

**THE DIFFERENCES IN COOL PACK COMPRESSES  
AND DEEP BREATH RELAXATION TECHNIQUE  
ON PAIN IN SCHOOL-AGED CHILDREN  
AFTER THE BOOSTER Td**

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**ABSTRACT**

Pain is an uncomfortable feeling and a major source of distress for children. Pain due to invasive action (immunization) can be reduced by applying the principle of atraumatic care. Cool pack compresses and deep relaxation techniques can be used to reduce pain, which is a non-pharmacological method. This study aims to identify the effectiveness of cool pack compresses and relaxation techniques of deep breaths on pain in school-age children after Td booster immunization. This study's design used a quasi-experimental post-test only a nonequivalent control group; the research instrument used a VAS (Visual Analog Scale) scale with 34 school-age children as respondents, divided into two groups, namely the cool pack group and 17 deep breath relaxation techniques. Respondents using a simple random sampling technique. The study results based on the Mann-Whitney statistical test showed no difference in the level of pain between the cool pack compress and the deep breathing relaxation technique. The value  $p = 0.375 > \alpha = 0.05$ . Researchers suggest that there is assistance from their parents or their closest family in the immunization action for school-age children. Support and attention can distract from pain and comfort the child.

Key Words: Cool Pack Compresses, deep relaxation techniques, school-age children, pain, immunization

**INTRODUCTION**

The total population of Indonesia in 2018, based on the 2018 population census, was more than 265 million. Based on the age structure, the 5 to 9-year age group occupies the largest number, namely 23.87 million people (11%). Meanwhile, the number of children aged seven years alone is around 4.8 million (Ministry of health RI, 2018).

Apart from being the foundation and future of the nation, children are also a group that is vulnerable to various health problems (Indriyani, 2013).

One of the preventable health problems in children is immunization. According to the Ministry of Health of the Republic of Indonesia (2017), immunization is an effort to actively induce/increase a person's immunity against a particular disease, so that if one day

they are exposed to the disease, they will not get sick or only experience minor illness. Some of the infectious diseases included in diseases that can be prevented by immunization (PD3I) include tuberculosis, difteria, tetanus, hepatitis B, pertussis, measles, polio, meningitis, and pneumonia. Children who have been immunized will be protected from these dangerous diseases, causing disability or death. This immunization program is one of the Ministry of Health's priority activities as a concrete form of the government's commitment to achieving the Sustainable Development Goals (SDGs), significantly to reduce the mortality rate in children (Ministry of health RI, 2017).

Apart from being the foundation and the future of the nation, children are also a group that is vulnerable to various health problems. Some of the infectious diseases that can be prevented by immunization include tuberculosis, diphtheria, tetanus, hepatitis B, pertussis, measles, polio, inflammation of the lining of the brain, and pneumonia. Children who have been immunized are protected from these dangerous diseases, which can cause disability or death. Prevention of disease for children aged > 5 years is carried out in primary school-age children in repeated immunizations.

The goal of Booster immunization is essential to increase the immune response to vaccines, which has decreased with age. If a booster is not done, the child is more risk of being unprotected when exposed to diseases that could have prevented. Immunization in infants and children is the primary source of pain and suffering that can cause trauma to children and families. Fear

can occur in some school children who consider injections as painful and consider the invasive action a threat to themselves threat to themselves.

Pain is a feeling of discomfort that is very subjective. Only the person experiencing it can explain and evaluate the feeling in general; the feeling of pain is defined as a feeling of discomfort, categorized as mild or severe. Atraumatic care is a therapeutic treatment action carried out by nurses using interventions by eliminating or minimizing psychological and physical stress experienced by children and their families in the health care system. The drugs used for pain therapy are narcotic analgesics, local analgesics, and nonsteroidal drugs. The non-pharmacological management that frequently used is the deep breathing relaxation technique.

Skeletal muscle relaxation can reduce pain by relaxing muscle tension that contributes to pain. The simple relaxation technique consists of slow, rhythmic abdominal breathing. A constant rhythm can be maintained by counting silently and slowly with each inhalation and exhalation. Regular periods of relaxation can help fight fatigue and muscle tension that occurs and that increases pain.

