Frontiers in Health InformaticsISSN-Online: 2676-7104 www.healthinformaticsjournal.com
2024; Vol 13: Issue 3 Open Access

The Influence of Mother's Ability About Non-pharmacological Pain Management (*Behavioral Intervention*) on Pain Scale and Endhorphin Levels in Toddlers Who Have Intravenous Infusions

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Cite this paper as: Wesiana Heris Santy,Firdaus,Lilik Supriati,Andreas putro Ragil Santosa, Rahmadaniar (2024) The Influence of Mother's Ability About Non-pharmacological Pain Management (Behavioral Intervention) on Pain Scale and Endhorphin Levels in Toddlers Who Have Intravenous Infusions *Frontiers in Health Informatics, 13* (3), 7340-7347

Introduction: Mother's involvement in nursing care for children is something that must be done. Where the child will feel comfortable and safe when he is near the mother in new situations or meeting strange people who are a source of stressor for the child. One of them is that when an invasive procedure is carried out in a children's hospital, the mother really needs to be present. The reality in the field is that the mother's involvement is still considered not optimal because the mother's opinion states that pain management is the nurse's job, the mother is not confident in being able to accompany her child when the IV is being installed and also the nurse's reluctance to involve the mother because they think the mother will hinder invasive procedures due to the mother's excessive worry. The aim of the research is the Effect of Mother's Ability on Web-Based Nonpharmacological Pain Management (Behavioral Intervention) on Pain Scale and Endhorphin Levels in Toddlers Who Have Infusion.
Method: The quasi-experimental study with "Post test control group design". Was performed among 30 mothers who have toddlers (15 of control and 15 of intervention group). Variable dependent maternal ability and dependent variable pain scale and endhorphin levels. **Results**: there is a relationship between maternal factors and filial values with a p value of 0.000 and there is a relationship between nurse factors and maternal filial values with a p value of 0.000. **Conclusion:** Mother's self-confidence is formed by the mother's own factors, namely motivation and cognitive factors and also nursing factors.

***Key words*:** mother, pain management, pain scale, endhorphin, toddler, infusion

A. Background :

The presence of parents during invasive procedures is necessary to relieve pain in toddlers. Family empowerment can help nurses and other health workers, where in its implementation it is necessary to have a family empowerment scale(Arief & Rachmawati, 2020)(Parhiz et al., 2016). Research shows that nurses lack adequate information and skills regarding methods that can be used to alleviate painful procedures(Jannecke et al., 2014). In addition, communication between parents and child health professionals about how to assess and manage their children's pain both with verbal and written instructions still needs to be improved.(Nascimento et al., 2019). Based on the description above, it can be explained that the implementation of non-pharmacological pain management in dealing with pain during the hospitalization period by nurses is still low and to date the role of the family in treating pain due to invasive procedures has not been optimal. Therefore, it is necessary to improve the mother's family's ability regarding web-based non-pharmacological pain

management (behavioral intervention) regarding the pain scale and endhorphin levels in toddlers undergoing infusion.

Observations made by researchers from 30 nurses, 13 (43.3%) had not brought the mother to accompany or be involved in managing pain during invasive procedures, the mother remained in the room and the child was taken to the treatment room for invasive procedures, 17 (46.7%) accompanied when invasive procedures are performed. Pain management is inadequate, it is reported that 35-55% of nurses underestimate patient pain and sixty-four percent of patients do not receive medication before or during painful procedures in intensive care units(Ray et al., 2017). Despite a large body of evidence in pediatric pain research, procedural pain management in children remains low(Ali et al., 2014).

Several factors that influence the implementation of non-pharmacological pain management are the lack of education from nurses and nurses not involving mothers optimally. Time constraints, lack of applicable regulations or policies, staff education, and the need for more options for care and provision of parent educationare some of the major barriers to optimal pediatric pain management(Ballard et al., 2017). Poor assessment and management of infant and child pain remains a challenge for health care providers and caregivers(Heale & Twycross, 2015). The greatest assets in the assessment and treatment of pain in young children are the parents. Children who have a relationship with their parents or caregivers may be easier to assess and may benefit from non-pharmacological treatment(Thrane et al., 2018).

