

Effect of Distraction Techniques on Minimizing Pain Associated With Burn Dressing Changes among Preschool Children

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Abstract: Background: Pain related to burn dressing is the most extensively aspect of burn pain. Pain management is an integral component of nursing practice. Distraction can be increasingly used as pain reducing methods. **Aim of the study:** the present study aimed to evaluate the effect of distraction techniques on minimizing pain associated with burn dressing changes among preschool children. A quasi experimental design was conducted in the present study. **Sample:** 105 burned children were randomized into three equal groups; 35 child per group: video game group (I), toys group (II) and control group (III). **Setting:** burn unit of Al-Ahrar Educational Zagazig Hospital. **Tools:** Three tools were used in the present study as follows; questionnaire interview sheet, burn assessment sheet and pain assessment tool using Children's Hospital of Eastern Ontario Pain Scale (CHEOPS) to evaluate pain intensity. **Results:** revealed that there was statistically significant difference between physiological responses and pain intensity during dressing change in study and control groups. **Conclusion:** distraction techniques using videogames and toys had a significant positive effect in minimizing pain associated with burn dressing change among preschool children. **Recommendations:** Based on the results of the present study distraction techniques should be integrated into the routine nursing care with combination of pharmacological methods as well as application of non-pharmacological pain management in hospitals as a routine and daily care.

Key words: Burn, Pain, Preschool Children, Distraction Techniques, Dressing Change.

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I. Introduction

Burn is a global public health problem associated with a significant morbidity and mortality, occur more frequently in low and middle income countries ⁽³⁸⁾. Burns are a major source of suffering, disability and are extremely frightening for burned children and their families; it impairs recovery, decreases socialization, impairs ambulation and increases health care utilization and costs ⁽³¹⁾.

Globally, Approximately 2 million burn injuries occur each year with over 50% of these cases being seen in children, the largest number of burns occurs before the age of 6 years ⁽²³⁾. The American Burn Association estimates that one-half million people with burn injuries receive medical treatment each year, of these burn injuries around 3400 deaths occur each year and around 250,000 children under age 18 year require hospitalization for burn injuries ⁽³⁹⁾.

In Egypt, it is difficult to get the precise burn injury statistics due to the lack of an accurate national reporting system. Pediatric burn for children from 1-18 years old admitted to Burn Unit of Al-Ahrar Zagazig Hospital in the period from (2014-2017) were 467 children with different burn injuries. Children under six years were the most susceptible to burn injuries ⁽⁵⁹⁾.

Burns are caused by transfer of energy from a heat source to the body. Heat may be transferred through conduction or electromagnetic radiation. Burns are categorized as thermal, electrical, radiation or chemical burn ⁽⁶⁰⁾. Severity of burn injury depending on the depth of the wound and the proportion of the body affected. Burn depth is classified as superficial, partial thickness and full thickness burn ⁽¹¹⁾.

Burn pain is inevitable experience from any burn injury and common experience of all children with burns regardless of cause, size or depth of the burn. It can be the worst pain experienced that an individual will ever experience ⁽³⁹⁾. Burn pain have both nociceptive and neuropathic pain components, thus management of burn pain is one of the most difficult challenges facing the burn team ⁽²¹⁾.

Pain can be caused by many procedures during hospital treatment but dressing changes particularly for burn wounds can be a major cause and represented the highest level of pain among burned children as well as the most painful stage of dressing change is the removal of the innermost layer of gauze and wound

debridement⁽¹⁷⁾. Ineffective managing procedural pain can lead to several physiological, psychological and social outcomes that threat children. Also, dressing pain which is not relieved can lead to depression, decrease quality of life, prolong stress response after burn injury, prolong hospitalization and delay wound healing. Based on this, pain relief should be the first priority of all care decisions⁽⁴¹⁾.

Despite significant recent advances in burn care, inadequate burn pain management still exists. This is due to both the complex nature of pain and insufficient training of the professionals involved and unfounded fears of analgesic treatment among medical staff. Therefore pain management should be integrated as an essential component of the wound management plan in children with burns^(16, 63).

Pain management, which includes pharmacologic and non-pharmacologic approaches, is a central component of the complex issues involved in treating burns. Non-pharmacological therapy is an important measure to manage pain in burned children. It should be initiated as early as possible in order to prevent the development of anxiety, which can perpetuate the cycle of pain⁽³⁷⁾. Distraction techniques are the most common non-pharmacological intervention that successfully reduces pain and behavioral distress by diverting children's attention away from painful stimuli during invasive procedures. Distraction appears to be safe, inexpensive and simple technique which does not require any specific training and it can be implemented by nurses, parents or other health staff members, besides, it has no risks for the patient, it can lead to the reduction in procedure duration and the number of staff required for the procedure⁽³¹⁾.

Pain management is an integral component of nursing practice and major concern for most nurses in burn unit because of duration of contact that nurses had with children with pain, they play a vital role in overall management of pain through adequate assessment, selection of appropriate intervention for pain management and monitoring effect of treatment⁽³⁶⁾.

Significance of the study

Burns are one of the most excruciatingly painful injuries among children especially during subsequent dressing. Pain has adverse physiological and emotional effects. So, it is essential to frequently assess child's pain and adequate pain management. Non-pharmacological method plays an important role in building a trusting therapeutic relationship between the burned children and the multidisciplinary team. In addition, it can aid in preventing elevation of metabolism, thereby reducing the chance of malnutrition and deterioration of the Immune system. Distraction is a non-pharmacological intervention which reduces the pain intensity without side effects for the patient.

II. Aim of the Study

The aim of the present study was to evaluate the effect of distraction techniques on minimizing pain associated with burn dressing changes among preschool children.

Research Hypothesis

1. The study subjects exposed to distraction techniques exhibit less level of pain during dressing change than control group.
2. The study subjects exposed to distraction techniques exhibit less physiological responses to pain during dressing change than control group.

III. Subjects and methods

Research Design:

A quasi experimental design was used to carry out the present study.

Setting:

The present study was conducted at Burn Unit of Al-Ahrar Educational Zagazig Hospital.

