

# The Effect of Distraction Techniques on Pain Intensity and Acetaminophen Received after Tonsillectomy in Children Aged 5-12 Years Old

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## Abstract

**Background:** Tonsillectomy is a common painful surgery in children. One of the methods of pain relief is the use of non-pharmacological treatments.

**Aim:** This study was performed with aim to determine the effect of distraction Techniques on pain intensity and acetaminophen received after tonsillectomy in children aged 5-12 years old.

**Method:** This experimental study was conducted on 75 children aged 5-12 years old from September 2020 to March 2021. The subjects by random allocation method were divided into two intervention groups (1: watching cartoons, 2: listening to music) and one control group. Wong-Baker Faces Pain Rating Scale and the Numerical Pain Rating Scale (NRS) were used to report pain intensity. Data were analysed by SPSS software (version 25) and inferential statistical tests, such as Wilcoxon, kruskal-wallis, chi-square, and Mann-Whitney U.  $P < 0.05$  was considered statistically significant.

**Results:** In the intervention group 1, significant difference was found between before and after the intervention in terms of pain intensity ( $p < 0.001$ ). After the intervention, there was a significant difference in the pain intensity and acetaminophen received between the intervention group 1 and 2 and between the intervention group 1 and the control group ( $p < 0.001$ ).

**Implications for Practice:** Distraction techniques by watching cartoons reduce postoperative pain and acetaminophen received. Therefore, it is recommended that these techniques be used by patients or their caregivers to reduce pain after tonsillectomy.

**Keywords:** Acetaminophen, Cartoon, Music, Pain, Tonsillectomy

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## Introduction

Postoperative pain is a major health care issue (1). According to the International Association for the study of Pain (IASP), pain is an unpleasant sensory and psychological experience that results from actual or potential tissue damage (2). McCaffery defines pain as “what the patient says it is and lasts as long as the patient says it does” (3). Both pharmacological and non-pharmacological approaches can be used to relieve pain. Non-pharmacological approaches involve having a series of creative activities performed by the patient or caregiver that reduce the patient’s pain or make it tolerable without risk (4). Studies show that preoperative examinations and interventions can affect the severity of the patient’s postoperative pain and response to pain (5). On the other hand, training the patient and family and reducing concerns increases the patient’s cooperation in postoperative treatment (6). Mild pain has a few behavioural symptoms such as changes and pressure on face, crying, restlessness and protection of the painful area, and resistance to movement; more severe degrees of pain can also lead to a series of emotional symptoms such as irritability, withdrawal, anxiety, depression, fear, anger, apathy, despair, and helplessness (7). Stress caused by acute postoperative pain can increase coagulability and impair internal and adaptive immunity. The severe consequences of these complications also increase the risk of postoperative infections (8).

Some studies have compared the effect of distraction techniques on the pain reduction of patients in different procedures and contradictory results have been reported (9-12). The studies which used music distraction techniques and distraction cards showed that the use of these methods does not have much effect on reducing pain (9, 11). On the other hand, other studies which used music or animation techniques to control pain showed effectiveness of these methods in reducing pain (10, 12, 13). Although the effects of music and watching cartoons on pain have been investigated in some studies, there is little information about the comparison of the effects of these two techniques on pain intensity after tonsillectomy surgery. Tonsillectomy is a common painful surgery in children that requires appropriate and adequate pain relief to facilitate the recovery process (14). Therefore, considering the result of previous studies and in order to bridge the existing information gap, the present research was performed aimed to investigate the effect of distraction techniques on pain intensity and acetaminophen received after tonsillectomy in children aged 5-12 years.

## Methods

This interventional and experimental study was performed on all children aged 5-12 years who had been referred to Valiasr Hospital in Khorramshahr for tonsillectomy from September 2020 to March 2021. Inclusion criteria were children aged 5-12 years, the parents’ and child’s willingness to participate, the signature of informed consent by parents, at least one parent’s commitment to attend the intervention session with their child, no mental retardation, lack of underlying diseases, no history of previous surgery, and the ability to communicate verbally. Exclusion criteria were non-cooperation, child’s incompatibility, or reports of pain anywhere other than the surgery site.

