

Effect of Distraction Technique on Pain Control for Children Receiving Chemo-Radiotherapy

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Abstract: Pain management is an important concern for a child with cancer or other pain-causing diseases. Distraction is one of the non-pharmacological techniques of pain management strategies. Aim of this study was to determine the effect of distraction technique on pain control in children receiving chemo-radiotherapy. A quasi-experimental research design was used to conduct the present study. **Subjects and method:** This study was conducted on 60 pediatric patients presented at Oncology Institute Affiliated to the Ministry of Health and Pediatric Hematology and Oncology Department of Tanta University Hospital. Data were collected by using an interview and pain assessment sheets. **Results:** This study revealed that the majority of children, who had severe pain associated with chemo-radiotherapy, had immediate improvement after the implementation of distraction technique with the majority had no pain and 15% had mild pain. **Conclusion:** Distraction is a non-pharmacological intervention aimed to reduce procedural pain or control pain in cancer children. Age-specific non-pharmacological interventions used to manage the pain are most effective when adapted to the developmental level of the child. **Recommendations:** In service training programs should be held with nurses working in the radiation and oncology department which include lesson about cancer and side effects of cancer, pain

Keywords: cancer pain, chemo-radiotherapy, distraction technique, pain control.

1. INTRODUCTION

Cancer is not considered as one disease with a difference between pediatric and adult malignancies.⁽¹⁾ The causes of childhood cancer are not well understood. Although a small number of cases of childhood cancer are due to genetic abnormalities, the causes of most childhood cancers are unknown.^(2,3) General symptoms of pediatric malignancies were similar to that commonly seen in other diseases including fever, fatigue, swollen glands, or weight loss. When these manifestations persist or worsened investigations to exclude malignancy is needed.^(4,5) Specific cancer therapy (surgery, chemotherapy, and radiotherapy) made a considerable persistent chronic pain in up to 50% of surviving patients that adversely affect the quality of life. In addition, the persistence of pain has an additional burden in that it is often perceived to be indicative of disease recurrence.⁽⁶⁾

Pain is a subjective experience that reports the presence of severe discomfort or an uncomfortable sensation being experienced by all cancer children, more than 70% of patients reporting severe pain, there is the need to recognize this pain. Pain may result from painful procedures, disease progression, among other factors.⁽⁷⁾ Cancer pain shares the same neuro-patho physiological pathways as non-cancer pain. The pain mechanism may present as a pure somatic, visceral, or neuropathic syndrome with the development over time is complex and varied, depending on cancer type, line of treatment and associated morbidities.⁽⁸⁾

Assessment of pain depends on the subjective report, physiologic monitoring and behavioral observations. Use a combination of the three methods usually results in an accurate pain evaluation.⁽⁹⁾

Distraction technique is a non-pharmacological pain management strategy that focuses on patient attention to something other than pain. It helps the children to deal with their pain and distress during the painful procedure. It may be as simple as telling jokes or funny stories, watching cartoons or movies, playing computer games or conversation during the painful procedures. It should be interesting, attractive and appropriate according to the child age. Also, a reward may be used to motivate the child when trying to distract his attention away from pain. Many studies reported that pain can be reduced markedly by placing the patients in a virtual world.⁽¹⁰⁻¹²⁾

Before the procedure starts, the nurse will spend time with child, to get to know child better. We will explain the procedure, may be using dolls, DVDs or books to explain further. It also allows us to find out if there is a particular aspect of the procedure worrying child. Some children may be afraid of needles, whereas others are worried about anesthetics. Once the child has decided which type of distraction therapy to use, we start. During the procedure it is very important we are the only one trying to distract the child. If other people are also trying to distract child, it take his or her concentration away from us. Distraction that is facilitated by the mother is referred to as mothers-led distraction, and typically involves prior training. Investigated the efficacy of a brief education intervention for parents prior to their children's venipuncture. Role of the nurse in the department oncology at hospital has developed sets of distraction techniques by assist with the preparation of the child and career assessment of the child and knowledge examination required. Age –appropriate distraction facilitates coping, helps manage pain, decrease the use of various medications, and builds trust between nurses and children.⁽¹⁰⁻¹²⁾

Aim of the study:

The aim of the present study was to determine the effect of distraction technique on pain control in pediatric patients with malignant disease receiving chemo-radiotherapy.

