

# The effect of the active and passive distraction techniques on the burn children's pain intensity and anxiety during dressing changes

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## Abstract

**Context:** Pain and anxiety due to the dressing change make it hard to care for children with burn injuries.

**Aims:** This study aims to compare the effect of active and passive distraction techniques on the pain intensity and anxiety related to burn dressing change.

**Setting and Design:** The participants of this quasi-experimental study were 120 children aged 3–6, referred to the clinic in Shahid Motahari Hospital.

**Materials and Methods:** Convenience sampling was used, and the children were allocated into three groups: active distraction technique (game), passive distraction technique (music), and control. The intervention in the two experimental groups started 10 min before entering the dressing room and continued during dressing change, while the control group received routine care. The Visual Analog Scale was applied to measure pain, and their anxiety level was evaluated using the Observational Scale of Behavioral Distress-Revised.

**Statistical Analysis Used:** Data were analyzed with independent *t*-test, ANOVA test, and ANCOVA test.

**Results:** The mean ages of patients in the control, game, and music groups were  $4.30 \pm 1.36$ ,  $4.01 \pm 1.22$ , and  $4.23 \pm 1.30$  years ( $P = 0.79$ ), respectively. The mean of the difference in pain intensity scores during dressing change compared to before in the game, music, and control groups was  $2.80 \pm 3.22$ ,  $3.27 \pm 3.71$ , and  $4.30 \pm 2.42$ , respectively ( $P = 0.1$ ). Finally, the mean of differences during dressing change anxiety scores compared to before in the game, music, and control groups was  $0.60 \pm 0.95$ ,  $0.50 \pm 1.01$ , and  $0.96 \pm 1.06$ , respectively ( $P = 0.10$ ).

**Conclusion:** Given that, playing game positively affected pain decrease and music had a positive effect on reducing anxiety during a burn dressing change.

**Keywords:** Anxiety, Child, Pain, Burning

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## INTRODUCTION

One of the most painful injuries a person may experience during their lifetime is burn which is a critical global threat to children's health and may have lifelong effects on children.<sup>[1]</sup> Millions of children worldwide are affected by burns;<sup>[2]</sup> 2.3% of burns in children under 10 years of age and mortality from the burn at this age are higher than that of adults.<sup>[3]</sup> Regardless of the cause, depth, and size of the burn, all children with burns experience severe pain. Noncompliance of pain with medical treatments leads to prolonged recovery and posttraumatic stress disorder.<sup>[4]</sup>

People with burns experience severe pain and anxiety throughout the frequently performed treatment procedures, including wound debridement, washing, dressing, and skin grafting.<sup>[5]</sup> According to experts, the pain experienced by the children while dressing change has several dimensions, including anxiety and stress, and children blame themselves for being in this painful situation. Minimizing pain, anxiety, and stress in this situation may affect subsequent care and lead to a decrease in the short-term and long-term adverse effects of pain in follow-up care.<sup>[6]</sup>

Management of burn pain during and after therapeutic interventions such as physiotherapy, dressing change, or surgery promotes treatment, shortens the length of hospital stay, prevents increased metabolism, decreases malnutrition and weak immune system, accelerates recovery, and boosts self-confidence.<sup>[7]</sup>

Pain relief with nonpharmacological methods is cost-effective and noninvasive and it depends on the nurse's performance. There are many nonpharmacological techniques for relieving pain and anxiety among children that are adapted from adult models.<sup>[8]</sup> The distraction technique is an inexpensive and safe way that reduces the duration of treatment. Distraction consists of active and passive techniques; the former involves the child in activities such as deep breathing and playing with electronic devices, while passive distraction includes watching videos, listening to music, reading books, and listening to stories.<sup>[9]</sup>

Based on clinical experience, managing the pain and anxiety in the first dressing change is crucially important. If it is associated with severe anxiety and distress, it most probably leads to an increase in the intensity and duration of pain and causes many problems in pain management.<sup>[10]</sup> Research shows that despite the importance of managing the children's pain and anxiety during diagnostic and therapeutic procedures, they are not well managed in the clinical setting, and there is still inadequate information in

this regard.<sup>[7]</sup> Since nurses spend most of their time with patients, they need to use nonpharmacological methods of pain relief for effective patient care in many situations.

Although a lot of studies have worked on the effect of passive distraction techniques, few studies have been conducted on active techniques. Moreover, scant research has been done to compare the effects of these two techniques on children. Therefore, the researchers aimed at comparing the effect of these two techniques, namely game (active distraction technique) and music (passive distraction technique), on reducing pain and anxiety during burn dressing change among 3–6-year-old children.

