



## The effect chest physiotherapy on changes respiration rate (RR) in asthma patients in patut patuh patju hospital west nusa tenggara

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### ABSTRACT

#### Background

Asthma is a condition in which reversible airway obstruction is characterized by coughing, dyspnea, in individuals with hyperactive airways. Asthma has affected more than 5% of the world's population, and several indicators have shown that prevalence continues to increase. Broadly speaking, the management of bronchial asthma is divided into 2 namely pharmacological and non-pharmacological. One of the non-pharmacological management for asthma patients is the provision of chest physiotherapy performed by postural drainage, clapping, and vibration. This action is carried out with the aim of increasing the efficiency of the breathing pattern and cleaning the airway.

#### Method

The type of research used was research True Experimental with design Randomized Pre Post Test Group Control Design. This study compiled two groups, namely the intervention group and control group. Technique Probability sampling with method allocation random sampling is used to get 30 respondents divided into 2 groups.

#### Results

Independentt test result shows p value 0.001 which means that there is a significant effect of chest physiotherapy on respiration rate (RR) between the intervention groups and control.

#### Conclusion

The results of the study after being given an intervention increased the respiration rate (RR) of patients who received chest physiotherapy, so that the therapy was effectively implemented for patients who have asthma, especially those who have asthma.

**Keywords:** Chest Physiotherapy, Respiration Rate (RR), Asthma.

### INTRODUCTION

Healthy conditions are an underlying thing in human life. One health problem that is a problem now is non-communicable diseases, namely the incidence of asthma in Indonesia. Asthma is a

condition in which reversible airway obstruction is characterized by coughing, dyspnea, in individuals with hyperactive airways. Hypersensitivity reactions to the bronchi can cause swelling of the bronchial mucosa. [1] Asthma symptoms appear

episodically and repeatedly, such as wheezing, shortness of breath, chest tightness and coughing, especially the night before dawn. [2]

Asthma has affected more than 5% of the world's population, and several indicators have shown that prevalence continues to increase. The prevalence of asthma in children is 8-10% and in adults 3-5%. [3] The prevalence increase is thought to be due to undiagnosed asthma, poor air quality and changes in people's lifestyle. [4] Epidemiological problems of asthma mortality and morbidity still tend to be high, according to the World Health Organization (WHO) in collaboration with asthma organizations in the world, namely Global Astma Network (GAN) predicts that the number of asthma patients in the world will reach 334 million, estimated that this number will continue to increase by 400 million people in 2025 and there are 250 thousand deaths from asthma in adults and children. [5]

Asthma in Indonesia is included in the top ten diseases that cause pain and death. From the total population of Indonesia which amounted to 265 million in 2018, the highest incidence of asthma from the results of the Riskesdas survey in 2018 reaching 4.8% with the highest number of sufferers was women, 2.5% and men as much as 2.3%. [6] Where as asthma sufferers in West Nusa Tenggara in 2017 amounted to 18,173 cases and the highest number of asthma sufferers was in East Lombok Regency with the number of cases was 8,499. According to data from the medical record of Patut Patuh Patju Hospital, in 2016 there were 174 people. In 2017 there were an increase in the number of cases of asthma recorded as many as 187 people who experienced recurring recurrence. [7]

Asthma is caused by intrinsic and extrinsic factors, extrinsically asthma can be caused by infection (influenza virus, pneumonia mycoplasmal), physical (cold weather, temperature changes), irritants such as chemicals, air pollution (CO, cigarette smoke, perfume), factors emotional (fear, anxiety and tension) is also excessive activity. Intrinsically / immunologically asthma can be caused by antigen-antibody reactions and inhalation allergens (dust, powder, animal hair). [8]

Broadly speaking, the management of bronchial asthma is divided into 2 namely pharmacological and non-pharmacological. Pharmacologically the treatment of asthma uses reliever, a drug that serves to eliminate obstruction and the controller as

an anti-inflammatory. Belonged to reliever is beta-2 agonist (such as salbutamol, terbutaline, fenoterol, prokaterol, isoprenaline), anti-cholinergic as broncodilator eg in the form of inhaled ipratropium bromide, theophylline and systemic corticosteroids. Drugs included in the controller include: corticosteroids, sodium chromoglycate, sodium nedocromil, and anti-slow antihistamines. [9]

Non-pharmacological management in patients with asthma can basically be distinguished psychologically and physically. Psychologically, among others: the importance of educating asthmatics about their disease and how to react to it, recognizing allergic factors (mites, house dust, allergens from animals, fungi, pollen substances, air pollution), providing support to control emotions during attacks so that breathing gradually Regular and shortness of breath is reduced. Physically, it is to seek activity normal and provide education about healthy lifestyles, regular treatment of control, how to deal with asthma attacks at home so as to increase understanding of asthma in general and the pattern of asthma alone and improve compliance (compliance) and independent handling. [10]

In addition, there is also nursing management for asthmatic patients, namely the provision of chest physiotherapy performed by postural drainage, clapping, and vibration. This action is carried out with the aim of increasing the efficiency of the breathing pattern and cleaning the airway. [11]

Chest physiotherapy is a group of therapies used in combination to mobilize pulmonary secretion. This therapy consists of postural drainage, chest percussion, and vibration. Chest physiotherapy must be followed by a productive cough and suctioning on the mucus of clients who have asthma. [12] The impact of these therapies is that bronchial spasms disappear so that the bronchial muscles become relaxed and there is no increase in breathing and the client easily secretes a productive cough. [2]

In the previous study the data obtained analyzed using univariate and bivariate showed that there were significant differences in the mean frequency of airway clearance before and after physiotherapy obtained by P-value 0000, whereas for different tests of airway clearance before and after physiotherapy obtained a P-value of 0.225. [13]