Research hypothesis:

The present study was hypothesized that pain intensity was expected to be minimized after application of distraction technique.

2. SUBJECTS AND METHOD

Research design:

A quasi-experimental research design was used in this study.

Setting:

The study was conducted at Pediatric Hematology and Oncology Department of Tanta University Hospital and Tanta Cancer Center (Pediatric Oncology Department) throughout a period of one year from April 2016 to March 2017.

Subjects:

Convenience sampling of 60 children with cancer of both sexes aged 5-15 years and their mothers or caregivers were selected. They were treated with chemo and radiotherapy and free from any associated morbidities e.g. Diabetes Mellitus, renal failure, parasitic infestation or malabsorption.

Tools for data collection:

Four tools were used to collect the required data.

Tool I: Structured interview schedule:

This tool was developed by the researcher to collect the required data and consists of two parts. Biosocial data: Data related to the child such as age, sex, birth order, and educational level. Data related to their parents such as parent's age, occupation, level of education, housing condition, family size and residence (urban-rural). Medical history of the childhood illness and hospitalization: duration of illness in months, Duration of school absence in weeks, child weight, treatment side effects (e.g. nausea, vomiting, loss of appetite, alopecia, fatigue, diarrhea, constipation, stomatitis, pain and skin changes), and child reactions during the treatment sessions as anxiety, tiredness, depression, anger, frustration, and fear.

Tool II: Pain assessment:

Method currently used to measure pain intensity include self-report, behavioral, and physiological measures. Location and extension of pain was measured by using front and back figure (Elands color scale), which consists of giving the child a picture of the anterior and posterior aspect of the body then asking him to point on the picture where his pain is. Pain intensity was measured by using numerical rating scale as 10cm straight line which 0 means that child feel no pain and 10 mean the worst pain. Quality of the pain was measured by encouraging the child to use the pain descriptor list as children selected words from the list that best describe the pain which include sensory qualities of pain as knifelike, hot burning sharp, dull, or affective qualities of pain as fearful, sickening, anxious and depressed. Onset and duration of pain as constant, intermittent or rhythmic.

Tool III: Effect of pain on physical and physiological function:

The effect of pain such as nausea, headache, constipation, physical activity as bedridden, sleep as insomnia, appetite as anorexia, emotional state as depression, irritability, withdrawal or aggression and factors reliving pain as rest, drug, play and distraction technique were reported.

Tool IV: Behavioral observation schedule:

Observation of the child behavior was done before therapy and immediately after the implementation of distraction technique. Also, verbal facial expression and motor behavior were observed. Vocalization: include words as hurt, crying, screaming and gasping. Facial expression include grimacing, wide open eye. Body movement including arm movement as rubbing painful part, leg movement as a purposeless activity.

3. METHOD

Administrating process: An official permission was obtained from Tanta Cancer Center (Pediatric Oncology department) and Pediatric Hematology and Oncology Department for carrying out the study.

Ethical consideration: All children and their parents or care givers were informed about the purpose, tools and duration of the study after explaining the benefits of the study. During the study the researcher informed the parents that the confidentiality was assured and their right to withdraw their children at any time they want without reason and consents were obtained.

Tool development: The tools developed were based on the recent relevant literatures. Tool I was developed by the researcher and the content validity was tested by 5 experts in the field of the nursing and oncology.

Pilot study was carried out on 10%of children to ensure clarity, reliability and applicability of the study tools, to identify the difficulties that may appear during application and to estimate the time needed to apply the technique. The results of the data obtained from the pilot study helped in the modification needed in tools. The tools then were revised, redesigned, and rewritten.

Phases of the study: The study was conducted on three phases:

Assessment phase:

The researcher was working with every child and his/her mother or care giver after giving distraction technique. Medical information was obtained using tool I, where every child was interviewed individually. The severity of pain was estimated by self-report, behavioral, and physiological measures. The researcher observed the child behavior through observation check list before therapy and immediately after implementation of distraction technique.