Subjects:

Convenient sample composed of 105 burned children were selected from the above mentioned setting according to the following criteria:

- Age 3-6 years.
- Both sexes.
- Alert, able to communicate.
- Second degree burn; 15%-25% (TBSA).
- Third degree burn; 1%-10% (TBSA).
- Were dressed with the usual method of the unit.
- After 72 hours of burn occurrence

Exclusion criteria

- Concomitant injuries as fracture or polytrauma.
- Having a cognitive, visual or auditory impairment.
- Having a diagnosed illness in addition to a burn injury.
- Children had face and hand burn.

The recruited children were randomized into three equal groups: the video game group (I), the toys group (II), and control group (III).

1. **Video game group (group I):** They involved 35 burned children. Distraction technique was introduced by researcher during dressing change through allowing studied group to play with videogames on a portable tablet.
2. **Toys group (group II):** They involved 35 burned children. Distraction technique was offered by the researcher during dressing change through playing with attractive toys.
3. **Control group (group III):** They involved 35 burned children had received routine hospital care including dressing change without any intervention from the researcher.

Tools of data collection

Three tools were used to collect the necessary data as follows;

Tool I: A questionnaire interview sheet

A questionnaire interview sheet was developed by the researcher after thorough review of relevant literatures to collect the required data. It was divided into three main parts as the following:

Part I: Characteristics of the studied children such as: age, gender, residence, birth order and crowding index.

Part II: Child burn history including: place of burn, time of burn and causes of burn.

Part III: First aid and hospitalization of studied children including: pre-hospital first aid, time of hospitalization, surgical decision, as well as length of hospital stays.

Tool (II): Burn assessment sheet: Burn assessment sheet was designed by the researcher to assess burn wound of the children through assessment of degree, site (body part affected), depth of burn and total body surface area affected (TBSA). As guided by (Antoon & Donovan, 2016).

Tool (III): Pain assessment tool

Pain assessment tool was consisted of two main parts:

Part I: Children's Hospital of Eastern Ontario Pain Scale (CHEOPS)

This scale was developed by McGrath et al (1985). It is an observational scale used to evaluate pain intensity in young children and monitor the effectiveness of interventions for reducing the pain and discomfort. It includes six verbal and motoric behavioral parameters: cry, facial, verbal, torso, touch and legs. Each one of the six parameters had a number of behavioral descriptions and each one of these descriptions was assigned a value ranged from 0 to 3. Scoring: the researcher selected the best behavioral description which is congruent with the child's condition for each parameter. Then the total score was calculated by obtaining the sum of points for all the six parameters and the total score was ranged from minimum score 4 (no pain) to maximum score 13 (the worst pain) that classified into "No pain (4), Minimum pain (5-6), Moderate pain (7-9), Sever pain (10-13).

Part II: Vital signs sheet

Vital signs sheet was used by the researcher to assess physiologic response to pain by assessing body temperature, heart rate and respiratory rate.

- Body temperature was measured axillary by using thermometer.
- Heart rate was measured by palpation at radial artery and auscultation.
- Respiratory rate was assessed by observation of abdominal and chest movement.

Distraction Techniques:

Distraction techniques aimed to reduce pain by diverting children's attention away from painful stimuli during painful dressing change procedure. Two distraction techniques were used in the current study: using videogames for one group while attractive toys were offered to another group.

The intervention was divided into the following:

A. Before dressing change procedure:

- Researcher introduced himself to children and their caregivers and explaining the purpose of the study, getting a verbal consent from caregiver in three groups and presented some explanations about the study.
- Caregivers of studied children were interviewed individually in burn unit to collect demographic data using **part I (characteristics of studied children)** and to obtain burn history using **part II (child burn history)**

of tool I. Each interview lasted from 15 to 20 minutes according to the child's condition and caregivers' understanding.

- All studied children were not received analgesics before the dressing change procedure on three observations.
- Positive child-researcher relationship to establish trust, child's cooperation, providing quiet professional reassurance to child and quiet environment are the first important steps before distraction.

B. During dressing change procedure:

- Researcher observed all studied children during dressing change procedure to determine the sites, depth of burn and percentage of injured parts using **tool II (burn assessment sheet)**.
- During dressing change, only two nurses were usually involved in dressing procedures. One performs dressing change procedure and the other assist and handling equipment. This procedure was included 3 main phases: removing old dressing, cleaning the burn wound, applying new dressing. Distraction either with videogame or toys did not interfere with nurse's ability to conduct the dressing change.
- **For video game group (group I):** 10 minutes before the dressing, distraction started by displaying the preferred game on a portable tablet and continued to play the game until the end of dressing change. The researcher supports the child to focus his attention on the distractor and praised his attention to the distractor. Children were observed for physiologic responses and pain intensity using vital signs sheet & CHEOPS scale before and after distraction for three dressings.
- **For toys group (group II):** 10 minutes before the dressing, distraction started by displaying attractive toys, children played with a toys that required the child to press buttons in order to move and to produce sounds and spine a colorful wheel which was very attractive to them. Also, the researcher supports the child to focus his attention on the distractor and praised his attention to the distractor. Children were observed for physiologic responses and pain intensity using vital signs sheet & CHEOPS scale before and after distraction for three dressings.
- **For control group (group III):** under the same conditions, without any intervention by the researcher, children were observed for physiologic responses and pain intensity using vital signs sheet & CHEOPS scale before and after receiving the routine nursing care (dressing change procedure) for 3 dressings.

C. After dressing change procedure

- The child received specific verbal praise for a desired behavior exhibited during the procedure and a handheld distraction toy at the end of the dressing.

Field Work

Data was collected during 9 months, starting in the period from the beginning of July 2016 to the end of March 2017. The researcher started the data collection every day (from Saturday to Thursday) from 9 a.m. to 12:00 p.m. in the morning shift. Each child in three groups was changed his/her dressing three days per week in morning shift for 15-30 minutes according to the length of dressing change and TBSA. The researcher assessed the children individually in the dressing room. Each child observed and received distraction techniques for a total 3 dressing changes (one dressing change / day).

Pilot Study

The pilot study was conducted on 10% of the total sample (11 children) from burn unit after the tools were developed and before starting the data collection to test the applicability, consistency, clarity and the feasibility of the study tools as well as to determine the required time to fulfill the tools. Children who shared in the pilot study were included in the main study sample as no radical modifications were needed on the study tools.

