THE EFFECTIVENESS OF GIVING PURSED LIPS BREATHING THERAPY TOWARDS KIDS' OXYGENATION STATUS WITH PNEUMONIA

Yunita Muliasari[a*], Iin Indrawati[b]

[a] Baiturrahim Institute of Health Science, Prof. M. Yamin Street No. 35, Jambi, 36135, Indonesia

[b] Baiturrahim Institute of Health Science, Prof. M. Yamin Street No. 35, Jambi, 36135, Indonesia

* Correspondent Email: umi.afiqahmz@gmail.com, Handphone: 085266019863 (Yunita)

Abstract

Pneumonia is the second most common disease that brings about death in children under five years of age in the world. It seems, Symptoms that appear in the case of Pneumonia are acute respiratory problems that need to be overcome appropriately. The aim of this research is to identify the effect of pursed lips breathing therapy through tongue blowing activity on the oxygenation status of preschoolers with Pneumonia. This research used quasi experimental with pre-post test group design. The sampling technique is purposive random sampling with 36 people consisting of 18 intervention groups and 18 control groups. Data were analyzed using univariate and bivariate tests (t-test). The results showed a significant difference between oxygenation status before and after intervention with tongue blowing therapy (PLB), namely p value= 0.045 on respiratory frequency (RR), p value = 0.037 to saturation oxygen (Sa02) and p value=0.036 on heart rate (HR). The results of this study can add alternatives to independent nurse interventions in dealing with pediatric patients who have pneumonia or with oxygenation disorders.

Keywords: Pursed lips breathing (PLB), preschool children, Pneumonia

1. Introduction

Pneumonia is inflammation of the pulmonary parenchyma in the alveoli and interstitial tissue brought about by bacteria, with symptoms of high fever kept accompany with coughing up phlegm, rapid breathing (breathing frequency > 50x/minute), tightness, and other symptoms (a headache, anxiety, reduced appetite). The World Health Organization (WHO) defines Pneumonia based solely on clinical findings obtained from inspection and respiratory frequency (1).

The incidence of pneumonia in children <5 years of age in developing countries is higher when compared to developed countries, which is equal to 10-20 percent / 100 children per year, causing more than 5 million deaths per year in children under five years old. In accordance with Riskesdas 2007, pneumonia is the second leading cause of death after diarrhea (15.5% among all toddlers) and is always ranked as the 10th largest disease every year in every health facility. Toddler pneumonia is one indicator of the disease control and environmental health program in the Ministry of Health's strategic plan for 2010-2014. Based on population age group, a high period prevalence occurs in the age group 1-4 years. Since 2015, the Community Health Center (Puskesmas) has been examining and managing pneumonia through the Integrated Toddler Pain Management (IMCI) program. Over the past few years, the coverage of pneumonia has never reached the national target. Achievements in 2015 were only 14.64% of the targeted 20% in all existing districts/cities. According to the report of the ISPA control program in the Jambi City Health Office in 2016, Pneumonia cases were most prevalent in toddlers (1,251 cases) compared to 269 cases of infancy (2).

Children who experience clinical symptoms of Pneumonia must get treatment quickly and precisely. Parents can bring the child with clinical symptoms to the nearest health service center such as the health center or hospital to get the right handler until his condition improves.The matters that often arise in children with Pneumonia who are taken to health facilities and hospitalized are respiratory distress characterized by rapid breathing, chest wall retraction, nasal lobe breathing and stridor (3). Respiratory distress is the body's compensation for lack of oxygen because low oxygen concentrations will stimulate the central nerve to increase respiratory frequency. If the effort is not compensated, there will be a disruption of the oxygenation status from mild to severe, even causing seriousness. The decrease in oxygen concentration to tissues is often caused by the presence of upper and lower airway obstruction due to increased secretion production as one of the manifestations of airway inflammation (4).