Implementation phase:

This phase include: Setting objectives. Preparation of the content that cover the reason behind the application of the session. The studied children and his/her mother or care giver were divided into groups and the intervention guidelines were carried out for each group through conduction of successive sessions. The intervention guidelines were conducted in 4 sessions given twice weekly. The time of each session was about 30 minutes including periods of discussion according to child progress and their feedback. Different methods and teaching media were used including lectures, group

discussion and demonstration. Each group attended the following sessions: **The first session:** It covered the following topics: definition, causes, types, signs and symptoms of cancer. **The second session:** It began with a review of the concepts previously presented and progress to the next level which focused on treatment and side effect of chemotherapy and radiotherapy. **The third session:** It was concentrated on definition, types, and methods for pain assessment. At the end of the session child question were answered. **The fourth session:** It began with reviewing the points previously instructed and demonstrating about pain and was focused on definition, types, and methods of distraction technique.

Evaluation Phase:

Evaluation was done for all studied children using tool II, III & IV to evaluate and measure pain control through self-report, behavioral, and physiological measure before and immediately after distraction technique to evaluate the efficacy of the protocol for pain control on clinical outcomes of the studied children with cancer.

Statistical Analysis:

The collected data was organized, tabulated, and statistically analyzed using Statistical Package for Social Sciences software (SPSS v-20). For quantitative variables range, mean and standard deviations were calculated. For qualitative variables, the number and percentage distribution were calculated. Chi-square test was used to examine the relation between qualitative variables. Fisher exact test was used to compare observations before and after distraction technique. Significance was adopted at $p < 0.05$ for interpretation of results.

4. RESULTS

Table (1): Represents the socio-demographic characteristics of the studied children. It was revealed that, The majority of the studied children (40%) aged 5-<7 years, males (63.33%) and 60% were the second born in birth order. Regarding educational level of children, 66.67% were in primary school. In relation to family members, 66.67% had >5 members and 70% were from rural area and living in a private house. According to the medical history of studied patients, leukemia and lymphoma were the commonest types 46.67% and 23.33% respectively and all the children received chemotherapy and 33.33% received chemo-radiotherapy. More than half of the children (53.33%) have illness for a period >1-12 months and 70% were absent from school >4 week. Regarding children weight, 68.33% were considered underweight.

Table (2): Regards the side effects to chemo radiotherapy and their psychological reactions to chemo-radiotherapy. The most common effects reported were nausea and vomiting, loss of appetite and inflammation of mouth, pain and fatigue and anemia (90%, 86.67%, 85% & 80%) respectively. As regard to children reaction to chemo-radiotherapy, anger, fear & fatigue were the most common reactions reported (90%, 88.33% & 85%) respectively.

Table (3): Represents distribution of the studied children related to pain intensity, quality and referral. Among 49 (81.67%) patients who reported severe pain at presentation, only 5 (8.33%) patients still had the same pain level immediately after implementation of distraction technique and for patients who reported no pain before, the percentage improved from 3.33% to 70% ($p=0.001$ (Table 3, Figure 1)). As regard to pain location it was found that, among 33 (55%) children who cannot locate the site of pain at the start, only 2 (3.33%) still cannot locate the site of pain immediately after implementation of distraction technique ($p=0.001$). Patients presented with cutting or itching pain showed significant improvement immediately after implementation of distraction technique ($p=0.021$ & 0.003 respectively). Also, pain referred to other sites showed statistical improvement from 63.33% to 20% ($p=0.001$). It was observed that, about two third of children's (63.33%) had pain referred to other sites before distraction technique and (20%) of the studied children had pain referred to other sites immediately after implementation of distraction technique.

Table (4): . represents distribution of the studied children related to pain associated with physiological signs. It was found, (90.00%, 41.67%, 36.67%, 31.67%, 26.67%) of them respectively had nausea, headache, rapid pulse rate, constipation, and rapid breathing before distraction technique and immediately after implementation of distraction technique (11.67%, 10%, 10%, 8.33%, 8.33%) of them respectively had nausea, headache, rapid pulse rate, hypertension, and rapid breathing. As regards pain associated with physiological signs before and immediately after implementation of distraction technique it was found that there were statistically significant differences related to nausea, headache and rapid pulse rate ($P=0.020$, $P=0.003$, $P=0.012$) respectively.