Administrative and Ethical Considerations

An official permission was obtained by submission of an official letter issued from the dean of the Faculty of Nursing, Zagazig University to the director of Al-Ahrar Educational Zagazig Hospital. An oral consent was obtained from the caregiver to accept to participate in the study. The researcher introduced herself and clarified the aim of the study briefly to children and their caregiver included in the study. During the work every effort was made to ensure the safety, privacy and confidentiality for each child.

Statistical Design

Data were coded, computed and analyzed by using SPSS version 20.0. Data were presented using descriptive statistics in the form of frequencies & percentages and (χ^2) test was used for comparison of qualitative variables (Mont Carlo exact was used when any cell contain less than 5). Quantitative variables were presented as means \pm standard deviations and student T test (for comparison of two groups) and one way a nova

(F) test were used (for comparison of more than two groups). Pearson's Correlation coefficient (r) was used to measure the strength of the association between two quantitative variables.

- P value was statistically significant at ≤ 0.05 .
- P value was highly statistically significant at ≤ 0.001 .

IV. Results

Table (1) shows Characteristics of studied children. It was found that age distribution is significantly difference between groups. 48.6% of video game group were in the age group 5-6 years and those who were at age of 3- <4 years constituted 82.9%, 51.4% in both toys and control group respectively; with mean age 4.45 ± 1.10 , 3.52 ± 1.01 and 4.11 ± 1.124 years. It is revealed from the table that males had the highest percentage among three groups as they represented 65.7%, 65.7% and 68.6% for video game, toys and control group respectively. Concerning residence, it was found that 68.6%, 77.1% and 77.1% of studied children were from rural area among video game, toys and control group respectively. Results of the present study showed that the second child represented the highest percentage of children's birth order in the three groups which constituted 37.1, 34.3% and 45.7% in video game, toys and control group respectively. Moreover, it can be seen that 65.7%, 68.6% and 68.6% had high crowding index 2 persons or more per room.

History of burn among studied children was revealed in table (2). It was found that 91.4%, 97.1% and 88.6% of studied children were burnt at home in video game, toys and control group respectively where the Kitchen represented the highest percentage of burn place in three groups that constituted 57.1%, 62.9% and 65.7% in video game, toys and control group respectively. Concerning time of burn, it was found that 40.0%, 42.9% and 51.4% of three groups respectively were burnt afternoon. The same table clarifies that 82.9%, 91.4% and 77.1% of studied children were burnt due to boiled liquids among video game, toys and control group respectively.

Table (3) clarifies characteristics of burn wound among studied children. It was found that 48.6%, 31.4% and 42.9% of studied children had second degree burn among three groups respectively. Moreover, 71.4%, 85.7% and 57.1% of studied children among three groups had multiple burns respectively. It is revealed from the table that shoulder represented the highest percentage of children's affected area in three groups that represented 31.4%, 57.1% and 51.4% in video game, toys and control group respectively. Also, it was found that 68.6%, 65.7% and 60.0% of the three groups respectively had Deep-thickness burns. Moreover, the highest percentage of studied children among three groups had burn within 15 to less than 20% of total body surface area (TBSA) which represented 91.4%, 82.9%, 88.6% among three groups respectively.

Prescribed medication and distraction techniques during dressing change among studied children illustrated in table (4). It was found that 100% of studied children did not receive analgesics before dressing change. Moreover, 100% of them did not receive any method of distraction by the nurse during dressing change. **Figure (1)** presents that there was statistical significant difference in decreasing mean temperature values after application of distraction techniques using video games or toys all over the three dressings.

Figure (2) illustrates that there was statistical significant difference in decreasing mean values of heart rate after application of distraction techniques using video games or toys all over the three dressings.

Figure (3) clarifies that there was statistical significant difference in decreasing mean values of respiratory rate after application of distraction techniques using video games or toys all over the three dressings.

Table (5) shows mean children's behavioral pain scoring among studied groups before and after applying distraction techniques according to CHEOPS all over the three dressings. It was found that there was highly statistically significant difference in decreasing mean score of pain after application of distraction techniques all over the three dressings ($P < 0.001$).

Correlation between pain Intensity and vital signs among studied children after the third dressing was shown in table (6). It was found that there was positive statistical significant correlation between pain intensity and respiratory rate among video game group. Also there was positive statistical significant correlation between pain intensity and temperature & respiratory rate among control group. Moreover, there was positive not statistical significant correlation between pain intensity and heart rate among three groups.

Table (7) shows relation between mean children's behavioral pain scoring of CHEOPS and characteristic of studied children after the third dressing. It was found that there was no statistical significant relation between mean pain score and characteristics of studied children among three groups ($P > 0.05$).

V. Discussion

Pain resulted from burn injuries is one of the most stressful and scary experiences in children, among the common therapeutic procedures for burns is dressing changes that considered one of the largest sources of pain in the burn unit. Therefore, managing the pain resulted from dressing change is one of the therapeutic priorities⁽⁵²⁾.

There are various non-pharmacological strategies that can be employed to treat pain in children with burn injuries. Distraction is one of the pain control techniques utilizing five senses in order to focus the patient's attention on other stimuli and hence control pain in a better way without side effects to the patient⁽⁵¹⁾. It is most effective when adapted to the child's age and developmental level; moreover, distraction appears to be safe and inexpensive, it can lead to reduction in procedure duration and the number of staff required for the procedure⁽³⁾.

Concerning age of studied children, the results of the present study showed that the majority of children in video game group were at the age group 5-6 years, while nearly half of children in toys group were at the age of 3- <4 years. There was statistical significant difference between study and control group related to their age. This result may be attributed to young children were interested and more distracted by using attractive toys, while older children were interested and distracted better with a hand-held video games. This finding goes in line with⁽⁵⁷⁾ who mentioned that distraction techniques are adapted according to the age and developmental level where toys with lights and sounds can help to distract young children, while playing video games help to distract older children during procedures.

It is revealed from the current study that there was no statistical significant relation between average pain score and children's age among three groups, where young children experience more pain than older children with no statistically significant differences. This finding goes in line with^(8, 15, 27, 54) who mentioned that no statistical significant difference between pain score and age in the intervention and control groups. This finding is inconsistent with⁽⁴³⁾ who found that there was a significant difference between pain intensity and age of studied children.