## MATERIALS AND METHODS

The present research is a quasi-experimental study with two intervention groups: music (passive distraction technique) and game (active distraction technique), and one control group. The study population encompassed 3–6-year-old children who suffered from burns and were referred to Shahid Motahari Teaching Hospital, using a convenience sampling method. The required sample size at 95% confidence level, 80% test power, and considering the standard deviation of pain intensity score of three in each group, was calculated to be at least 36 children. However, 40 children were supposed to participate in the study due to attrition.

The researchers selected the samples from the children referred to the clinic to change their first dressing. To facilitate the procedure and not intervene in the dressing room conditions, the researchers spent each day of the week on one group, that is, Saturdays and Tuesdays for the music group, Sundays and Wednesdays for the game group, and Mondays and Thursdays for the control group.

Inclusion criteria included the following: 9%–35% of body surface burns, absence of other acute and chronic diseases, lack of hearing and vision disorders, lack of cognitive impairment, no burns in at least one hand to allow playing the game, no pain other than burn pain, and no previous burn experience. On the other hand, the exclusion criteria included burns with electricity, chemicals, and tar and burns of the perineum, head, and neck. Besides, those with numbness at the burn site due to deep burns were omitted from the study.

## Data collection tools

Demographic information of children (i.e., age, gender, and percentage of burns) and their parents (i.e., education level, number of children, and employment status) was

collected using a questionnaire. The researchers used the visual analog scale (VAS) to measure pain. It is a visual tool with a 10-cm horizontal line ranging from 0 (the left side of the line), indicating no pain, to 10 (right side of the line), meaning severe pain. A score of 1–3 indicates mild pain, 4–7 means moderate pain, and 8–10 shows severe pain.<sup>[11]</sup>

To assess the child's behavioral distress, we used the Observational Scale of Behavioral Distress-Revised (OBS-D-R) that examines eight observable behaviors, including crying, screaming, physical restraint, verbal resistance, seeking emotional support, information seeking, verbal pain, and flail. The range of scores in the anxiety level is from 0 to 4; if a behavior is present, it receives the score of .5; if a behavior does not observed, it receive the score zero.<sup>[12]</sup>

### Interventions

The Ethics Committee of Iran University of Medical Sciences approved this study with the code of IR.IUMS.REC.1397.513. First, the researcher communicated with the child in the waiting room and gave the tablet to the game group for 10 min, and started playing with him/her. If the child was not familiar with the game, the researcher simply and practically explained how to play. After the child got involved with the game, he/she was told that he/she could continue playing during dressing change. Thus, the child had the tablet until the dressing process was completed. Meanwhile, the researcher was present in the room and indirectly supervised the child and helped him/her to continue the game if necessary (when the game had a problem). In the music group, the researcher first communicated with the child in the waiting room before entering the dressing room and played happy children's songs or selected music by the child on headphones for 10 min. When the child became interested in the music and wanted to keep on listening, the researcher told him/her that he/she could listen to it during dressing change. Then, the researcher was in the room and, with indirect supervision, helped him/her continue listening to music if necessary (the music was interrupted or there was a problem in the music program). No special action was done for the control group, and this group received routine clinical care.

Five minutes after all three groups entered the room and before dressing change, the VAS and OBS-D-R were completed by one of the nurses working in Shahid Motahari Hospital. The researcher had previously trained the nurse on how to complete the two instruments. Since the approximate time to change the dressings was usually between 15 and 20 min, 10 min after starting the dressing

change, the above instruments were completed for the second time by the researcher's assistant. The researcher was present in the dressing room in all cases and supervised the procedures. All the dressings were replaced by a definite person who was in charge of the dressing change in the pediatric clinic of Shahid Motahari Hospital.

### Data analysis

Before dressing changes, the ANOVA test was used to compare pain and anxiety between the three groups (basic analysis). The results of the baseline ANOVA test (before dressing change) were considered covariates. Due to the assumption of normality, homogeneity of regression line slope and equality of variance of the three groups, ANCOVA test was used to compare pain and anxiety between the three groups when changing the dressing.

### RESULTS

The mean ages of patients in the control, game, and music groups were  $4.30 \pm 1.36$ ,  $4.01 \pm 1.22$ , and  $4.23 \pm 1.30$  years, respectively ( $P = 0.59$ ).