Table (5): As regards observation of their behavior of children’s .It was found that, about one third of children (36.67%,35%) was respectively moaning or whimper and cry before distraction technique and increase to (6.67%,5%) was respectively cry and moaning or whimper immediately after implementation of distraction technique. There were significant differences. It was found that, the majority of children (85%) was Wrinkled forehead and about half of children (53.33%)was Widely opened eyes before distraction technique and decrease to (16.67,11.67%) was respectively Wrinkled forehead and Widely opened eyes immediately after implementation of distraction technique. There were significant differences. It was found that, more than half of children (55%) was Muscle cramps or stiffness and about one third of children (36.67%) was Rubbing of painful area before distraction technique and decrease to (10%,8.33%) was respectively Rubbing of painful area and Muscle cramps or stiffness immediately after implementation of distraction technique. There were significant differences except elevated of painful area (P=0.060).

Table (6): Represent relation between different methods of distraction technique to control pain. The researcher used different methods of distraction to control pain. it was noticed that(97.62%) of child who used TV ,music, and visits of family and friends as distraction method had no pain, followed mobile or video games 92.86%, reading stories (59.52%), and telling jokes (45.24%).It was also noticed that,(88.89%) of child who used TV ,music , visits of family and friends, and mobile or video games as distraction method had mild pain. It was also noticed that, (75.00%) of child who used TV , music , visits of family and friends, reading stories and mobile or video games as distraction method, had moderate pain. There were no significant differences.

Table (1): Percent distribution of studied children related to socio-demographic characteristics .

Children socio demographic Characteristics	(n=60)	
	No	%
Age (years)		
5-<7	24	40.00
7-<9	12	20.00
9-<11	7	11.67
11-<13	5	8.33
13-15	12	20.00
Range	5-15	
Mean ±SD	8.567±3.326	
Sex		
Male	38	63.33
Female	22	36.67
Birth order		
First	12	20.00
Second	36	60.00
Third	8	13.33
Forth and more	4	6.67
Level of education		
Nursery school	6	10.00
Primary	40	66.67
Preparatory	14	23.33
Family members		
3	4	6.67
4	16	26.67
≥5	40	66.67
Residence		
Rural	42	70.00
Urban	18	30.00
Type of disease		
Leukemia	28	46.67
Lymphoma	14	23.33
Brain tumors	7	11.67
Sarcoma	7	11.67
Wilms’ tumors	4	6.67

Management		
Chemotherapy	40	66.67
Radiotherapy	0	0.00
Chemo-Radiotherapy	20	33.33
Duration of illness (months)		
1	12	20.00
>1-12	32	53.33
>12	16	26.67
Duration of school absence (weeks)		
<1	5	8.33
1-4	13	21.67
>4	42	70.00
Children's weight		
Underweight (<90)	41	68.33
Normal (90-110)	6	10.00
Overweight (>110)	13	21.67

Table (2): Percent distribution of the studied children related to side effect and their psychological reactions to chemo-radiotherapy.

	(n=60)	
	No	%
Side effects		
Nausea and vomiting	54	90.00
Loss of appetite and inflammation of mouth	52	86.67
Pain and fatigue	51	85.00
Anemia	48	80.00
Loss of hair and changes of skin	28	46.67
Constipation	19	31.67
Diarrhea	8	13.33
Psychological reactions		
Angry	54	90.00
Fear	53	88.33
Fatigue	51	85.00
Frustration	38	63.33
Depression	30	50.00
Anxiety	28	46.67
Nervous	22	36.67
Feeling lonely	11	18.33

Table (3): Percent distribution of the studied children related to Pain intensity, location, quality, duration & referral

Assessment of pain	Before distraction technique (n=60)		Immediately after implementation of distraction technique (n=60)		Chi-Square	
	No	%	No	%	X ²	p-value
Pain intensity						
No pain	2	3.33	42	70.00	73.358	0.001*
Mild	5	8.33	9	15.00		
Moderate	4	6.67	4	6.67		
Severe	49	81.67	5	8.33		
Pain location					49.283	0.001*
Front	6	10.00	22	36.67		
Back	3	5.00	20	33.33		
Front and back	18	30.00	16	26.67		
Didn't know	33	55.00	2	3.33		

Pain quality						
Cutting	14	23.33	4	6.67	5.294	0.021*
Burning	10	16.67	3	5.00	3.106	0.078
Beating	7	11.67	2	3.33	1.922	0.166
Itching	19	31.67	5	8.33	8.802	0.003*
Aching, dull	5	8.33	0	0.00	3.339	0.068
Didn't know	5	8.33	0	0.00	3.339	0.068
Pain referred to other sites						
Yes	38	63.33	12	20.00	21.429	0.001*
No	22	36.67	48	80.00		