Battle et al⁽¹³⁾ who conducted a study to report the incidence of all burns presentations to the emergency department over a 7-year period in **South Wales** and found that boys are more commonly affected than girls. This agrees with the current study revealed that more than half of studied children were males in both study and control group. This result attributed to male children are probably more active than females and increase their curiosity levels as well as disobedient nature of boys, so they more frequently exposed to burn injuries. Similarly with⁽⁴⁰⁾ who conducted a study to identify the risk factors of childhood burn in rural **Bangladesh** and found that boys are more vulnerable than girls in younger age groups. This finding disagrees with⁽²²⁾ who mentioned that females were affected with burn injuries than males.

Moreover, the finding of the current study showed that there was no statistical significant difference in gender distribution between three groups. This is in agreement with⁽¹⁰⁾ who conducted a study to determine the pattern of pediatric burn injuries in **Saudi Arabia** and found that there was no statistical difference in the gender distribution.

The current study presents that there was no statistical significant relation between average pain score and children's gender among three groups. This is related to the fact that females are sensitive and less tolerance to pain than males but this difference was not significant. This goes in line with^(7, 20, 51) who reported that there was no statistically significant difference between pain intensity and gender. This finding is incongruent with⁽³⁰⁾ who found that there was a significant relation between pain intensity and gender.

Hassan et al⁽²⁴⁾ who conducted a study at the burn unit of **Assiut University Hospital** to identify the epidemiological features of childhood burn accidents and stated that the incidence of childhood burn tended to be higher in rural children than urban children, This finding is accordance with the present study clarified that more than half of studied children in three groups were from rural areas. This is due to the traditional habits of cooking over low stoves and people in rural areas are more using alternative heating sources as well as lack of preventive measures. This finding is contrast with^(50, 53) who found that the incidence of burns in the urban regions was higher than that in the rural areas.

Concerning birth order, the present study illustrated that the first and second child represented higher percentage of children's birth order in both study and control groups. This finding may be attributed to presence of higher birth order and mothers' busy with the new or last child leading to lack supervision for the first or second child. This finding is supported by⁽³⁵⁾ who studied the effect of distraction with play dough and bubble making on children's parents satisfaction during venipuncture and stated that the second child represented the highest percentage of children's birth order in three groups. Similarly with⁽⁵⁶⁾ who conducted a study in **United Kingdom** to identify risk factors for scald injury in children under 5 years of age and reported that the higher number of burn injuries were children born first.

Mokbel⁽⁴²⁾ mentioned that birth order of the children in study and control groups was positively correlated with their behavioral pain responses. This finding disagrees with the present study that clarified that

there was no statistical significant relation between birth order and average behavioral pain scoring among three groups.

As observed from the present study, more than half of studied children in three groups had higher crowding index. This may be due to low socioeconomic status where some families and their young children sleeping, living and cooking in one room. Such result agrees with ⁽⁴⁸⁾ who conducted a study to identify morbidity, mortality, causes and risk factors of burns in **Tanzania** and found that burn patients were from low socioeconomic group, coming from homes where people live in crowded conditions.

Regarding place of burn, results of the present study revealed that the majority of burn among studied children in three groups occurred at home. This can be explained that children frequently play in the house where kitchen is the commonest place for occurrence of burn injury where hot water, boiling milk and soup are the common sources of burn among studied children as well as several factors including lack of proper supervision from parents, improper cooking practices. This finding agrees with ⁽⁵⁾ who conducted a study to provide information on the pattern of burn injuries in preschool children in **Iran** and found that the majority of burns were occurred in residential homes and kitchen was the most common place for burn injury in pre-school children. Similarly with ⁽⁵⁵⁾ who studied the pattern of burns and the need of a health education program within the setting of **rural Kwa-Zulu Natal** and mentioned that most burns occurred at home as a result of hot water and food spillages. On the contrary, this finding disagrees with ⁽⁴⁷⁾ who found in their study about the epidemiology of burn injuries in the **East Mediterranean Region** that older children were significantly more likely to be burnt outside compared to younger children.

lin et al ⁽³⁴⁾ who conducted a study to identify the incidence, mechanism and agents of pediatric burn in **Southern Taiwan** and mentioned that 35% of all pediatric burns happened at dinner time (5 p.m.–8 p.m.) and 19.7% occurred at lunch time (11 a.m. to 1 p.m.). This result agrees with the current study where the highest percentage of studied children in three groups was burned at afternoon and night. This is related to that at night, the housewife is tired after the day's activities, supervision may be inadequate and children may exposed to hot fluids (hot soup is typically a part of the evening meal) as well as at afternoon time, the house is most crowded and families were busy in preparing the main meal of the day. Also this result goes in line with ⁽⁶⁵⁾ who found that the minor peak of burn injuries occurs between 12 and 1p.m. and the major peak occurs between 8 and 9 p.m.

Concerning causes of burn, results of the present study clarified that most of studied children in both study and control groups were burned due to hot fluids followed by flame burn, while none of them were burned due to chemicals or electricity. This could be explained that young children accidentally pull hot object from high surfaces onto themselves without awareness of danger and adequate supervision from parents leading to serious scald burn, as well as families is still using traditional methods for heating and children like to play with fire that lead to flame burn. This finding consistent with ⁽⁴⁴⁾ who conducted a study at **Turkey** to determine etiologic factors of the burn injured children less than 6 years and reported that scald injuries was the common cause of burn injuries among children followed by flame burn. Similarly with ⁽¹³⁾ who found that scalds were the most common thermal injury in children aged less than 6 years. Also, this is congruent with ⁽⁵⁾ who mentioned that all burn injuries occurred because of thermal injury and none of pre-school children had electrical and chemical burn. On the contrary, this finding disagrees with ⁽¹⁹⁾ who found that after age 2 years, flame burn is the most common cause of serious burn injuries, accounting for nearly one third of all serious burns.

It is clear from the current study that nearly half of studied children in both study and control groups had second degree burns and they were treated in the burn unit. This findings could be interpreted by children with minor burns were treated at outpatient clinic while children with second or third degree burn were treated at burn unit. Moreover, one child might have more than one degree of burn. This finding agrees with ⁽⁴⁵⁾ who conducted a study in **Turkey** to detect risk factors and prepare a program for prevention of burn injuries in children aged up to seven years and found that the most of children had second-degree burns and only 20% had third-degree burns.