Fear in childhood will have an impact on non-compliance with health care in the future, which is estimated to reach 25% of adults and around 10% are afraid of needles.(Hogan et al., 2010)In fact, pain has an impact on all aspects of a child's life, including affecting appetite, ability to move, social isolation, changes in self-concept, depression and even suicidal thoughts. Effective communication & hope for intense intervention in pain management can increase patient satisfaction. Hospitals wishing to increase satisfaction should encourage healthcare providers to improve care regarding pain management and engage in pain control with patients & parents(Caruso et al., 2018).

Explanation of Previous Research Results: the filial values of the mother are most influenced by the mother's own factors (internal factors), namely beliefs, motivation and personal traits. The results of the study proved that the mother has good motivation, knowledge, attitude, and cognitive so the mother is ready to be involved in pain management in children. Managing children's pain is important for multiple reasons, including alleviating patient suffering, improving the success of evaluation and treatment, and preventing future negative healthcare experiences or avoidance of healthcare(Santy, Ugrasena, Arief, Hidaayah, et al., 2023). The research results explain that the mother's ability to care for children who experience pain due to invasive procedures begins with strengthening the mother's filial values regarding non-pharmacological pain management (behavioral intervention) which includes breathing exercises, parental coaching, positive reinforcement, desensitization. Where the mother's filial value is influenced by maternal factors and nurse factors. Maternal factors are the factors that have the most influence on filial values and the mother's ability to treat pain due to invasive procedures on toddlers. The mother's abilities include perceiving health, personal growth, existential well being. Family center empowerment-based non-pharmacological pain management (behavioral intervention) development module with an attractive web-based application method which includes an SOP for infusion installation that is integrated with non-pharmacological pain management (behavioral intervention) so that it can make it easier for nurses to apply the module. to mothers in order to increase the mother's ability to reduce anxiety and increase the child's sense of comfort when carrying out the infusion procedure. With web-based online media, it will reduce nurses' time constraints, increase mothers' knowledge and skills so that child nursing care, especially acute pain problems, can run more optimally.(Santy, Ugrasena, Arief, Hidayah, et al., 2023).

Method:

The quasi-experimental study with "Post test control group design". Was performed among 30 mothers who had toddlers (15 of control and 15 of intervention group). The variables in this study were pain scale and endhorphin levels. The purposive sampling technique is mothers whose children have an IV insertion procedure,

mothers who take care of their children while in the hospital, mothers who refuse to be respondents. The research instrument used *The Faces Legs Activity Cry Consolability Scale* (FLACC) and saliva endhorphins.
Education used website media for mother was conducted for intervention group during 30 minutes before applying infusion, while a control group used standard operational procedures from hospital. Both of groups were measured pain scale and salivary endorphin after intervention program. Wilcoxon U-test was used to compare the effectiveness of the intervention given to the intervention group and the control group after providing the intervention. This research has passed the ethics of the hospital with no 025.EC. KEP. RSIAY.08.21

RESULTS

1. Respondent Characteristics

Table 1. Frequency distribution of maternal characteristics in the treatment group and control group at Surabaya Islamic Hospital

No.	Characteristics	Treatment Percentage(%) Frequency (n)	Control Percentage(%) Frequency (n)	Homogeneity Test
1	**Mother's Age**			0.734
	Late Teenagers (17-25 Years)	13.3(4)	6.7(2)	
	Early Adulthood (26-35 Years)	10(3)	36.7(11)	
	Late Adulthood (35-45 Years)	76.6(23)	53.3(16)	
	Early Elderly (>45 Years)	0	3.3(1)	
2	**Education**			0.525
	Base	6.67(2)	0	
	Intermediate	26.67(8)	36.7(11)	
	Tall	66.67(20)	63.3(19)	
3	**Work**			0.464
	Work	60(18)	46.7(14)	
	Doesn't work	40(12)	53.3(16)	

Based on Table 1, it shows that the characteristics of respondents in the treatment group and control group are all homogeneous so that characteristic factors will not be confounding variables in this study. The homogeneity test was carried out using the Lavene test, and it resulted that all characteristics met the requirements, namely having a $p>0.05$ value.