*Significance $p < 0.05$

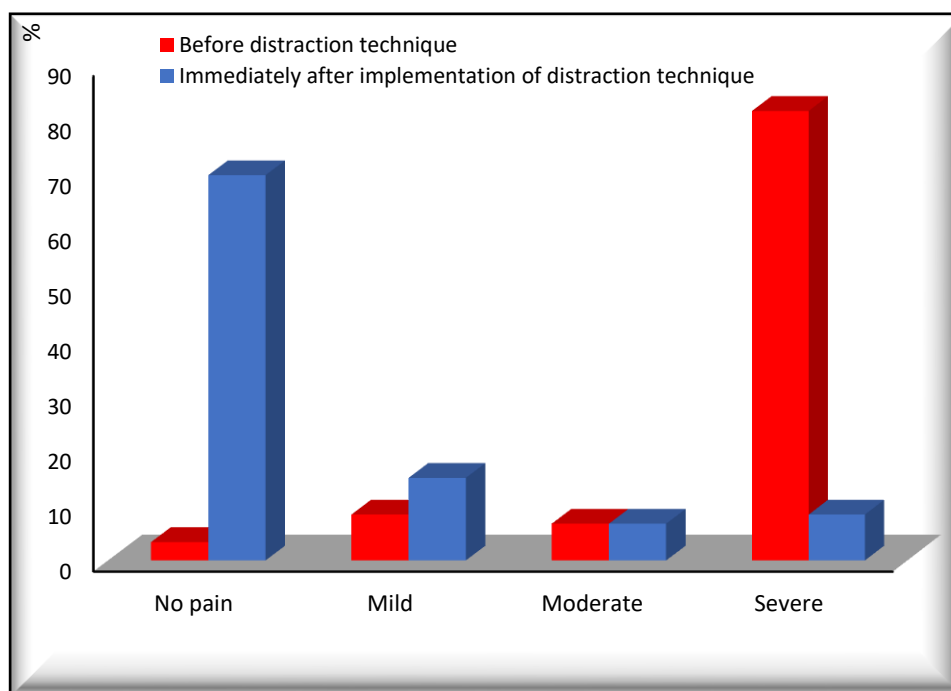


Figure (1): distribution of the studied children related to pain intensity.

Table (4): Percent distribution of the studied children related to physiological signs.

Physiological signs	Before distraction technique (n=60)		Immediately after implementation of distraction technique (n=60)		Chi-Square	
	No	%	No	%	X ²	P-value
Nausea	54	90.00	7	11.67	70.553	0.001*
Headache	25	41.67	6	10.00	14.092	0.001*
Constipation	19	31.67	4	6.67	10.542	0.001*
Rapid breathing	16	26.67	5	8.33	5.772	0.016*
Dizziness	14	23.33	3	5.00	6.853	0.009*
Sweating	6	10.00	2	3.33	1.205	0.272
Pupils dilation	4	6.67	1	1.67	0.835	0.361
Tachycardia	22	36.67	6	10.00	10.481	0.001*
Hypertension	12	20.00	3	5.00	4.876	0.027*

*Significance $p < 0.05$

Table (5): Percent distribution of the studied children related to observation of their behavior.

	Before distraction technique (n=60)		Immediately after of distraction technique(n=60)		Chi-Square	
	No	%	No	%	X ²	p-value
Vocalization						
Shout or screaming	17	28.33	2	3.33	12.256	0.001*
Cry	21	35.00	4	6.67	12.935	0.001*
Hurt	13	21.67	3	5.00	5.841	0.016*
Repeated words	16	26.67	2	3.33	11.046	0.001*
Moaning or whimper	22	36.67	3	5.00	16.371	0.001*
Deep respiration	13	21.67	2	3.33	7.619	0.006*
Facial expression						
Biting on teeth	16	26.67	3	5.00	9.005	0.003*
Tightly closed lips	22	36.67	7	11.67	8.912	0.003*
Tightly on lower lips	16	26.67	4	6.67	7.260	0.007*
Widely opened eyes	32	53.33	7	11.67	21.880	0.001*
Wrinkled forehead	51	85.00	10	16.67	53.348	0.001*
Crying	21	35.00	4	6.67	12.935	0.001*
Body movement						
Rubbing of painful area	22	36.67	6	10.00	10.481	0.001*
Purposeless movement	16	26.67	3	5.00	9.005	0.003*
Immobilization	14	23.33	4	6.67	5.294	0.021*
Muscle cramps/stiffness	33	55.00	5	8.33	28.074	0.001*