Asuquo ⁽¹²⁾ who conducted a study to provide information on the current epidemiology of burns, its morbidity and mortality profile in the **University of Calabar Teaching Hospital** and found that two thirds of burn injury involved multiple anatomic regions. This finding agrees with the current study clarified that most of studied children in three groups had multiple burns. This may be due to burn occurs at different sites of the body. Similarly with ⁽⁴⁾ who conducted a study to identify risk factors related to pediatric burns mortality in **Ghana** and found that the majority of studied children had multiple body part burnt.

Moreover, the current study displayed that the anatomic areas most commonly affected by burn among three groups were shoulder, chest, thigh and leg. This could be related to the upper body especially shoulder and anterior trunk was found to be easily involved in an attempt to grasp or touch hot objects from higher surfaces among young children for exploration. However, the greater number of flame burns affect the lower extremity than the upper extremity. This finding goes in line with ⁽⁶⁵⁾ who conducted a study to investigate presentation patterns of scald injuries in children and suggest potential measures to reduce these injuries in **Urban Pediatric**

Emergency departments and mentioned that the upper limbs (shoulders) and the upper trunk (chest) were most commonly affected areas.

Dhopte et al ⁽¹⁸⁾ carried out a study to provide recent prospective epidemiological data on pediatric burns in **India** and found that the highest proportion of patients sustained partial thickness burns. This finding disagrees with the result of the present study that more than half of studied children in both control and study groups had deep thickness burn. Also, this is incongruent with ⁽⁴⁶⁾ who studied childhood burns in **Nigeria** and found that partial-thickness burn occurred in most of children.

According to TBSA, the present study showed that most of studied children among three groups sustained burn injuries within 15 <20% of TBSA. This result is in line with ⁽⁹⁾ who studied the incidence, pattern of pediatric burn injuries in **King Abdul-Aziz Medical City** and mentioned that the majority of children had burn more than 15% TBSA. On the other hand, this finding disagree with ⁽⁶⁷⁾ who conducted a study of hospitalized pediatric burns in **North China** and found that pediatric burn patients mainly presented small burns <10% TBSA. Also, this is inconsistent with ⁽²⁹⁾ who conducted a study in **Uganda** to investigate the causes and severity of burns and reported that the majority of the patients sustained injuries within 10-15% of TBSA.

The results of the present study revealed that none of the studied children in both study and control groups were received analgesics before dressing change. This is due to shortage of analgesics and fear of its side effects in children such as respiratory depression and addiction as well as lack of nurses' knowledge about pain management. This result in disagreement with ⁽¹¹⁾ who mentioned that it is important for the nurse to administer analgesics at least 20 to 30 minutes before dressing changes and debridement.

The current study revealed that none of the whole studied sample had received any form of distraction by nurses during dressing change prior conducting the study. This might be attributed to lack of nurses' knowledge about the importance of non-pharmacological measures in reducing pain associated with dressing change, lack of pain assessment by nurses. Furthermore, shortage of nursing numbers, where only two nurses were responsible for changing dressing for all burned patients (children and adults) during morning shift, so that there was no sufficient time for nurses to practice distraction techniques. This finding disagrees with ⁽³³⁾ who carried out a study to assess pain management in children with burn injuries admitted at **Kilimanjaro Christian Medical Center** and found that 26% of nurses were giving reassurance for children, 9% of them were used toys for pain management.

As observed from the present study, there was statistical significant increase in vital signs before application of distraction techniques all over the three dressings. This can be justified by the stress and fear of procedure trigger certain physiological mechanism in form of increased production of epinephrine, which increase pericardial vasoconstriction and cardiac output, those associated with tachycardia, increase of respiratory rate ⁽²⁶⁾. This result is supported by ⁽⁶⁶⁾ who noted in a study about comparing the efficacy of two relaxation techniques on pain intensity post cardiothoracic surgery at **Tanta University Hospital** that there was increase of vital signs before starting relaxation techniques. Furthermore ⁽⁵⁸⁾ suggested that elevation of vital signs can be contributed to experience of acute pain.

Mokbel ⁽⁴²⁾ reported that there was a positive significant difference in decreasing body temperature, heart rates and respiratory rates all over the three days after practicing distraction. This finding congruent with the current study that clarified that there was a significant difference in decreasing body temperature, heart rates and respiratory rates all over the three dressings after practicing distraction techniques. The justification of this result may be due to the application of distraction techniques decrease sympathetic nervous system activity and promote release of endorphin that activate parasympathetic activity to enhance the body to relax and decrease pulse rate, respiratory rate and blood pressure ^(26, 25).

Moreover, this result is supported by ⁽⁶¹⁾ who conducted a study to determine the effects of distraction on some physiological indices and intensity of pain in the hospitalized children aged 3-6 years undergoing IV injection and found that there was statistical significant differences in the average heart rate and the amount of saturated oxygen where distraction with bubble maker resulted in decreasing the physiological responses. On the other hand, this finding disagrees with ⁽⁶⁾ who found that there was no significant change of heart rate, blood pressure and respiratory rate post practicing distraction techniques.

The results obtained from the current study showed that there was statistical significant difference in increasing body temperature, heart rate and respiratory rate after receiving the routine nursing care (dressing change procedure) all over the three dressings. This may be due to severe pain related to dressing change increases physiological responses. This is disagrees with ⁽⁴²⁾ who found that there was no statistical significant difference in increasing vital signs after receiving the routine nursing care all over the three days.

Abd El-Gawad & Elsayed ⁽¹⁾ conducted a study to examine the effectiveness of the interactive versus cutaneous stimulation for venipuncture pain relief in school age children at **Ain Shams University Hospitals** and found that there was no statistical significant difference between pain intensity and vital signs. This goes in line with the present study that there was no statistical significant correlation between temperature and pain intensity among study groups.

The current study clarified that there was no statistical significant correlation between pain intensity and heart rate among study or control group. This finding agrees with ⁽²⁰⁾ who found that there was no statistical significant correlation between heart rate and pain intensity either in study or control groups. On the other hand, this finding contrast with ⁽⁶¹⁾ who found that there was statistical significant difference in the average heart rate and pain intensity between two groups after the intervention.

Wehaida et al ⁽⁶²⁾ reported in a study about the effect of reciting the name of “Allah “combined with deep-slow and regular breathing on pain intensity and anxiety on burned patients during dressing change in the burn unit of **Menoufia University Hospital** that patients in burn units suffer severe pain and anxiety before going to a dressing room and experience the highest level of pain before the use of relaxation technique. This is in agreement with the current study that showed that there was a significant increase in children’s overt behaviors of pain all over the three dressings before practicing distraction techniques. This may be due to severe pain related to dressing change procedure.