According to a previous study (15) and considering  $d = 0.8$  and  $1 - \beta = 0.8$ , the sample size of 75 people was calculated. During the study period, 111 patients referred to the hospital for tonsillectomy, and according to the eligibility criteria, 21 patients did not enter the study due to lack of inclusion criteria and 15 patients did not agree to participate in the study. Finally, 75 patients were included in the study (Figure 1). The available sampling method and random allocation were used to divide patients into two intervention groups ( $n=25$  in each group), as well as one control group ( $n=25$ ). Simple random assignment of groups was applied, and 75 cards were prepared and placed in an envelope: 25 cards with letter I1 (intervention group 1, watching cartoons), 25 with letter I2 (intervention group 2, listening to music) and 25 with letter C (control group).

First, the necessary explanations about the working method were given to the parents and the children. Then, the parents completed a written informed consent form if they were willing to participate in the study. After the introduction process (and considering the ethical considerations), the child was asked to choose a card from the envelope.

In the group distracted by watching cartoons, a tablet device containing several cartoon films was given to the child, and was asked to watch cartoon films during the whole period of waking up after the operation. In the group distracted through music, a tablet device with age-appropriate music was given to the child, who was asked to listen to this music during the whole period of waking up after the operation. No intervention was performed in the control group. In accordance with ethical

considerations, in all three groups, an analgesic drug (oral acetaminophen) was given according to the doctor's order if necessary (PRN) after the child expressed pain; this was recorded in the patient's file. Postoperative pain intensity before the intervention and six hours after the intervention were assessed using the Wang Baker face scale and NRS by a person who was completely blinded to the type of intervention.

Data collection tools included a demographic information questionnaire and a self-report pain intensity checklist. A demographic information questionnaire (age, weight and sex of the child, age and level of education of the parents) was completed by the parents. Two standard scales were used as self-report measures of pain intensity: The Wong-Baker Faces Pain Rating Scale and NRS. The Wong-Baker Faces Pain Rating Scale has six images, each of which shows different amounts of pain, from a smiling face (painless position, score of zero) to a crying face (very severe pain, score of 10). This scale is used for children who are not able to count. The numerical scoring scale is designed as a