*Significance $p < 0.05$

Table (6): Relation between different methods of distraction technique to cancer pain control

Method of distraction technique	No pain (n=42)		Mild (n=9)		Moderate (n=4)		Chi-Square	
	N	%	N	%	N	%	X ²	P-value
T.V	41	97.62	8	88.89	3	75.00	4.291	0.117
Music	41	97.62	8	88.89	3	75.00	4.291	0.117
Controlled breathing	12	28.57	2	22.22	1	25.00	0.162	0.922
Telling jokes	19	45.24	7	77.78	1	25.00	4.142	0.126
Reading stories	25	59.52	5	55.56	3	75.00	0.453	0.797
Blowing of soap	12	28.57	3	33.33	1	25.00	0.116	0.943
Visits of family and friends	41	97.62	8	88.89	3	75.00	4.291	0.117
Mobil or video games	39	92.86	8	88.89	3	75.00	1.462	0.481

*Significance $p < 0.05$

5. DISCUSSION

Childhood cancer is the second leading cause of death in children aged 5-15 years. The incidence in this age group is approximately 129 per million children. For all children in pediatric age group, leukemia is the most frequent type of cancer, followed by lymphoma. In the present study, it was observed that leukemia is the most common type of cancer followed by lymphomas. This agreement with **Baghat et al, (2013)** ⁽¹³⁾ who mentioned that the age of cancer patient ranged from 5-15 years.

Males constitute 63.33% of the present study. The National Cancer Institute in the United States reported that males had cancer more than females (ratio of 1.2:1) for children less than 15 years of ages. ⁽¹⁴⁾

Psychosocial and developmental researches demonstrate that life style and environmental factors influence individual health and chances of developing cancer. In the current study, it was revealed that highest percentages of children lived in rural areas.

Contributing to the learning problems which many students with cancer face is the high rate of absenteeism that may result from hospitalization, treatment, and treatment side effects. In the present study, 70% of the children were absent from school for more than 4 weeks. **Barrera et al, (2014)** ⁽¹⁵⁾ who found that children with leukemia report missing

between 10 to 20 weeks from school in one year, and as a result, many of them repeat grades. Furthermore, when a child is out of school for a long period of time, he/she may experience reactions such as depression, apathy and poor self-concept.

Chemo-radiotherapy can affect rapidly dividing normal cells such as epithelial cells of GIT leading to an increase susceptible to damage. The current study revealed that the majority of studied children reported side effects on GIT in addition to pain, fatigue and anemia. **Moors et al, (2011)**⁽¹⁶⁾ who mentioned that nearly all chemotherapeutic agents as well as radiation therapy have gastrointestinal toxicity. **Gralla et al, (2008)**⁽¹⁷⁾ who stated that anti-emetics are most effective when they are given the night before chemotherapy and continued at 6 hours intervals. **Langstein et al, (2009)**⁽¹⁸⁾ and **Tisdole, (2007)**⁽¹⁹⁾ who mentioned that pain represent highest incidence as a problem affecting nutritional intake in one third of all cancer patients at diagnosis and it may occur as a side effect of treatments. **Donaldson et al, (2011)**⁽²⁰⁾ who reported that taste sensation deteriorates rapidly, often within the first two weeks of therapy.

Mahan et al, (2008)⁽²¹⁾ who stated that intestinal function affection by chemo-radiotherapy may persist throughout therapy, resulting in weight loss. In the present study it was observed that nearly two third of children had weight loss.

Grosvenor et al, (2008)⁽²²⁾ and **Sandra et al, (2011)**⁽²³⁾ who reported that the most common nutritional challenges seen during active therapy for cancer includes diarrhea, taste change, fatigue, stomatitis, swallowing difficulties, dry mouth, nausea, and vomiting which result from the treatment or cancer itself. Also **Donnelly et al, (2013)**⁽²⁴⁾ and **Fearon et al, (2011)**⁽²⁵⁾ who mentioned that the above symptoms are the most prevalent in GIT cancer patient.