The results of the Chi-square test showed that there was no significant difference among the three groups ( $P = 0.39$ ) regarding their demographic criteria. Moreover, the burn cause of most of the cases in the game group (55%) and control group (40%) was boiling water and in the music group (37.5%) was hot liquids. However, the results of the Chi-square test revealed that there was no significant difference in the cause of burns in the three groups ( $P = 0.09$ ). Other demographic data of children in the three groups (game, music, and control) are depicted in Table 1.

As it is illustrated in Table 2, there was no significant difference in the mean score of pain between the three groups before dressing change ( $P = 0.21$ ). However, the results of the ANCOVA test demonstrated a significant difference in pain mean score between the three groups during dressing change ( $P = 0.003$ ) [Table 2]. According to the results of the Scheffe test, the pain intensity was significantly higher in the control group than in the game group ( $P = 0.003$ ). According to the results of the ANOVA test, the mean scores of anxiety were different between the three groups before dressing change ( $P = 0.03$ ). ANCOVA test results were showed a significant difference in anxiety mean scores between the three groups during dressing change [Table 3]. Consequently, the results of the Bonferroni test revealed that the anxiety scores of the control group were significantly higher than that of the game ( $P = 0.005$ ) and music ( $P = 0.006$ ) groups.

**Table 1: Frequency, mean, and standard deviation of children's characteristics in music, game, and control groups**

Variable	Group, frequency (%)			P
	Active distraction technique (game)	Passive distraction technique (music)	Control	
Age				
4 and less	27 (67.5)	25 (62.5)	24 (60)	0.59
Over 5	13 (32.5)	15 (37.5)	16 (40)	
Total	40 (100)	40 (100)	40 (100)	
Mean±SD	04.1±1.22	4.23±1.30	4.30±1.36	
Gender				
Girl	22 (55)	24 (60)	18 (45)	0.39
Boy	18 (45)	16 (40)	22 (55)	
Duration of hospital stay				
10 days and less	3 (42.9)	4 (40)	1 (33.3)	0.79
>10 days	4 (57.1)	6 (60)	2 (66.7)	
Mean±SD	12.14±4.56	14.40±12.08	16.67±12.20	
Hospitalization situation				
Outpatient	33 (82.5)	30 (75)	37 (92.5)	0.10
After hospitalization	7 (17.5)	10 (25)	3 (7.5)	
Cause of burn				
Boiling water	22 (55)	13 (32.5)	16 (40)	0.09
Hot liquids	7 (17.5)	15 (37.5)	8 (20)	
Hot object	6 (15)	5 (12.5)	12 (30)	
Steam	5 (12.5)	7 (17.5)	4 (10)	
Burn degree				
First degree	1 (2.5)	0	1 (2.5)	0.056
Second degree	37 (92.5)	30 (75)	30 (75)	
Third degree	1 (2.5)	2 (5)	0	
First and second degree	0	3 (7.5)	6 (15)	
Second and third degree	1 (2.5)	5 (12.5)	3 (7.5)	

SD: Standard deviation

**Table 2: Comparison of pain before and during burn dressing change in the game, music, and control groups**

Group	Time (mean±SD)		
	Before dressing	During dressing	Mean difference
Game	2.53±1.84	5.33±3.69	2.80±3.22
Music	3.23±3.03	6.50±3.45	3.27±3.71
Control	3.63±2.23	7.93±2.76	4.30±2.42
F (P)	2.11 (0.21)	6.11 (0.003)	2.34 (0.1)

SD: Standard deviation

**Table 3: Comparison of anxiety before and during dressing change among children in the game, music, and control groups**

Group	Time (mean±SD)		
	Before dressing	During dressing	Mean difference
Game	0.27±0.59	0.87±0.81	0.60±0.95
Music	0.48±0.84	0.98±0.88	0.50±1.01
Control	0.76±0.96	1.72±1.09	0.96±1.06
Test results, F (P)	3.59 (0.03)	6.75 (0.002**)	2.31 (0.10)

SD: Standard deviation

## DISCUSSION

The results of this study showed that there were no significant differences in the pain scores of the three music, game, and control groups before dressing change.