The inability to issue secretions is an obstacle that is often found in children aged infants to toddlers because at that age cough reflexes are still weak. Some effective alternative measures to overcome this problem are chest physiotherapy, which is often referred to as conventional physiotherapy which includes postural drainage, vibration, and percussion (5).

Another alternative to overcome the problem of ineffective airway clearance in children is by applying the Pursed Lips Breathing (PLB) technique. This technique can be used as an alternative to help overcome the ineffectiveness of airway clearance in children (6). In addition, PLB is useful for increasing alveolar expansion in each lung lobe, so that alveolar pressure increases and can help push secretions on the airway during expiration and can induce normal breathing patterns (7). In the end, the PLB is expected to improve oxygenation status. But this PLB technique can only be used in children who are aware and able to be invited to cooperate. The age group that is able to be invited to collaborating starts from preschoolers, because at this age children are able to master the language and understands simple commands besides their motor skills that have developed from toddlers (4).

The PLB technique is analogous to playing activities such as blowing balloons/blowing tongues, foam bubbles, cotton balls, paper wheels, bottles and others (4). The mechanism used to apply PLB intervention, namely increasing alveolar pressure in each lung lobe so that it can increase airflow during expiration. Increased air flow during expiration will activate cilia in the airway mucosa so that it can evacuate secretions out of the airway. This action is one of the efforts that is thought to be able to improve oxygenation status.

The research was conducted by Sutini (2011), entitled "the effect of playing activities blowing tongue blows on the status of oxygenation in preschool children with pneumonia at the Jakarta Islamic hospital", revealed that the activity of blowing tongue blowing had a significant influence on improving oxygenation status in children [decrease the frequency of (8.1%) Respiratory Rate/RR, increase Heart Rate/HR by (6.25%), and increase SaO2 (5.43%) (8).

The findings of the preliminary study were obtained from interviews with nurses on duty at the Kebun Handil Community Health Center in Jambi City, management for children with Pneumonia, namely providing oxygen when the child is congested and antibiotic therapy according to the management of pneumonia according to IMCI such as amoxicillin. Independent nursing actions are carried out such as positioning and observing the frequency of breathing of children, while actions such as chest physiotherapy and suction are almost uncommon because they require special skills. Nurses have never heard of the effectiveness of therapy with tongue blows can be useful to improve oxygenation status in patients with respiratory disorders, one of them is Pneumonia.

THE OBJECTIVE

The study aimed to examine the effect of pursed lips breathing therapy through tongue blowing activity on the oxygenation status of preschoolers with Pneumonia.

METHOD

This research applied a quasi-experimental design, pretest-posttest with control group design. In this model, before conducting the treatment of the two groups, the pretest was conducted by measuring the initial oxygenation status and then given the PLB intervention then oxygenation (post-test) status was measured, whereas in the control group chest physiotherapy was performed. This study was conducted from February-April 2018 at Kebon Handil primary health care Jambi city.

The respondents involved in this study were 36 people altogether that consisting of 18 PLB groups and 18 in the chest physiotherapy groups. The inclusion criteria in this study are 1) Pre-school children 3-5 years old with Pneumonia, 2) Level of awareness compos mentis and stable condition, 3) Able to be invited to cooperate and cooperative, 4) Mother or family of children willing to become respondents. The data data collected by fill in the observation sheet that contains the patient's identity and oxygenation status (breathing frequency, pulse frequency, and oxygen saturation) before and after being given the PLB

RESULT

After collecting the data, they were processed by univariate and bivariate analysis. The univariate analysis describes the characteristics of the research respondents. The explanation of the results can be seen as the following:

Table1.1 The distribution of respondents by sex (n= 36)

Group	Male	%	Female	%
Control	10	55,6	8	44,4
Intervention	11	61,1	7	38,9

Table 1.2 Characteristics of respondents according to age, weight, blowing strength, and the length of illness (n= 36)