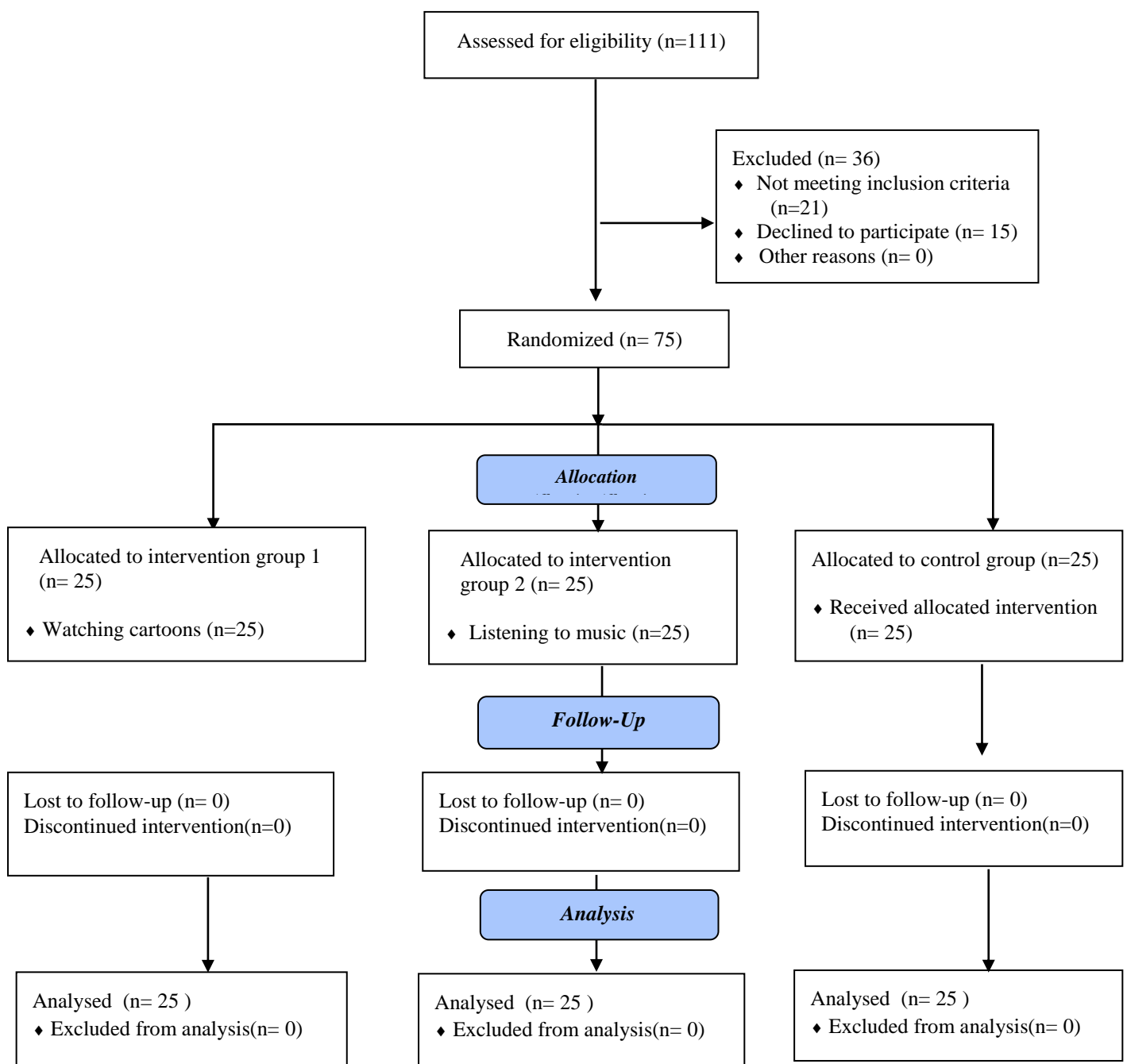


Figure 1. Patients' enrolment process

0 to 10 ruler. Zero describes the painless condition, and 10 indicates the highest level of pain. Before the tonsillectomy, the researcher completely explained the child about the scales. In a previous study, Garra et al. confirmed the reliability of the Wong-Baker facial pain scoring scale with a Spearman correlation coefficient of 0.9 (16). In the Baeyer's study, the reliability of the numerical scoring scale was obtained with Spearman correlation coefficient of 0.87 (17).

All children participating in the study underwent the same surgical method and under the same general anaesthesia by the same surgeon. None of the patients had significant postoperative bleeding, and no patients required reoperation or any other intervention.

Data were analysed by SPSS software (version 25) and inferential statistical tests, such as Wilcoxon, kruskal-wallis, chi-square, and Mann-Whitney U.  $P < 0.05$  was considered statistically significant.

## Results

The demographic characteristics of the participants were shown in Table 1. The results of kruskal-wallis and chi-square tests showed no statistically significant differences between the intervention and control groups in terms of demographic characteristics.

Table 2 presented the mean of pain intensity based on the NRS and Wong-Baker Faces Scale in the intervention and control groups, before and after the intervention, based on Wilcoxon test and acetaminophen received after the surgery. There was a statistically significant difference in the intervention group 1 based on the NRS and Wong-Baker Faces Scale, also significant difference in the intervention group 2 based on the Wong-Baker Faces Scale, but no statistically significant difference was observed in the intervention group 2 based on the NRS. In the control group no statistically significant difference was observed based on the NRS and Wong-Baker Faces Scale. The results showed that pain intensity was reported to be lower after the intervention compared to before the intervention in the intervention group 1, based on the NRS and Wong-Baker Faces Scale, and in the intervention group 2 based on the Wong-Baker Faces Scale.

The comparison of acetaminophen received and pain intensity after the intervention based on the NRS and Wong-Baker Faces Scale between the intervention groups 1 and 2 and the control group was shown in Table 3. The results of Mann-Whitney U test showed a statistically significant difference between the intervention groups and between the intervention group 1 and the control group in terms of pain intensity ( $p < 0.001$ ). There was no statistically significant difference between the intervention group 2 and the control group in terms of pain intensity ( $p = 0.527$ ). The results of chi-square test showed a statistically