It is revealed from the results that there was a statistical significant difference in decreasing children’s overt behaviors of pain all over the three dressings after practicing video game distraction (an active form of distraction). This finding is due to children showed a positive emotional response evidenced by smiling facial expression and active participation in games. This finding agrees with ⁽²⁷⁾ who mentioned that there was a significant decrease in pain intensity in video game group in comparison with control group.

Kiche & Almeida ⁽²⁸⁾ who found in a study about therapeutic toy as a strategy for pain management and tension relief during dressing change that children had better adaptation, acceptance of dressing change and had lower pain score after the use of toys. This goes in line with the current study that clarified that there was a statistical significant difference in decreasing children’s overt behaviors of pain all over the three dressings after using attractive toys (an active form of distraction). This may be related to studied children were interested with toys that capable of capturing the child’s attention away from his/her pain and gave endless hours of pleasure as well as changing children’s mood to a better way.

Furthermore, **Abd El-Wahab** ⁽²⁾ who conducted a study to assess the effect of play in reducing postoperative pain in children having abdominal operations at **Menoufiya University** and stated that play helped children to cope with and alleviate their pain and they had related less pain intensity as a psychological response to postoperative pain. Moreover, this result emphasizes by ⁽⁶⁴⁾ who mentioned that using toys as a distraction is more effective in reducing pain during venipuncture. On the other hand, this finding is contradicted by ⁽⁴⁹⁾ who noted in a study about the effect of jaw relaxation on pain intensity of burn dressing in **Iran** that there was no significant difference of the pain intensity after practice jaw relaxation during burn dressing. Also, this is contrast with ⁽⁵¹⁾ who mentioned in a study about the effect of distraction in the two groups of inflating the balloon and mother's arms on the pain of venipuncture in children aged 3-6 that there was no significant difference in pain intensity after practicing distraction in the two groups.

As observed from the current study, it was found that distraction techniques either with video games and toys were significantly effective in reducing pain during dressing change. This result agrees with ⁽¹⁴⁾ who mentioned that distraction techniques such as using toys, playing video games are effective or even better than pharmacologic methods. This is disagrees with ⁽³²⁾ who conducted a study to evaluate cartoon movie distraction on burned children’s pain behavior during dressing changes and found that no significant effect of cartoon movie distraction on observed behavioral distress in children hospitalized with burns.

The current study illustrated that there was statistical significant difference in increasing children’s overt behaviors of pain all over the three dressings after receiving the routine nursing care. This may be related to the routine nursing care including dressing change procedure consider painful in nature and many children in the current study appeared to show significant distress upon exposure to the nurses and medical instruments. This inconsistent with ⁽⁴²⁾ who found in a study about the effect of distraction on preschool children's Postoperative pain at **Benha University Hospital** that no statistical significant difference between children’s behavioral pain scoring all over three days after the application of routine nursing care.

VI. Conclusion

Based upon the findings of the present study, it can be concluded that distraction techniques using video games and toys had a significant positive effect in minimizing physiological responses and intensity of pain associated with burn dressing change among preschool children.

Recommendations

1. Distraction techniques should be integrated into the routine nursing care with combination of pharmacological methods.
2. Development of in-service education program for all nurses working in burn unit about the effectiveness of distraction techniques on minimizing pain associated with burn dressing.

3. Written booklets about burn pain and its relieving techniques should be available for both the health team members and the families.
4. Burn dressing should be performed separately for each child away from other children in dressing room to reduce children anxiety and fear from dressing change.
5. Multidisciplinary approach, involving medical, surgical, psychologist, pain and play therapist must be available during dressing change.
6. Equipment for distraction should be available such as toys, interactive books, puppets, bubbles and electronic games that distract the children and hold their attention.
7. Written policy and guidelines should be available regarding assessment of pain associated with burn dressing.

Table (1): Characteristics of Studied Children (Total n=105)

Characteristics	Video game group (35)		Toys group (35)		Control group (35)		Significance test
	No	%	No	%	No	%	
Age (years)							$\chi^2 = 16.745$ P= 0.002*
▪ 3-	13	37.1	29	82.9	18	51.4	
▪ 4-	5	14.3	1	2.9	6	17.1	
▪ 5-6	17	48.6	5	14.3	11	31.4	
Mean ± SD	4.45 ± 1.10		3.52 ± 1.01		4.11 ± 1.124		
Gender							$\chi^2 = 0.086$ P= 0.958
▪ Male	23	65.7	23	65.7	24	68.6	
▪ Female	12	34.3	12	34.3	11	31.4	
Residence							$\chi^2 = 0.897$ P= 0.683
▪ Rural	24	68.6	27	77.1	27	77.1	
▪ Urban	11	31.4	8	22.9	8	22.9	
Birth order							$\chi^2 = 4.836$ P= 0.565
▪ First	10	28.6	10	28.6	12	34.3	
▪ Second	13	37.1	12	34.3	16	45.7	
▪ Third	6	17.1	7	20.0	6	17.1	
▪ Fourth	6	17.1	6	17.1	1	2.9	
Crowding Index							$\chi^2 = 0.087$ P= 0.957
▪ High ≥ 2 persons / room	23	65.7	24	68.6	24	68.6	
▪ Low < 2 persons / room	12	34.3	11	31.4	11	31.4	

*Significant at p ≤ 0.05

Table (2): History of Burn among Studied Children (Total n=105)

Variables	Video game group (n=35)		Toys group (n=35)		Control group (n=35)		Significance test
	No	%	No	%	No	%	
Place							$\chi^2 = 1.894$ P= 0.388
▪ Home	32	91.4	34	97.1	31	88.6	
▪ Outdoors@	3	8.6	1	2.9	4	11.4	
Specific place at home:							$\chi^2 = 4.392$ P= 0.462
▪ Kitchen	20	57.1	22	62.9	23	65.7	
▪ Sitting room	4	11.4	5	14.3	2	5.7	
▪ Bath room	9	25.7	7	20	9	25.7	
▪ Other area@@	2	5.7	1	2.9	1	2.9	
Time							$\chi^2 = 1.237$ P= 0.872
▪ Morning	6	17.1	7	20.0	5	14.3	
▪ Afternoon	14	40.0	15	42.9	18	51.4	
▪ Night	15	42.9	13	37.1	12	34.3	
Cause							$\chi^2 = 2.667$ P= 0.264
▪ Boiled liquids	29	82.9	32	91.4	27	77.1	
▪ Flame/ fire	6	17.1	3	8.6	8	22.9	
▪ Chemical	0	0	0	0	0	0	
▪ Electrical	0	0	0	0	0	0	

*Significant at p ≤ 0.05 @ Street, workshop @@ Balcony, bedroom, house knock

Table (3): Characteristics of Burn Wound among Studied Children.