Another option in non-pharmacological management with skin stimulation is to reduce the pain felt in children with cool compresses. The application of cool compresses is also believed to increase the release of endorphins, which block the transmission of pain stimuli and stimulate the large diameter A-beta nerve fibres, thus reducing the transmission of pain implants through the small A-delta and C nerve fibres or cold jelly bag. Cool

compresses that are easy to use are using cool pack/cool gel pack. Fikri's research results explained that cold compresses have a significant effect in reducing pain during immunization for 0-1-year-old babies.

The results of interviews with the Principal of Elementary School West Bandung Public School said that children were not informed about being immunized so far because it would make children afraid and not going to school and the intervention used before the immunization injection was advised to take a deep breath. The impact of the immunization injection causes the child to be traumatized and refuse to receive immunization, the child rebels, cries, and screams. The results of the interviews with two teachers said that the children looked afraid when the public health centre staff came to administer immunization injections so that a teacher had to stand guard at the door to avoid children leaving the classroom and there were 6-7 students had to be accompanied by the teacher when they were injected. The results of interviews with 5 students of Grade 2 elementary school said they were afraid of being injected, and a friend was crying and had to be hugged by a teacher. The results of interviews with public health centre officers who administered immunizations indicated that the cold compress technique had never been used before injection. The efforts from health centre officers and school authorities to reduce pain during the injection of Td booster immunization are by accompanying children who will be injected, recommend not looking at needles when going to be

injected and are encouraged to read prayers.

Currently, there is no specific intervention carried out by health workers to reduce the pain caused during immunization other than relaxation techniques (deep breaths). There have not been any atraumatic care measures such as cool pack compresses, which have many benefits and are sufficient to be applied easily. This makes researchers interested in researching the effect of cold compresses on pain levels in school-age children before Td booster immunization.

## **METHODOLOGY**

The scope of this research is about cool pack compresses and relaxation techniques with deep breaths on pain in school-age children after Td booster immunization. This research was conducted in November 2019 at the 2nd-grade public elementary school in West Bandung, which will receive Td booster immunization. The study sample was school-age children aged 7-9 years old class 2 of West Bandung Public Elementary School, who will get Td booster immunization totalling 34 children (17 children in the control group and 17 children in the intervention group) using a simple random sampling technique. The study used a quantitative method with a quasi-experimental post-test only non-equivalent control group design. The research instrument used a VAS (Visual Analog Scale), an interval measuring scale with 0 - 10. Statistical data analysis used the comparative hypothesis test of the numerical variables Shapiro-Wilk test. The bivariate analysis used in this study was the Mann-Whitney test.

**RESULTS**

**1. Respondent characteristics**

**a. Respondent characteristics based on gender**

Table 1

Frequency Distribution of Respondent Characteristics Based on Gender in school-age children at Public elementary School West Bandung (n = 34)

Gender	Male		Female		Total, n (%)
	N	%	N	%	
Compress Cool Pack	6	35.3	11	64.7	100
The deep breath	10	58.8	7	41.2	100

Table 1 shows that in the cool pack group, more than half (64.7%) were female (11 respondents). While in the deep breath group, more than half (58.8%) were male (10 respondents)

**b. Respondent characteristics based on age**

Table 2

Frequency Distribution of Respondent Characteristics by the age of School-aged Children in Elementary School in West Bandung (n = 34)

No	Age	Compress Cool Pack		The deep breath	
		N	%	N	%
1	8 years	17	100	17	100

Table 2 shows that all respondents (100%) in the cool pack group were eight years old (17 respondents), and all respondents (100%) were eight years old (17 respondents) in the deep breath group

**c. Respondent Characteristic based on ethnicity**

Table 3

Frequency Distribution of Respondent Characteristics by Ethnicity in school-age children at public elementary school West Bandung (n = 34)

No	Ethnic	Compress Cool Pack		The Deep breath	
		N	%	N	%
1	Sundanese	17	100	17	100

Table 3 shows that all respondents (100%) in the cool pack group and the deep breath group came from the Sundanese ethnicity (17 respondents).