Variable	Group	Mean	Deviation Standar	95% CI	P*value*
Age	Control	4,36	0,74	3,99-4,73	0,474
	Intervention	4,04	0,81	3,64-4,44	
Weight	Control	16,1	1,9	15,1-17	0,012
	Intervention	14,6	2,3	13,4-15,7	
Blowing strength	Control	14,2	0,73	13,9-14,6	0,489
	Intervention	13,3	1,53	12,5-14	
Length of Illness	Control	2,9	1,23	2,28-3,5	0,075
	Intervention	4,4	0,74	3,99-4,73	

From the table above, it can be drawn conclusions that the majority of respondents were male, both in the intervention group and in the control group. Other characteristics of respondents can be explained through the table above. Normality and homogeneity tests were carried out in both groups. It can be concluded that there is equality between the control group and the intervention group in terms of children's characteristics (respondents).

Table1.3 The differences of oxygenation status: heart rate before and after administration of PLB in the control group and intervention group (n= 36)

Group	Mean	SD	SE	P value	n
Control					
Before	114,17	15,66	3,692	0,214	18
After	113,44	15,33	3,614		
Intervention					
Before	114,28	21,06	4,964	0,036	18
After	109,33	15,3	3,606		

* Significance at α = 0.05

Through table 1.3 above it can be summed up that the administration of PLB can decrease the administration of heart rate above5x/minute in children who have Pneumonia.

Table1.4 The differences of oxygenation status: RR before and after administration of PLB in the control group and intervention group (n= 36)

Group	Mean	SD	SE	P value	n
Control					
Before	24,2	2,706	0,638	0,055	18
After	23,8	2,813	0,663		
Intervention					
Before	28,0	6,088	1,435	0,045	18
After	26,11	5,487	1,293		

* Significance at α = 0.05

From the table above it can be concluded that the administration of PLB can reduce respiratory frequency by 1.89 or 2x / minute, while in the chest physiotherapy group only decrease breath frequency by 0.04x / minute.

Table 1.5 The Differences of oxygenation status: oxygen saturation before and after administration of PLB in the control group and intervention group (n = 36)

Group	Mean	SD	SE	p	n
Control					
Before	98,33	0,840	0,198	0,163	18
After	98,44	0,856	0,202		
Intervention					
Before	97,39	1,852	0,436	0,037	18
After	97,94	1,862	0,663		

* Significance at α = 0.05

The table 1.5 showed that the administration of PLB can increase oxygen saturation by 0.55% compared to the provision of chest physiotherapy of 0.11%. It can be concluded that the administration of PLB is effective in increasing oxygen saturation in children who have Pneumonia.

DISCUSSION

Most of the sexes of the male respondents were in the two groups. The method of sampling in this study is Purposive Sampling so that the possibility of the highest number of groups in one sex might occur. During data collection, more boys suffer from pneumonia when compared to girls. The findings in the field are in accordance with the theory put forward by Hockenberry and Wilson (2009) which states that boys at United State are more at risk of experiencing morbidity and mortality compared to girls. [4]

The mean age of children in the control group was 4.36 years and 4.04 years in the intervention group. In Canada, the cause of children experiencing hospitalization and even impacting death is due to illness, including influenza and pneumonia. This disease is associated with immunization coverage rates. Sebastian et al. (2008) states that the age group of children who are more at risk of developing pneumonia and influenza occurs in the age group that is smaller and larger than the school age. This means that children in preschool age (3-5 years) tend to be more at risk of suffering from pneumonia (9).

Based on guidelines for the implementation of stimulation, detection and early child development interventions in preschool age growth is stable. Development occurs with increased physical activity and increased thinking skills and processes. Entering the preschool period, children begin to show their desires, along with their growth and development. At this time besides the environment inside the house, the environment outside the home was introduced. Children start to enjoy playing outside the house. This is risky for children to be exposed to and infected with infectious diseases such as influenza and pneumonia from game friends and the environment in which children play outside the home (2).