The majority of mothers' ages were in late adulthood 35-45 years in both the intervention and control groups. The majority of mothers' education levels were high levels of education in both groups, the majority of mothers' employment status in the intervention group was working and in the control group, those who worked and did not work had almost the same percentage.

Table 2. Frequency distribution of characteristics of children in the treatment group and control group at Surabaya Islamic Hospital

No.	Characteristics	Treatment Percentage(%) Frequency (n)	Control Percentage(%) Frequency (n)	Homogeneity Test
1	**Gender**			0.359
	Man	56.7(17)	53.3(16)	
	Woman	43.3(13)	46.7(14)	
2	**Child Age**			0.629
	1 year	30,(9)	6.7(2)	
	2 years	16.7(5)	60(18)	
	3 years	53.3(16)	33.3(10)	
3	***HealthStatus***			0,000
	Chronic >6 Months	10(3)	0	
	Non Chronic < 6 Months	90(27)	100(30)	
4.	**Previous infusion experience**			0.005
	There isn't any	30(9)	10(3)	
	There is Experience	90(21)	90(27)	

Based on Table 2, it shows that the characteristics of children based on gender and age in the treatment group and control group are homogeneous, meaning that the characteristic factors of gender and age will not be confounding variables in this study. The health status and experience variables are not homogeneous because the p value is <0.05. The results of child characteristics show that the majority of children in the intervention group are 3 years old and the majority of children in the control group are 2 years old. The majority of gender in both groups was male, the health status was non-chronic and the majority had had previous infusions.

2. Variable Description

Table 3. ResultsPain Scale and*endorphins*In toddler children who underwent invasive procedures in the treatment group and control group at the Surabaya Islamic Hospital

Indicator	Category	Group					
		Treatment			Control		
		Frequency (n)	Percentage (%)	Mean±SD (min-max)	Frequency (n)	Percentage (%)	Mean±SD (min-max)
Pain Scale	There isn't any	1	3.33	5.9 ± 2.4 (0-9)	0	6.67	8.8±1.8 (5-10)
	Light	3	10.00		0	0.00	
	Currently	20	66.67		4	13.33	
	Heavy	6	20.00		26	86.67	
Endhorphins	Normal	7	63.64	945±865.4 (140-3000)	9	69.23	808.8±8339 (25-2920)
	Abnormal	4	36.63		4	30.77	

Based on Table 3, it is explained that the pain scale of children who underwent infusion in the treatment group was mostly in the moderate category and the severe category in the control group. Endorphin levels between the treatment and control groups were in the same category, namely not within normal limits.
The pain scale in the treatment group was found to be an average of 5.9 lower than the control group's 8.6. Mean endhorphin levels in the treatment group were higher than the control group.

3. The Influence of Mother's Ability to Treat Pain Due to Invasive Actions in Toddler Age Children on Enhanced Comfort

Table 4. Test results *Mann-Whitney Enhanced comfort in children undergoing invasive procedures at the Surabaya Islamic Hospital*

Variable	**Group**					**Information**
	Treatment		**Control**		**p value**	
	Mean	**Min-max**	**Mean**	**Min-max**	***Mann-Whitney***	
Pain Scale	5.9	0-9	8.8	5-10	0,000	Significant
Endhorphins	945	140-3000	808.8	25-2920	0.543	Not Significant

Based on table 7 Pain scale variables (p=0.000) has a p value of less than 0.05, which means there is a difference in the child's pain scale in the two groups. Because there is a significant difference, it can be said that "there is an influence on the mother's ability to treat pain due to invasive procedures on the pain scale of toddlers who are undergoing IV drips. Endorphin levels obtained a significant value (p=0.543) which has a p value of more than 0.05, which means there is no difference in endorphin levels in the two groups, however, the average endorphin levels in the treatment group were higher than the control group.