**d. Respondent Characteristics based on injection experience**

Table 4

Frequency Distribution of Respondent Characteristics Based on Experience of being injected at school-age children at Public Elementary School West Bandung (n = 34)

No	Experience of Being Injected	Compress Cool Pack		The Deep Breath	
		N	%	N	%
1	Ever	17	100	17	100
2	Never	0	0	0	0

**2. Univariate Analysis**

**a. Pain scale after Td booster immunization given a cool pack**

Table 5

Frequency Distribution of Pain Scale after being given cool pack treatment for school-age children after Td booster immunization at Public Elementary School Bandung Barat (n = 17)

Pain Scale	N	Mean Rank	Median	Std. Deviation	p value
Compress cool pack	17	1.47	1.00	.874	.375
The deep breath	17	1.71	2.00	.772	

Table 5 shows that less than half of the respondents (41.1%) experienced pain 1 (7 respondents) after being given cool pack treatment.

**b. Pain scale after Td booster immunization given a relaxation technique, take a deep breath before immunization.**

Table 6  
Frequency Distribution of Pain Scale

Pain scale	Frequency	%
0	1	5.9
1	5	29.4
2	9	52.9
3	2	11.8
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
Total	17	100.0

after being given a deep breath relaxation technique to school-age children after Td booster immunization at public elementary school West Bandung (n = 17)

Tabel 6 shows that after being given a deep breath relaxation technique treatment, more than half of the respondents (52.9%) experienced pain 2 (9 respondents)

**3. Bivariate Analysis**

Table 7  
Distribution of the average pain scale given cool pack compresses and relaxation techniques with deep breaths in school-age children after

Pain scale	Frequency	%
0	2	11.8
1	7	41.1
2	6	35.3
3	2	11.8
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
Total	17	100.0

Td booster immunization at public elementary school, West Bandung.

Table 7 shows that the statistical test results show that the mean value of cool pack compresses is 1.47, with a standard deviation of 0.874. The results of statistical testing of deep breath relaxation techniques obtained a mean value of 1.71 with a standard deviation of 0.772. The results of statistical tests using Mann-Whitney obtained a value of p value = 0.375, when compared with the value of the alpha coefficient ( $\alpha$ ), then p value >  $\alpha$  (0.05). It can be concluded that there is no difference in cool pack compresses and deep breathing relaxation techniques on the pain scale of school-age children after Td booster immunization at SDN West Bandung.

**DISCUSSION**

**1. Based on Respondent characteristics**

The pain response felt by each person is different. Hence, it is necessary to explore to determine pain (Patasik, Chandra, 2013). Several factors can influence the pain experienced by a person. In this study, the description of pain will be discussed based on the respondent's characteristics,

namely, gender, age, ethnicity, experience, and family support.

Research shows that female respondents have a higher level of pain than male respondents. According to Gill (1990), men and women do not differ significantly in response to pain. Some cultures that influence gender can influence an individual's response to pain. A boy in his culture must be brave and not allowed to cry, while a girl is allowed to cry in the same situation (Potter & Perry, 2013). Asriani's (2017) research supported this statement. The pain level of female respondents was 0.38 higher than the pain level of male respondents. Although in the process of this research, when using the VAC scale for school-age children, it has been described regarding pain assessment for both the cool pack group and the deep breath relaxation technique.

Based on this study, all respondents were school-age children aged eight years. Asriani (2017), in her research, shows that there is no difference in the age group where respondents in the intervention group were six years old, namely 27.8%, while in the control group, the majority of respondents were 6 and 12 years old, namely 27.8%. This is supported by Ball, Jane (2010), that school-age children (7-9 years) have a clear understanding of the causes of pain, understand a painful procedure to monitor or treat disease, have a more complex awareness of physical and psychological pain, such as moral dilemmas and mental pain. One of the efforts to reduce pain is by using pharmacological and non-pharmacological techniques.

All of the ethnic origins in this study are 100% of the Sundanese ethnicity. The respondents come from the area around the West Bandung Elementary School Public. This object choice is supported by Indriyani (2013), who revealed that respondents in her study, both Javanese and Sundanese, tended to have a high pain tolerance. According to Nayak et al. (2000), in Callister (2003), people from eastern cultures have a higher pain tolerance than people from western cultures. Based on Potter & Perry's (2013) theory, values, and beliefs in culture affect how individuals deal with pain. Some cultures believe that showing pain is a normal thing, while others tend to be more introverted.