Who mentioned that children of the present study showed psychological reactions to the treatment e.g. angry, fear, fatigue, anxiety, frustration, depression, and anxiety. These reactions may be due to the stress started from cancer diagnosis, investigations, hospitalization or administration of chemo-radiotherapy with subsequent toxicity and body changes. **Yu et al, (2011)**⁽²⁶⁾ who described the prevalence of anxiety in patients awaiting diagnostic procedures in an oncology center waiting room and mentioned that more than one third of participants had anxiety. On contrary, **Phipps et al, (2012)**⁽²⁷⁾ who reported that children with cancer don't exhibit clinically significant symptoms of distress and also reported lower levels of depression and anxiety.

Controlling pain is an important part in treating children with cancer as pain can suppress the immune system; interfere with sleep, and increase the incidence of depression. The child felt stronger and better during treatment if he doesn't have pain.^(7,11)

Pain and easy fatigue are the most side effects of chemo-radiotherapy. Cancer pain may result from painful procedures, diseases progression or nerve compression. In the present study, the majority of children had pain and fatigue. **Gedaly et al, (2009)**⁽²⁸⁾ who stated that children in their study suffered from pain and fatigue. **Walsh et al, (2010)**⁽²⁹⁾ and **Weis, (2011)**⁽³⁰⁾ who reported that the prevalence of these symptoms (pain and fatigue) ranged from 50% to 84% and from 59% to nearly 100% respectively. **Miller et al, (2011)**⁽³¹⁾ who reported that pain and fatigue were among the most prevalent symptoms in hospitalized children with cancer.

Distraction as a non-pharmacological technique due to its lower costs, less side effects and more accessibility has been more attractive in children. Distraction is one of the pain control techniques that utilize the five senses in order to focus the patient's attention on other stimuli and hence control pain in a better way. Some of the various methods of distraction used to reduce pain in children include handheld video games, audio-visual systems (watching cartoons), reading stories, blowing soap, and visits of family or friends, listening to music, and therapeutic touch.⁽³²⁾

Watching television movies and listening to music are among the distraction methods to reduce pain during chemo-radiotherapy in children. In the current study, it was noticed that the majority of the studied children who used these methods had pain control. **Bellieni et al, (2010)**⁽³³⁾ who showed that watching television and playing video games were an effective methods in controlling pain during venipuncture. On the other hand, **Landolt et al, (2012)**⁽³⁴⁾ who stated that distraction technique using playing video games had no effect on the pain reduction in children hospitalized with burns. Also, **Press et al, (2013)**⁽³⁵⁾ who found that listening to music with headphones during venipuncture did not lead to pain control.

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Soap blowing is another distraction technique used to reduce children's pain during chemotherapy. **Bellieni et al (2010)**⁽³³⁾ who showed that focusing attention on making bubbles can be effective in the relief of venipuncture pain.

Breathing exercise techniques (e.g. an aerobic exercise) if done right, can cause children to focus on their own breathing thus reduces the pain. Also, focusing on breathing during the procedure can cause brain cells responsible for recording provocations such as pain to get involved in these messages, and therefore fewer pain messages are recorded.⁽³⁶⁾

Involving the family is critical. The parents are able to play an active role in supporting and training their children during the procedure, during intervention and/or during evaluation.⁽³⁹⁾ Parents-children relationship favors coping with and accepting the distraction intervention, during knowingly painful procedures. **Manne et al, (2013)**⁽³⁷⁾ who suggested that the link between parents and children is extremely relevant for the effectiveness of the intervention when it depends on the training offered by parents to children.

In general, the present study found that, intervening with cancer children by performing distraction technique is helpful in controlling pain after administration of chemo-radiotherapy

6. CONCLUSION

Distraction is a non-pharmacological intervention aimed to reduce procedural pain or control pain in cancer children. Age-specific non-pharmacological interventions used to manage the pain are most effective when adapted to the developmental level of the child.

7. RECOMMENDATIONS

1. In-service training programs should be held with nurses working in the radiation and oncology department that include lesson about cancer, side effects of treatment, pain, and distraction techniques.
2. Nurses should give the patients an effective teaching about the disease and lines of treatment. Nurses should help the patients to identify the side effects of radiation, chemotherapy and increase their self-care abilities and methods of distraction techniques.
3. Most distraction techniques are easy to implement, considering their low cost, and are useful for health professionals looking at enhancing pediatric patients' assistance with regard to pain management.

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