The mean weight of children in the control group was 16.1 kg while 14.6 kg in the intervention group. If it was seen from the data through the research results, it indicates there is a possibility that pneumonia pain that affects the child's weight. If the weight continues to decline because the condition of the child's illness will be able to influence the child's growth and development.

Body weight is one determinant of nutritional status in children. For monitoring growth by using body weight according to age, it is carried out routinely at the POSYANDU every month. If a child is found with a weight that has not risen twice in a row or a child weighing below the red line, the cadre will refer to the health worker for confirmation using the weight indicator according to body length / height.

The mean blowing power of children in the control group was 14.2 cm and 13.3 cm in the intervention group. The power of blowing on a child will be related to the child's ability to breathe deeply. Physiological factors that cause respiratory problems include hyperventilation, hypoventilation and hypoxia. Children who are unable to breathe deeply indicate a disturbance in the respiratory system. Other physiological processes that affect the oxygenation process are changes that affect the capacity of the blood to carry oxygen, such as anemia, increased metabolic needs (such as fever, infection) and changes that affect the movement of the chest wall or central nervous system (10).

The mean length of illness in the control group was 2.9 days and 4.4 days in the intervention group. Respiratory disorders are the most common cause of sick children and being treated in hospitals. This disease can be mild and not acute to life-threatening conditions. Chronic diseases can affect quality of life, but acute or recurrent infections that often occur, can also interfere with the welfare of some children (11).

Parents can usually have difficulty determining the severity of their child's condition and seeking medical assistance very early in the course of the disease. In this study, it was found that the average parents sought help from health workers not on the first day of sick children but after 3-4 days after illness (2.9 days in the control group and 4.4 days in the intervention group).

Furthermore, the results of bivariate analysis will be discussed, namely oxygenation status before and after the PLB is given. The activity of children playing with the tongue blowing besides being fun for children who are sick is also beneficial for children to practice deep breathing. Because every time a child is about to blow, the child will try to breathe to the limit of his ability (as optimal as possible) and try to return to blow the air as hard as possible.

When viewed from the length of the child blowing the tongue blast that is the average power of 13.3 cm, it can be seen that the child has mild breathing problems, because the maximum length and tongue blowing toys given during the research process are 15 cm so the average child has not been able to blow maximally. Minimum it is 12.5 cm and the maximum blow is 14 cm. Common respiratory problems in children can be acute, life-threatening and chronic.

Meanwhile the average age of 3-5 years of respondents is usually in a cooperative condition and is very fond of playing conditions using tools and is very fond of playing instruments that are blown and make loud noises. Supported by the sex of the respondents, most of whom are men who are usually more active and aggressive when asked to blow.

Infants and young children breathe in smaller air, and exhale relatively large oxygen. Infants and young children have fewer alveoli; therefore, the slight alveolar surface is where gas exchange occurs. These factors, together with a higher metabolic rate, affect the increase in respiratory frequency in infants and children. Seeing the above information should be on the respondent's children in good breathing conditions so they can blow the

tongue blast to the highest limit of 15 cm. The range of RR respondents before intervention was 20-41 with an average of 28 times / minute. A range of ranges after intervention is 18-39 with an average of 26.1 times / minute. The difference that indicates a change is the benchmark that therapeutic activity by blowing tongue blowing has a significant effect (p value = 0.47). Increased activity carried out by children results in an increase in respiratory frequency and depth.

The lungs have two main functions, namely providing oxygen to the body and removing CO2 and to maintain the body's acid base balance According to Garrod and Matheison (2012), PLB is part of breathing exercises that are needed for patients who experience disorders of the respiratory system, because PLB has a good effect on the respiratory system, including; healthy ventilation, freeing air trapped in the lungs, keeping the airway open longer and reducing breathing work, extending the time of exhalation which then slows the frequency of breathing, increasing breathing patterns by releasing old air and entering new air into the lungs, eliminating shortness breath and increase relaxation (12).