Characteristics	Video game group (n=35)		Toys group (n=35)		Control group (n=35)		Significance test
	No	%	No	%	No	%	
Degree							$\chi^2 = 2.274$ P= 0.519
▪ Second	17	48.6	11	31.4	15	42.9	
▪ Third	6	17.1	8	22.9	6	17.1	

▪ Second & Third	12	34.3	16	45.7	14	40.0	
Anatomic region							
▪ Single	10	28.6	5	14.3	15	42.9	$\chi^2 = 2.381$ P= 0.123
▪ Multiple	25	71.4	30	85.7	20	57.1	
Affected area in the body#							
▪ Shoulder	11	31.4	20	57.1	18	51.4	$\chi^2=5.130, P=0.077$ $\chi^2=8.220, P=0.016$ $\chi^2=4.097, P=0.129$ $\chi^2=0.110, P=0.946$ $\chi^2=0.081, P=0.962$ $\chi^2=0.311, P=0.857$ $\chi^2=2.191, P=0.335$
▪ Chest	13	37.1	16	45.7	17	48.6	
▪ Back	6	17.1	10	28.6	8	22.9	
▪ Abdomen	8	22.9	7	20.0	7	20.0	
▪ Thigh	15	42.9	15	42.9	14	40.0	
▪ Leg	16	45.7	16	45.7	14	40.0	
▪ Foot	2	5.7	2	5.7	5	14.3	
Depth							
▪ Partial thickness	1	2.9	3	8.6	0	00.0	$\chi^2=4.979$ P= 0.376
▪ Deep thickness	24	68.6	23	65.7	21	60.0	
▪ Full thickness	10	28.6	9	25.7	14	40.0	
Extent (TBSA)							
▪ 10-<15%	0	00.0	3	8.6	0	00.0	$\chi^2=6.438$ P=0.376
▪ 15-<20%	32	91.4	29	82.9	31	88.6	
▪ 20-25%	3	8.6	3	8.6	4	11.4	

More than one site affected TBSA= Total Body Surface area burned

Table (4): Prescribed Medication and Distraction Techniques during Dressing Change among Studied Children

Variables	Video game group (n=35)		Toys group (n=35)		Control group (n=35)		Total (n=105)	
	No	%	No	%	No	%	No	%
Prescribed medication used before dressing:								
• Take analgesic before dressing	0	00.0	0	00.0	0	00.0	0	00.0
• Not take analgesic	35	100	35	100	35	100	105	100
• Dressing under anesthesia	0	00.0	0	00.0	0	00.0	0	00.0
Measures done by the nurse to distract child attention during dressing:								
- Talking with the child	0	00.0	0	00.0	0	00.0	0	00.0
- Listening to music	0	00.0	0	00.0	0	00.0	0	00.0
- Telling stories	0	00.0	0	00.0	0	00.0	0	00.0
- Playing with videogames	0	00.0	0	00.0	0	00.0	0	00.0
- Using attractive toys	0	00.0	0	00.0	0	00.0	0	00.0
- Nothing from above	0	00.0	0	00.0	0	00.0	0	00.0
- Others	35	100	35	100	35	100	105	100
	0	00.0	0	00.0	0	00.0	0	00.0

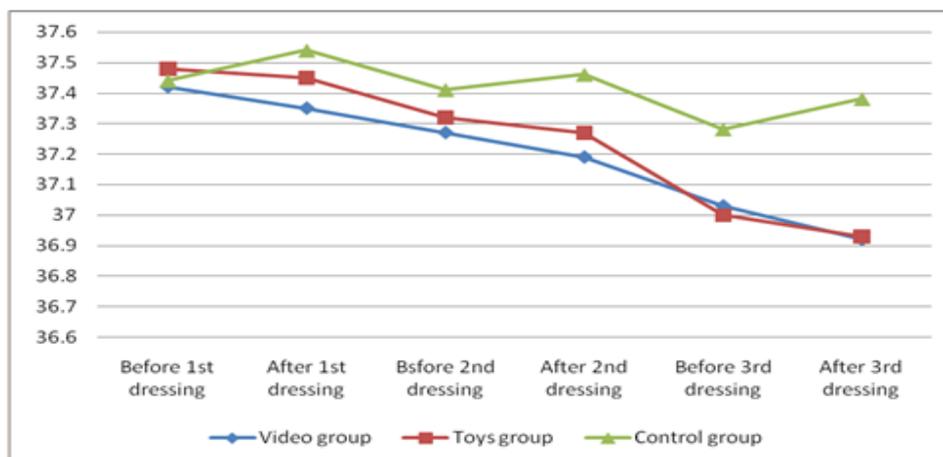


Figure (1): Mean Temperature Values before and after Applying Distraction Techniques all over the Three Dressings.

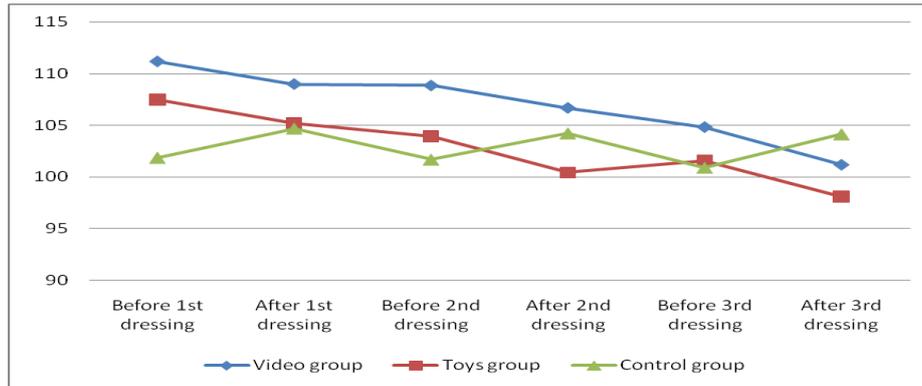


Figure (2): Mean Heart Rate Values before and after Applying Distraction Techniques all over the Three Dressings.

