moderate to severe pain remains a common outcome in pediatric surgical procedures and the majority of children experienced pain after surgery. More than 5 million children undergo surgery every year, it is reported that up to 80% of school age children experience moderate to severe pain even when receiving analgesics. Managing children's pain is a growing priority in the hospital setting with increasing attention given to minimizing the painful aspects ***(Sazzad, 2018).***

The study findings in relation to the characteristics of the study sample table 1, is not supported by findings of ***Mohy (2015),*** study which entitled; "the effect of reflexology technique on post-operative pain among school-age children undergoing abdominal surgery" who reported that, the age group from 10-12 years. While contradicted regard to females were slightly higher than males in the study group and vice versa in the control group. The study findings supported by ***Suresh and De Oliveira (2015)*** study which entitled "The effect of audio therapy to treat postoperative pain in children undergoing major surgery: a randomized controlled trial" who reported that the children aged from 6 to 18 years 10.9 (9.1–13.9) for study group and 12.4 (9.8–14.6) control group but contradicted in relation to female where higher than male for study group and slightly closed for control group. The researcher think that the children during this period of age could understand the nature of pain and the rationale and strategy of evidence based intervention. On the other hand the study of ***Thomas (2011)*** study which entitled "Study to assess the effectiveness of Guided imagery on education of pain among post-operative children selected hospital at Kerala" who cited Level of education Regarding the educational, majority 45% child were Preparatory level, this is disagree with this study findings where the majority 84%, 92% of children were primary level for control and study group respectively.

The findings of the current study reported that appendicitis is the most common diagnosis; table 2. It contributed to ***Gajbhiye et al. (2013)***, study which entitled; "perforated appendicitis in children" who reported, that the appendicitis is mostly affects teens between the age 10 to 19 years old, and is rare in preschool children and infants. The researcher opinion can be explained on the basis that the growth of lymphoid tissue is at its peak during this period. In the present study, most of the children had ruptured appendicitis, mainly due to ignorance on the part of parents about the disease, self-medication and delay in reporting to hospital.

Regarding the physiological parameters Table 4, this findings are congruent with the results ***Ali (2013)*** study which entitled;" Effect of massage on pain and sleep disturbances of children after abdominal surgeries" who reported a better heart rate, respiratory rate after applying evidence based nursing intervention in the study group rather than in the control group. On the other hand; ***Jones et al. (2012)*** which" Is there a specific hemodynamic effect in reflexology" who cited that there was no significant difference noted in the heart rate and blood pressure. This study goes in line of the current study but contradicted according to heart rate. The researcher thinks, it can be attributed to the fact that evidence based nursing intervention promoted parasympathetic activation, which causes reductions in heart rate and breathing. Elevation of vital signs after surgery increased as physiological response to postoperative pain, which is believed to be due to an over activity of the sympathetic nervous system. Moreover, these findings disagree with ***Mohy (2015),*** who showed that there was no change of body temperature either before or after receiving reflexology intervention. The researcher thinks it could be attributed to the fact that massage increases metabolism to sixteen percent for a few minutes as well as reduction in anxiety, cortisol and epinephrine during.

In relation to pain intensity table 5, showed that the most of the control group have medium, large and worst pain compared with the study group that the most of them have no, little and medium pain, that reflect the effect evidence based nursing intervention that used in study group rather than control one. these findings result are in the same line with ***Han & Lee (2012)*** study which entitled; "The effect of back massage on degree of pain, state anxiety and quality of sleep of postoperative patient with gastrostomy" he cited that the degree of pain intensity was significantly reduced after ten minutes of reflexology and massage among postoperative children during two days after surgery.

Concerning the relation between intensity of postoperative pain and age Table 6, these study findings report that the younger children have medium, large and worst pain than older children regarding to both control and study group but there is no statistical difference between level of pain intensity and age, this goes in the same line with that ***Huth et al (2016)*** study which entitled "what school age children tell us about imagery" who reported that the older children reported the worst level of pain than younger children. The researcher thinks this is related to the fact that younger children did not

understand the cause of pain, but understand simple relationship between pain and disease, while older children have better understanding of the relationship between an event and pain. Also, may be younger children can't express about their pain related to fear and unwell recognized the type of pain.

Concerning the relation between intensity of postoperative pain and gender Table 7, these findings of the current study showed that, the most of the control and study group were males have a medium pain. This disagreed with ***Chieng et al (2013)*** study which entitled " Exploring influencing factors of post-operative pain in school age children undergoing elective surgery" with the findings of the present study in relation to medium pain intensity for control group and vies-versa for study group ; he cited that boys reported less degree of postoperative pain than girls with significant difference between gender and post-operative pain . Moreover ***Moura and Pereriar (2011)*** study which entitled "Post-operative pain in children a gender approach" who mentioned that girls reported higher pain level than boy. The researcher thinks these differences related to our cultural wise paly important role that the girls can't express her pain by clearly voice and expression, differences of individual pain tolerance and different type of surgery.

5. CONCLUSION

The selected evidence based nursing intervention used in this study was reading story, reflexology and massage, carton video and music techniques that did work in reducing postoperative pain intensity among children undergoing abdominal surgery, altered their pain behavior, provided relaxation, promoted circulation and provided them with a greater sense of control over their pain.

6. RECOMMENDATION

The results of this study provide a baseline from which research should continue and build. In the light of these findings, it can be suggested that:

1. Set pain scale measuring as a part of routine measurement like Vital sings especially post- surgery to measure pain.
2. Using evidence based nursing intervention as a routine care for the children undergoing abdominal surgery
3. Larger sample size is recommended in another study focuses on effect based nursing intervention on pain management for children undergoing abdominal surgery.
4. Examine what factors hinder or promote nurses from using pain alleviation methods in the clinical practice. Future research could also investigate the efficacy of different interventions, especially in pediatric surgical nursing.
5. Nurses should engage in continuous professional development and continued education, by studying recent research on pain management and practicing evidence based skills learnt so as to improve pain management nursing care.

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