In the characteristics of the previous injection experience on the level of pain, it was found that 100% of school-age children had previous injection experience, namely getting DPT immunization in the routine BIAS program organized by public health center. The sample has the experience that the injection will cause pain so that it will make the respondent anxious, whereas in this study did not show any anxiety in the respondent. This fact is consistent with Smetlzer & Bare (2010)'s theory that past experiences related to pain can reduce anxiety and make patients more tolerant of pain than those who have little experience with pain. In theory, Potter & Perry (2013) says that every individual learns from the experience of pain. Previous pain experiences do not always mean that the individual will accept pain more quickly in the future. This fact is

supported by Sulistiyani's research (2015), which explains no difference in the proportion of pain levels between pre-school children who have experience with infusion procedures and those who do not have experience. Mariyam's research (2013) shows no significant effect between previous infusion experiences on pain levels. However, the average pain level results of respondents who have never experienced infusion before are higher than respondents who have experienced previous infusions.

Based on research, children who received immunizations were not accompanied by their parents or their closest relatives at the time of immunization. Agustiningrum (2019), in her research, said that family support played a role in reducing pain levels, namely in his research, it was found that all respondents who accompanied them during immunization were their families, and their mothers accompanied most. Based on the above, so that the community health centre can cooperate with schools and parents in preparing children before immunization, the closeness of the mother will provide calm to the child so that it can affect the level of pain. In their theory, Kolcaba and DiMarco (2005) also state that particular people's presence will provide comfort to children, mostly psychological and socio-cultural comfort.

## 2. Univariate Analysis

### a. Pain scale of school-age children after being given a cool pack before injection of the Td booster immunization.

Supporting research results can be seen in table 5. After the Td booster immunization, which was given a cool pack before immunization, the pain scale showed that the respondents who experienced pain with pain scale 1 were 41.1%. This result is related to the presence of skin stimulation (cold) with the provision of cool packs, which affect reducing pain during the injection.

In this study, the measurement of pain was carried out by the VAS assessment. According to Wong, Donna L. et al. (2009), pain assessment using the VAS can be used at a minimum age of 4.5 years, preferably at least seven years of age. Measurements using the vertical VAS are more sensitive, produce higher scores, and are easier to use. According to Hockenberry and Wilson (2009), school-age children have begun to gain the ability to relate events to describe a child's mental which is expressed verbally or symbolically. Children can use their thought processes in assessing the events or actions they experience. The researcher measured the level of pain by interview because the sample's age characteristics could be done in this way. The sample in this study was eight years old, which included the development of children who already understood the concept of calculation and pain.

Cold compress is the application of stimulation to the skin using an ice pack to reduce pain. A cold compress application will cause numbness, which is suitable for use as a local anaesthetic for surface lacerations

or stab wounds, which is sufficient for pain relief (Wong, 2009).

Melzack and Wall's (1995) theory of pain defense (gate control) states that pain impulses can be regulated or inhibited by defense mechanisms and the central nervous system. The application of a cold compress will stimulate the descending nerve pathways to release endogenous opiates such as endorphins and dynorphins, which are natural pain killers from the body. The application of cold compresses can also stimulate neuromodulators to close the defense mechanism by inhibiting substance P (Potter & Perry, 2013). The lower level of pain in the intervention group due to cold compresses can inhibit pain transmission from peripheral fibers to the brain.

Aminabadi and Farahani's research (2009) states that applying cold compresses to the skin as an anesthetic agent increases the pain threshold for large stimuli such as the insertion of needles during the injection procedure. The duration of discomfort with ice is very subjective for each person. Administration of local anesthesia with compresses is recommended for 2-5 minutes, and the most optimal is 2 minutes.

Applying a cold compress can release endorphins, which block the transmission of pain stimuli. A cold compress using an ice pack slows the conduction of peripheral nerve fibers. It reduces the release of inflammatory mediators and nociceptors, causing a relatively fast skin anesthetic effect (Waterhouse, 2013).

#### **b. Pain scale of school-age children after a deep breath relaxation technique before Td booster immunization.**

The results obtained in table 6, "the pain scale after Td booster immunization given a deep breath relaxation technique before immunization," showed that the respondents who experienced pain with pain scale 2 were 52.9%.