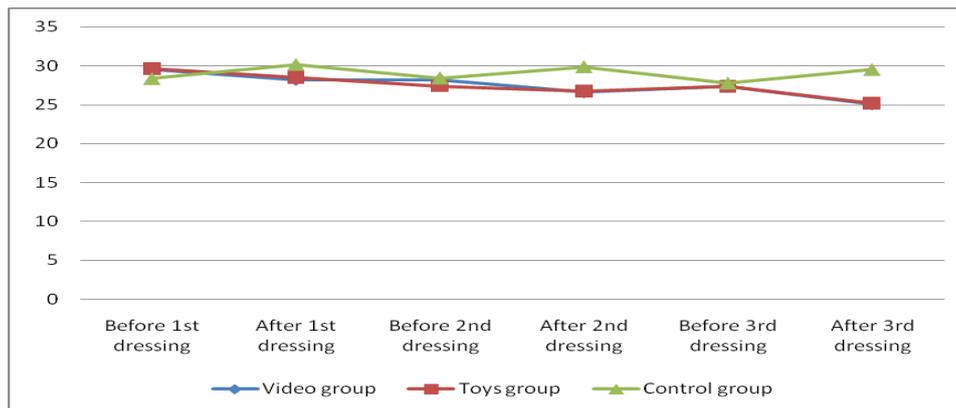


Figure (3): Mean Respiratory Rate Values before and after Applying Distraction Techniques all over the Three Dressings.

Table (4): Mean Children's Behavioral Pain Scoring among Studied Groups before and after Applying Distraction Techniques According to CHEOPS All Over the Three Dressings.

Pain Scoring	Video game group (n=35)	Toys group (n=35)	Control group (n=35)
	Mean ± SD	Mean ± SD	Mean ± SD
First dressing			
▪ Before distraction	11.29 ± 1.52	11.34 ± 1.84	10.48 ± 1.04
▪ After distraction	6.51 ± 1.42	7.43 ± 1.24	12.65 ± 1.61
Significance test (paired t test)	t=12.769 P=0.000**	t=13.728 P=0.007*	t=-3.132 P=0.004*
Second dressing			
▪ Before distraction	9.43 ± 1.70	9.14 ± 1.54	8.29 ± 0.93
▪ After distraction	5.46 ± 1.36	5.34 ± 1.14	9.86 ± 1.51
Significance test (paired t test)	t=20.429 P= <0.001*	t=18.249 P= <0.001*	t=-3.091 P=0.005*
Third dressing			
▪ Before distraction	7.89 ± 1.39	8.00 ± 1.08	7.91 ± 1.11
▪ After distraction	4.37 ± 0.77	4.54 ± 0.95	9.29 ± 1.56
Significance test (paired t test)	t=17.732 P=0.000**	t=17.454 P=0.000**	t=-2.927 P=0.007*

*Significant (p ≤ 0.05)

**highly significant (P≤0.001).

Table (6): Correlation between Pain Intensity and Vital Signs among Studied Children after Third Dressing (Pearson's Correlation).

Vital Signs	Pain Intensity					
	Video group		Toys group		Control	
	r	P	r	P	r	P
Temperature	+ 0.165	0.334	- 0.075	0.668	+ 0.417	0.013*
Pulse rate	+ 0.003	0.985	+ 0.228	0.188	+ 0.143	0.413
Respiratory rate	+ 0.392	0.020*	- 0.067	0.704	+ 0.368	0.029*

r= Pearson's Correlation coefficient

*significant at p ≤ 0.05

Table (7): Relation between Average Children's Behavioral Pain Scoring of CHEOPS and Characteristics of Studied Children after the Third Dressing.

Characteristics	Video group (35)		Toys group (35)		Control group (35)	
	No	Mean ± SD	No	Mean ± SD	No	Mean ± SD
Age:						
▪ 3-	13	4.54 ± 0.97	29	4.52 ± 0.78	18	9.17 ± 1.46
▪ 4-	5	4.60 ± 0.89	1	4.00 ± 0.00	6	10.50 ± 0.72
▪ 5-6	17	4.18 ± 0.54	5	4.80 ± 1.78	11	8.82 ± 1.40
Significance test	F= 1.075 P= 0.353		F= 0.343 P= 0.712		F= 2.570 P= 0.092	
Sex:						
▪ Male	23	4.26 ± 0.75	23	4.39 ± 0.72	24	9.16 ± 1.57
▪ Female	12	4.58 ± 0.79	12	4.83 ± 1.26	11	9.45 ± 1.57
Significance test	t= 1.183 P= 0.245		t= 1.162 P= 0.258		t= 0.660 P= 0.514	
Residence:						
▪ Rural	24	4.29 ± 0.62	27	4.55 ± 0.97	27	9.33 ± 1.71
▪ Urban	11	4.54 ± 1.03	8	4.50 ± 0.93	8	9.12 ± 0.99
Significance test	t= 0.902 P= 0.373		t= 0.143 P= 0.887		F= 0.327 P= 0.746	
Birth order:						
▪ First	10	4.50 ± 0.71	10	4.60 ± 0.97	12	9.25 ± 1.76
▪ Second	13	4.31 ± 0.85	12	4.50 ± 1.17	16	8.94 ± 1.48
▪ Third	6	4.67 ± 1.03	7	4.67 ± 0.82	6	10.17 ± 1.33
▪ Fourth	6	4.00 ± 0.00	6	4.67 ± 0.82	1	10.00 ± 0.00
Significance test	F= 0.871 P= 0.466		F= 0.081 P= 0.970		F= 0.968 P= 0.429	
Crowding Index						
▪ High ≥2	23	4.47 ± 0.84	24	4.67 ± 1.09	24	9.17 ± 1.52
▪ Low < 2	12	4.17 ± 0.58	11	4.27 ± 0.47	11	9.54 ± 1.69
Significance test	t= 1.141 P= 0.262		t= 1.141 P= 0.261		t= 0.660 P= 0.514	

*Significant at p ≤ 0.05

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