Discussion

The research results showed that the mother's ability to carry out non-pharmacological pain management (behavioral intervention) based on family center empowerment had an effect on the pain scale. Based on the analysis, it was found that the average of the treatment group was better on all indicators of the pain scale and endorphins than the control group.
The achievement of enhanced comfort is determined by the existence of needs related to health care, namely comfort needs that develop from stressful situations, comfort interventions, factors that influence the perception of comfort (intervening variables).(Kolcaba, 2003). The comfort intervention developed in the form of a module given to mothers is able to increase the mother's ability to carry out non-pharmacological pain management (behavioral intervention) which consists of a combination of interventions in the form of breathing exercises, parental coaching, reinforcement, desensitization so that it is effective in increasing comfort in children, marked by reducing anxiety. , and the child's pain scale during invasive procedures.
In line with the research results, it was found that mothers who were able to be good role models when their children had an IV infusion were found to find that the child's anxiety and pain response also decreased (Boerner et al., 2017). The mechanism underlying the maternal calming effect is activation of the endogenous opioid pathway(Campbell-Yeo et al., 2011). In line with the results of research that non-pharmacological pain management methods (proximal, distal, and procedural) have shown effectiveness in reducing the pain response of neonates, combining certain pain management techniques may have a stronger analgesic effect compared to administering individual techniques (Bucsea and Pillai Riddell , 2019).
The mother's ability to carry out non-pharmacological pain management (behavioral intervention) is pain management which consists of several combination interventions which include the mother holding the child, the mother diverting the child's attention by blowing a whistle together, the mother showing a cheerful face and

giving positive praise, where the combination intervention causes stronger effect to increase the sense of comfort. Behavioral intervention is a stimulus that the child will receive through transduction, transmission, modulation and perception pathways. The pain mechanism in the form of stimulation of comfort/pain is first received by mechanical nociceptors and the pain stimulus will be converted into electrical activity which will be transmitted by A delta nerve fibers and C nerve fibers via afferent nerves to the central nervous system (CNS). The CNS that receives these pain impulses is the dorsal cornus which is in the spinal cord. The dorsal cornus is also considered a pain gate because in the dorsal cornus there is an ascending pathway, if the ascending pathway is active or open then pain impulses will be received and the pain threshold will decrease so that a person can feel pain and can cause a pain response.(Andarmoyo Sulistyo, 2013).

Parental involvement is effective in reducing pain felt during invasive procedures and children of parents with high levels of anxiety have higher levels of preprocedural pain and anxiety.(Dilek Sonmez Saglık,et all, 2019). Nursing interventions related to pain management are recommended to involve the family because the presence and involvement of the family has been proven to be effective in helping reduce pain responses in children (Reni Elmiasih et all, 2015). Parents want to be present and given the opportunity to comfort their babies during and after painful procedures. Parents also prefer to receive formal/written information about the baby's pain(Vazquez et al., 2015).

Active maternal involvement can make children safer and more comfortable because toddler-aged children's biggest source of stress is separation from their parents. The relationship between child and mother is very close so that if they separate they lose the closest person which causes feelings of insecurity & anxiety. Parental support for children during hospitalization from painful procedures should be improved. Family-centered care ensures the health and well-being of children and their families through respectful family-professional partnerships. Family-centered care is a standard of practice that results in high-quality services.