This result is supported by Ayuningtika's research (2019) that there is an effect of deep breathing, blowing a balloon on changes in the pain scale in pediatric patients who have blood drawn. Wahyuni (2015), in his research, said that the relaxation effect is obtained during slow deep breathing therapy, which is analogous to when a child blows a propeller so that it can reduce pain. Patasik (2013), in his research, said that there was a change in pain intensity after deep breathing relaxation techniques, indicating that deep breath relaxation techniques were proven effective in reducing pain intensity in post-cesarean section surgery patients. Yulianti (2012) states that good preparation in action procedures helps reduce children's anxiety levels, increases children's cooperation, and supports good coping. According to Saputo (2017), children in their developmental period still find it challenging to understand orders given by nurses, so one good relaxation technique for children is playing activities, namely blowing balloons, where blowing a balloon is suitable for training children to take a deep breath.



Based on Ball, Jane et al. (2010) 's theory that with a long rhythmic breath, the child takes a deep breath, holds for 5 seconds and exhales through the mouth slowly. This technique can be done at the time of injection. This deep breath relaxation technique can promote relaxation and distraction during a painful procedure or as a mechanism to reduce stress. Based on Brunner & Suddart's (2001) theory, deep breath relaxation is mental and physical freedom from tension and stress because it can change the patient's cognitive perceptions and affective motivation. Relaxation techniques allow patients to control themselves when there is discomfort or pain, physical stress, and emotion in pain. Based on the theory of Smeltzer and Bare (2002), it states that the goal of deep breath relaxation techniques is to increase ventilation of the alveoli, maintaining gas exchange, prevent pulmonary atelectasis, increase cough efficiency, reduce both physical and emotional stress.

### 3. Bivariate Analysis

**The differences in the scale of children's pain after being given a cool pack and relaxation techniques with deep breaths in school-age children after Td booster immunization.**

Based on table 7 shows that the results of statistical testing show that the mean value of cool pack compresses is 1.47, with a standard deviation of 0.874. The results of statistical testing of deep breath relaxation techniques obtained a mean value of 1.71 with a standard

deviation of 0.772. It can be seen that the mean difference between the cool pack compress and the relaxation technique of deep breathing is 0.24, with a standard deviation of 0.10. The results of statistical tests obtained value = 0.375. The result can be concluded that there is no difference in the effectiveness of cool pack compresses and deep breathing relaxation techniques on pain of school-age children after Td booster immunization in SD Bandung Barat. This result is not much different from the research of Ramdhani (2018), which shows that there is no difference in the level of pain during venous function action in school-age children between the cool pack non-pharmacology group and the EMLA pharmacology group. This is inversely proportional to Asriani (2017) in his research showing that there is an effect of cold compresses on the pain level of school-age children during infusion where there is a decrease in the average pain level in controls due to differences in the speed of pain delivery from peripheral fibers to the brain.

Based on Lewis's theory, et al. (2011) said that cold compresses have a physiological effect of relieving pain and increasing the pain threshold. The application of cool pack compresses is believed to increase the release of endorphins. The technique blocks the transmission of pain stimuli. It stimulates nerve fibers with large diameter A-beta, thereby reducing pain impulses through the small A-delta and C nerve fibers. Cold also provides physiological effects such as reducing tissue inflammatory response, reducing blood flow, and reducing edema (Tamsuri, 2007).

Based on the theory of Wong (2009), it is said that deep breathing relaxation techniques can reduce pain in respondents due to the increased focus on pain, which switches to relaxing the breath so that the oxygen supply in the tissues will increase and the brain can relax. A relaxed brain will stimulate the body to produce endorphins, which inhibit the transmission of pain impulses to the brain, which can reduce pain sensations so that the pain experienced by respondents is reduced.

## CONCLUSION

1. After being given a cool pack treatment, the pain scale results show that less than half of the respondents experienced pain 1.
2. After being given a deep breath relaxation technique, the pain scale results indicate that more than half of the respondents experienced pain 2.
3. There is no difference in pain in school-age children after Td booster immunization is given cool pack compresses and deep breathing relaxation techniques with a p-value of  $0.375 < 0.05$ .

## SUGGESTIONS

1. For the next researcher can use pain intensity measurement instruments other than VAS, both verbally and nonverbally.
2. The school in implementing immunization can involve parents or close family. Support and attention can distract from pain and make the child feel comfortable.

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