**Table 1. Demographic characteristics of the participants**

variable	Intervention 1	Intervention 2	Control	p-value
Child Age <sup>(a)</sup>	8.48±2.03	8.80±1.75	8.76±1.96	0.752 <sup>c</sup>
Child Weigh <sup>(a)</sup>	30.68±6.44	29.88±7.31	31.44±6.54	0.619 <sup>c</sup>
Mother Age <sup>(a)</sup>	35.32±6.05	36.76±5.48	35.84±5.11	0.476 <sup>c</sup>
Father Age <sup>(a)</sup>	33.32±5.78	31.60±4.80	31.92±4.68	0.532 <sup>c</sup>
Gender <sup>(b)</sup>				
Girl	15(60)	11(44)	12(48)	0.5 <sup>d</sup>
son	10(40)	14(56)	13(52)	
Father Education <sup>(b)</sup>				
Illiterate			1(4)	0.372 <sup>e</sup>
High school	8(32)	13(52)	7(28)	
Diploma	13(52)	7(28)	12(48)	
bachelor	4(16)	5(20)	5(20)	
Mother Education <sup>(b)</sup>				
High school			3(12)	0.409 <sup>e</sup>
Diploma	2(8)	6(24)	15(60)	
Bachelor	14(56)	15(60)	6(24)	
Masters	9(36)	4(16)	1(4)	

<sup>a</sup>(mean±SD) <sup>b</sup> Frequency (percentage) <sup>c</sup>kruskal-wallis  
<sup>d</sup> Chi-square <sup>e</sup>Fisher Exact Test

**Table 2. The mean of pain intensity before and after intervention based on the NRS and Wong-Baker Faces Scale & number (Percent) of acetaminophen received after intervention**

Variable	time	Intervention 1	Intervention 2	Control
Wong- Baker Faces Scale	Before	4.56±0.71	4.52±0.71	4.16±0.89
	After	2.92±0.99	4.04±0.78	4.16±0.89
	p-value <sup>a</sup>	<0.001	0.003	0.999
NRS	Before	3.52±0.50	3.64±0.48	3.52±0.58
	After	2.64±0.56	3.52±0.91	3.52±0.58
	p-value <sup>a</sup>	<0.001	0.132	0.999
Acetaminophen received	After	1(4)	4(16)	9(36)

<sup>a</sup> Wilcoxon

significant difference between the intervention group 1 and the control group in terms of the amount of acetaminophen drug received ( $p = 0.011$ ). There was no statistically significant difference between the intervention groups 1 and 2 ( $p = 0.349$ ) and between the intervention group 2 and the control group ( $p = 0.196$ ) in terms of the amount of acetaminophen received. The results showed that the pain intensity after the intervention in was lower in the intervention group 1 than in intervention group 2 and the control group ( $p < 0.001$ ). Moreover, the acetaminophen received was lower in the intervention group 1 than the control group. According to these results, the method of distraction by watching cartoons (which involves the senses of sight and hearing) was more effective in reducing postoperative pain than distraction involving only hearing.

**Table 3. Comparison of acetaminophen received and pain intensity after intervention based on the NRS and Wong-Baker Faces Scale between intervention groups 1 and 2 and the control group**

Pairs	group	Acetaminophen received		Wong- Baker Faces Scale		NRS	
		p	$\chi^2$	p	z	p	z
Pair1	Intervention 1 Intervention 2	0.349 <sup>a</sup>	0.889	$p < 0.001$ <sup>b</sup>	-3.895	$< 0.001$ <sup>b</sup>	-3.928
Pair2	Intervention 1 Control	0.011 <sup>a</sup>	6.125	$p < 0.001$ <sup>b</sup>	-3.755	$< 0.001$ <sup>b</sup>	-4.319
Pair3	Intervention 2 Control	0.196 <sup>a</sup>	1.663	$P = 0.623$ <sup>b</sup>	-0.429	0.527 <sup>b</sup>	-0.632

<sup>a</sup> Chi-square

<sup>b</sup> Mann-Whitney U

## Discussion

The findings of the present study showed that distraction through watching cartoons significantly reduced the severity of pain and the need for acetaminophen after tonsillectomy in children.

The results of present study are similar to the results reported by Riddle et al., which showed that watching animation led to a decrease in vaccination pain in children (13). Also, the results of the study by Bergomi et al. showed the significant effect of watching animation on reducing the pain caused by venipuncture (18). Using distraction techniques that involve the child's five senses is more effective than techniques which only involve one sense.