This definition applies to all children, their families and all health care practitioners, including pediatricians, family physicians, nurses, social workers and other allied health care professionals. At its core is the transformational idea that health care provision is a partnership in which, families and practitioners work together for the child. As children grow and are able to make bigger decisions, children act as partners. A successful family-professional partnership requires that each member respect the skills and expertise that the child and family bring to the relationship; partners must fundamentally trust each other's actions and motivations; communication must be open, and decisions must be made together, with a willingness to negotiate as needed.

Endhorphin levels were measured using a toddler's saliva sample collected after the infusion was installed and measured using an endhorphin elisa kit. Normal level limits are 15625-1000 (Human Beta-endhorphin Elisa Kit). Based on the results of the analysis test, there was no difference in endorphins between the two groups, however there was a significant difference in the average endhorphin levels in the two groups, where the treatment group had higher endorphin levels on average than the control group and both groups had average levels still below normal levels.

Endorphins are morphine-type substances supplied by the body(Potter & Perry, 2005). Endorphins are activated by stress and pain, their location is in the brain, spine and gastrointestinal tract and endorphins also have an analgesic effect (Tamsuri, 2007). This hormone can function as a natural sedative produced by the brain which creates a feeling of comfort and increases endorphin levels in the body (Sindhu, 2006). Endorphins are neuropeptides produced by the body when relaxed or calm. Endorphins are produced in the brain and spinal cord. The average endhorphin level in children undergoing infusion is still below 1000 mg/dl, this occurs because the child is still undergoing the hospitalization process.

The causes of stress and anxiety in children undergoing hospitalization are influenced by many factors, including the behavior shown by health workers (doctors, nurses and other health workers), the child's hospitalization experience, the support system or family support that accompanies them during treatment. These factors can cause children to become increasingly stressed and this can affect the healing process (Mulyani, 2018). If a child is hospitalized, the child will be vulnerable to experiencing a crisis because the child experiences stress due to changes in both his health status and the environment, has several limitations in coping mechanisms to deal with urgent problems or events, various feelings that often arise in children, namely anger,

sadness, fear , and guilty(Asnidar, et all, 2018). The stress level of parents towards their hospitalized child depends on many factors, such as the psychological characteristics of the child and parents, the child's health condition, as well as support from family and medical personnel.(Zdun-Ryżewska et al., 2021).
The hospitalization process itself is a traumatic process for children because the child is in a strange place, meeting strangers so this affects comfort, feelings of relaxation and of course affects endorphin levels. This process also has an impact on discomfort, feelings of tension and anxiety in children. Childhood illnesses and hospitalization are very difficult and often unpredictable situations in the family life cycle. Family involvement in dealing with non-pharmacological pain is an important thing that nurses do in providing nursing care based on the philosophy of child care, where nursing care is centered on families emphasize the importance of family involvement and empowerment in caring for children. Research shows the application of family-centered care in the practice of treating families with care, conveying information to families so they understand the conditions of their child's care, involving family participation in decision making and child care, and collaboration between families and nurses.

Transfer knowledge related to child care information can be provided through health education. Health education is a form of nursing intervention to improve family capabilities. A nursing intervention is a nurse's action or response, which includes the nurse's therapeutic actions, that occurs in the context of the nurse-client relationship that impacts the functioning of the individual, family or society. Nursing interventions are intended to effect change, although none can predict progress on a specific outcome(Wright, L.M., & Leahey, 2000). Its effectiveness is influenced by the match between the intervention offered by the nurse and the physiobiological-spiritual structure of the client/family.

Conclusion

The mother's ability to treat pain due to invasive procedures influences the pain scale in toddler children and the average pain scale and endhorphin levels in the treatment group are better than the control group.

Acknowledgment
Abstract has been presented at The 3th International Conference on Applied Sciences, Education and Technology (IConASET) Nahdlatul Ulama University Surabaya

Conflict of interest
The author would thank Nahdlatul Ulama University Surabaya for providing the opportunity to present this study

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