However, the mean score of the procedural pain in the game group was lower than the control and music groups. Similarly, the results of the study conducted by Aydin and Sahiner demonstrated that the mean pain score in the game group was lower than that of the music group, although this difference was not significant.<sup>[13]</sup> Likewise, the results of another study revealed that playing a virtual reality game increases the pain tolerance threshold in children. However, no statistically significant difference was found between the two methods.<sup>[14]</sup>

On the other hand, Nilsson *et al.*, with a relatively similar finding in their study, concluded that active distraction (game) in comparison with passive distraction significantly reduces procedural pain and distress in burn dressing change.<sup>[6]</sup> Other studies have also shown the positive effects of the active game (medical-directed play) on reducing the severity of pain during burn dressing.<sup>[15]</sup>

On the other hand, the results of several studies on passive distraction techniques have displayed the positive effects of using such techniques in reducing pain among children during burn dressings change and other painful procedures.<sup>[16]</sup> Moreover, listening to music on consecutive days reduces pain during the burn dressing change.<sup>[17]</sup>

The results of this study and similar studies demonstrate that applying an active distraction technique (game) is more effective than employing passive distraction techniques (e.g., music) in reducing procedural pain.<sup>[6]</sup> Other studies have found that the type of music played is effective too. Although in this study, the child's favorite children's songs were played, the active game had a more positive effect on pain control during dressing change. This difference may be due to the duration of playing the music because some studies have emphasized the effect of music played for several days.<sup>[17]</sup> The discrepancy in the results can be due to differences in the age group of children participating in different studies, inclusion criteria in terms of degree and extent of burns, and even the variety of instruments used for data collection. Furthermore, some of the results were due to distraction interventions in nonburn procedures. Definitely, the pain caused by other injuries is quantitatively and qualitatively different from the pain during the burn dressing change. On the other hand, the severity of the pain can be affected by factors such as the person's previous experience and the emotional state of the child's parents.

Another variable studied in this study was anxiety. Due to the differences in anxiety levels in the three groups before the intervention, the results of the analysis of covariance



showed a significant difference in anxiety among patients in the three groups during dressing change. The results of the Bonferroni test showed that the anxiety scores of the control group were significantly higher than that of the game and music groups. Although the difference in anxiety scores during and before dressing change in the music group was the lowest and in the control group was the highest, the results of the ANOVA test did not show a significant difference in the anxiety scores of the three groups. Comparison of the two groups of game and music revealed that there was a little difference between the mean scores of anxiety during and before dressing change in the music group compared to that of the game group, though this difference was not statistically significant.

In line with the results of other studies, it was found that music results in reducing anxiety during dressings and other painful procedures.<sup>[17-19]</sup> Changing a child's dressing is a process with high anxiety which starts before the dressing change and increases during the procedure. A review of the literature emphasized that type of music, duration of consecutive playing the music during the days, before, during, and after the dressing change, and how to play music can influence the anxiety.<sup>[17]</sup> In the mentioned study, music was played for children using headphones; reducing the ambient noise is the advantage of this technique, and decreasing the verbal interaction between the nurse and the child while dressing change is the negative aspect.<sup>[17]</sup> Although no statistically significant difference was shown between the music and the game groups in this study, the mean score of anxiety before and during dressing change had less change compared to the other groups.

Overall, simultaneous application of distraction techniques seems to be more effective in reducing the pain and anxiety caused by burn dressing change. In this study, the simultaneous effect of music and game was not investigated; however, considering the positive effect of games in pain reduction and that of music on reducing anxiety to some extent, it seems that using the active and passive distraction techniques simultaneously will be more useful. Thus, it is recommended to use more than one technique in severe pain. Simultaneous application of these techniques can be effective in relaxation and increasing the tolerance threshold of individuals. Music calms the person by reducing sympathetic activity and releasing endorphins; this may reduce the anxiety level of children with burns.<sup>[20]</sup>

Similar to any other study, this study had some limitations, such as a hectic burn clinic and high traffic in the dressing room. Although the researcher tried to reduce unnecessary

traffic, she was not able to fully manage the situation due to the nature of the clinical setting.

## CONCLUSION

Considering the positive effect of games in reducing pain and music in decreasing children's anxiety while burn dressing change, it is recommended to use a combination of both techniques to reduce pain and anxiety in burn clinics.

## Conflicts of interest

There are no conflicts of interest.

## Authors' contribution

All authors have contributed significantly, and all authors are in agreement with the content of the manuscript. Mahnaz Shoghi designed the study and did the literature search, drafted the manuscript, and edited the manuscript. Malihe Zand Aghtai contributed in data gathering, drafted the manuscript, and edited the manuscript. Motahareh Kheradmand analyzed the data and interpreted the findings, drafted the manuscript, and edited the manuscript.

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