PLB which is done by blowing tongue technique can help to expand the alveoli in all lobes to increase, and the pressure in it also increases. High pressure in the alveolus and lobe can activate cilia in the airway to evacuate secretions out of the airway, which means it will reduce airway resistance and increase ventilation which ultimately has an impact on the oxygen perfusion process to the tissue.

In this study it can be concluded that the importance of deep breathing in children with respiratory problems such as Pneumonia patients and in this case the deep breathing exercises taught and conducted on respondents is to provide tongue blowing therapy in the form of games so that children will feel still playing without realizing that he is undergoing a respiratory therapy process.

It is very important for health workers to be able to continue carrying out therapy in accordance with the child's condition without getting significant rejection from the child. This can also be explained to parents in order to be able to implement it at home or in areas that are liked by children. The creativity of health workers in choosing models of therapeutic activities can support the success of the health measures given.

The mean oxygen saturation in the intervention group before being given PLB was 97.39 with a standard deviation of 1.852 and a standard error of 0.436. While the average oxygen saturation in the intervention group after being given the PLB was 97.94 with a standard deviation of 1.862 and a standard error of 0.663. The mean value of saturation difference between before and after given PLB in the intervention group was 0.55 and the results of the statistical test obtained p = 0.037, it can be concluded that at alpha 5% there was a significant difference in oxygen saturation between before and after the PLB was given at intervention group.

Physiological factors that cause respiratory problems include hyperventilation, hypoventilation and hypoxia. Other physiological processes that affect the oxygenation process are changes that affect the capacity of the blood to carry oxygen.

According to Hockenberry and Wilson (2009), continuous measurement of capillary oxygen saturation can be done using cutaneous oximetry. The advantages of oximetry measurements are easy to do, not invasive and easily obtained. This is also what the researchers did in this study, namely measuring oxygen saturation with oximetry. Pulse oxygen is very sensitive to hyperopia because hemoglobin is close to 100% saturation for the measurement results of SaO2 which is more than 100 mmHg (13).

In blowing activities carried out as play therapy on child respondents, children play a role. Researchers still pay attention to the general state of the child and give praise if the child can do the game correctly. This is done and the child does not feel afraid and even likes it. Although the value of oxygen saturation before and after PLB is still within the normal range, it seems that the saturation value changes towards a better one after the PLB is performed. This shows that the PLB action has a positive influence on the child's oxygen saturation value.

In the 2015 Integrated Management of Childhood Illness (IMCI) for children suspected of suffering from pneumonia, an examination using Pulse Oximeter should be used to assess oxygen saturation in children, counting breaths in 1 minute; see if there is a pull in the inner wall, and notice the presence of abnormal breath sounds. All examinations must be carried out on the child in calm condition.

Symptoms shown in oxygen values <90% indicate severe pneumonia. In the control group the average saturation value after PLB was 98.44% and 97.94% oxygen saturation values in the intervention group. This value becomes meaningful after comparing oxygen saturation before intervention and after intervention in the intervention group.

A sufficient portion of oxygen in a child's body is very important because oxygen is needed to maintain life. The respiratory and heart systems have an important role in supplying oxygen throughout the body. Actions taken on the PLB and asking the child to blow the tongue can help transport the vehicle containing oxygen throughout the body. This can strengthen the heart muscle with cra blow training so that heart function can be more optimal.

CONCLUSIONAND RECOMMENDATION

Effectively Pursed lips breathing therapy improves oxygenation status in preschoolers who experience Pneumonia including: temperature, respiratory frequency, pulse frequency, and oxygen saturation. The description of the respondent's characteristics, namely the majority of male sexes in both the control and intervention groups. The oxygenation status of respondents after being pursed lips breathing therapy increased by 0.2 in the variable

temperature, 1.89 on the respiratory frequency, 4.95 on the pulse frequency, and 0.55 on oxygen saturation. Oxygenation status in the intervention group had a higher mean compared to the control group.

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