The results of the present study showed that the use of music caused less pain reduction than the use of cartoon, although this difference was not significant between the intervention group 1 and the control group. This result is similar to the results reported in the study of Momen Nasab et al., in which the bubble making technique and music were used to reduce the pain caused by venipuncture in children aged 6 to 12, and the results showed that the intensity of pain was less in the bubble making group than that of the music group (19).

The results of this study similar to previous studies showed the effectiveness of distraction techniques in modulating pain intensity in cerebrospinal fluid aspiration pain, hemorrhoidectomy and herniation surgery, and bone marrow transplantation in adults and headache and intravenous and intramuscular

injections in children.. (20-24). The findings of Alm et al. suggest that the progressive relaxation of muscles with deep breathing through the release of endorphins can relieve pain by providing sufficient sensory input to activate the retinal network. The brain stop or ignore selected external emotions such as pain (25).

There are several possible reasons for this discrepancy. First, most previous studies did not match the studied units in terms of factors affecting pain intensity before the test, and they did not measure pain intensity immediately after the test (26, 27). Second, the different distraction techniques are used in the studies, and some used a combination of methods (28-30). Third, the type of surgery was different that can cause various degrees of pain (31).

Fourth, the measures of pain intensity in some studies were the observed behaviours; self-report criteria were not used. Some patients may not experience discomfort or pain, therefore, behavioural criteria for measuring pain are unreliable (28, 32). Fifth, the effect of the intervention on the amount of analgesia received is distorted. Specifically, the method and type of analgesic drug were different. Also, in most studies, the researcher did not control analgesics based on the schedule. Therefore, the effect of interventions on analgesia is not clear (26, 33, 34).

Sixth, problems related to the research method, such as small sample size and lack of random distribution between study groups or lack of control group in previous research, could be the reason for these conflicting results in the recent studies. Deviation of thought varied not only in content but also in duration, method of execution, practice, and reinforcement (35-38). In the present study, it was tried to solve these problems by taking several steps. First, tonsillectomy was selected because all surgeries cause almost the same amount of pain (39). Second, in all cases, distracted technique was used with supervision, and it was ensured about the child's learning. Third, self-report criteria were used to measure pain because it is known as the most valid measure of pain. Fourth, for all children, a single prescription (PRN if necessary and a single drug (oral acetaminophen) was used as an analgesic. Fifth, a random distribution was used to divide the samples into study groups. These steps allowed the results of the intervention groups to be compared with those of the control group.

Regarding no significant relationship between gender and pain intensity in the present study, this result is similar to the results reported in the previous studies (40, 41). However some studies indicated different pain intensities in males and females (42). Therefore, the lack of difference in males and females in the present study can be due to the young age of the participants; a gender difference might arise only in adults.

The results of the present study did not show a significant relationship between age and pain intensity. However, in some previous studies, younger children reported significantly more pain intensity. Given that previous researches have focused on short-term pain and acupuncture, it may be said that older children report less pain when the pain is mild (such as injection pain), but they report more pain intensity when it is severe and long-lasting (e.g., postoperative pain) (21-24).

The results of this study showed that distraction by cartoon significantly reduced the severity of postoperative pain and acetaminophen use, while the method of distraction through music did not reduce the severity of postoperative pain. The results of this study are consistent with the study conducted by Nasab et al., who compared music distraction and bubble making in reducing pain of venipuncture in hospitalized children (19).

According to the above mentioned, it can be said that deviation of thought can be an effective method for controlling postoperative pain in children and adjusting the use of analgesic medication, thereby modifying the negative and unpleasant experience of postoperative pain.

There were also some limitations in this study. The first is that the child's temperament and the social-cultural background that can affect the child's pain experience could not be controlled. Secondly, the length of the follow-up period after surgery is limited. Therefore, longer follow-up period is recommended for future studies.

It is also suggested that techniques involving the child's five senses be used to control pain after surgery in future studies.

### **Implications for practice**

There was a significant decrease in the mean score of pain intensity and the amount of acetaminophen received in the group distracted by watching cartoons compared to the group distracted through music and the control group. It seems that distraction techniques by watching cartoons (which involves the senses of

sight and hearing) is more effective in reducing postoperative pain in children 5-12 years old than distraction involving only hearing. Thus, distraction techniques that involve more of the patient's senses might more effectively reduce the pain of tonsillectomy.

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### Conflicts of interest

The authors declared no conflict of interest.

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