From the data from the research that was linked by Eva Fitrianda with the effect of chest physiotherapy on the decrease in the frequency of cough in children with acute bronchitis in the large hall of Surakarta lung health with the type of research used was Quasy Experimental with research design Pre-Post Test With Control Group Design showing. From the results of statistical tests with the Paired t test get a significant value  $p < 0.05$  ( $p = 0.012$ ) and the data from the effect of the difference test between the control group and the treatment group using the Independent t test obtained significant results with a value  $p < 0.05$  ( $p = 0,0001$ ). There is the effect of chest physiotherapy on the decrease in the frequency of coughing in toddlers with acute bronchitis, and there is a difference in influence between the control group and chest physiotherapy to decrease the frequency of cough in children with acute bronchitis. [14]

Chest physiotherapy has been focused on treating pulmonary functional disorders especially in pulmonary patients with mechanical ventilation support. Treatment with the provision of chest physiotherapy begins with assessment and scheduling with the aim of achieving maximum results. Chest physiotherapy is shown to prevent and reduce pulmonary complications such as hypoventilation, hypoxemia, in order to quickly restore lung muscle function and pulmonary function. From the results of a study conducted by Antoni et al with the title effectiveness of chest physiotherapy to reduce hospitalization and improve the function of mechanical ventilation, minimize lung infection rates and mortality in ICU patients where researchers used a cohort study design with a control group that was only given pharmacological treatment and treatment groups with the provision of chest physiotherapy and the provision of physical training such as leg exercises, the effect size was 1.7, which was very effective. [15]

From the observations of researchers when conducting a preliminary study in the inpatient lung there were 5 bronchial asthma patients treated all

patients experienced shortness of breath and wheezing and clients tended to be given pharmacological therapy and oxygen therapy alone. While to maintain the airway and improve lung development including by doing chest physiotherapy techniques are rarely given regularly and intensively.

Based on the above, researchers were encouraged to know the effect of chest physiotherapy on Respiration Rate (RR) in Asthma patients in Patju Patuh Patuh Hospital.

## METHODS

This type research used True Experimental with design Randomized Pre Post Test Group Control Design. The researcher arranged two groups, namely the intervention group that was given chest physiotherapy with a nebulizer and the control group was only given nebulizer action. Respondent's rate respiration measurement uses a watch with a second hand / stopwatch that is carried out for one minute (60 seconds) before and after the therapeutic action.

The population in this study were Asthma sufferers who underwent outpatient care and hospitalization at the Patut Patuh Patju General Hospital West Nusa Tenggara in 2018. Determination of the minimum number of samples using a technique sampling probability with method allocation random sampling and based on inclusion and exclusion criteria as many as 30 respondents were divided into 2 groups with each of the 15 respondents in the intervention group and 15 respondents in the control group.

In this study researchers conducted data collection by observing, identifying, interviewing and filling out the questionnaire. The collected data was analyzed through the IBM SPSS program version 24.0, and continued with a different test namely parametric test (Paired t test and Independent t test). The processed data is used as the basis for discussing problem statements, which are then presented in table form so conclusions can be drawn.

## RESULTS

**Table 1 Distribution respondents by group, sex, occupation, education and precipitant in patut patuh patju hospital (n=30)**

Variable	Frequency (n=30)	%
<b>Group</b>		
• Treatment	15	50
• Control	15	50
<b>Gender</b>		
• Male	12	40
• Female	18	60
<b>Education</b>		
• Junior	5	16.7
• High School	14	46.7
• Graduate	11	36.7
<b>Work</b>		
• Civil servants	8	26.7
• Housewife	6	20
• Private	16	53.3

Table 1 shows that of the total respondents (N) totaling 30 respondents with the frequency in the treatment group were 15 (50%) and in the control group as many as 15 (50%). The frequency of respondents based on sex showed that men were 12 (40%) and women were 18 (60%). The frequency

of respondents based on education shows that SMP is 5 (16.7%), SMA 14 (46.7%), and undergraduate 11 (36.7%). The frequency of respondents based on work shows that civil servants number 8 (26.7%), housewife 6 (20%), and private sector 16 (53.3%).

**Table 2 Distribution frequency of age, respiration rate before intervention (RRT1) and respiration rate after intervention (RRT2) in Patut Patuh Patju Hospital (n=30)**

Variable	Mean	Median	SD	Min - Max	N
Age	42.57	45	6.966	30 - 50	30
RRT1	26.27	26	1.230	24 - 29	30
RRT2	21.93	22	1.982	18 - 26	30

Based on table 2 shows that the distribution of respondents based on age obtained a mean value of 42.57, median 45 with SD (standard deviation) 6.966, min (lowest value) 30 and max (highest value) 50. Distribution of respondents based on measurements of respiration rate before intervention (RRT1) obtained a mean value of

26.27, median 26 with SD (standard deviation) 1,230, min (lowest value) 24 and max (highest value) 29. Respondent distribution based on measurement results after rate respiration intervention (RRT2) obtained a mean of 21.93, median 22 with SD (standard deviation) 1,982, min (lowest value) 18 and max (highest value) 26.

**Table 3 Differences rate respiration before and after treatment in the intervention group and control**

Variable	Mean	SD	T Value	Mean Diff.	95% CI	Eta squared	
			<b>p</b>		<b>Lower - Upper</b>		
Pre (RRT1)	26.40	1.404	5.976	0.000*	3.333	2.137 – 4.530	0.56
Post (RRT2)	23.07	1.624					

\*Paired t test

From the table above, the calculation results of data analysis using Paired t test on variable respiration rate before intervention (RRT1) the mean value was 26.40, SD 1.404 while the

respiration rate after intervention (RRT2) had a mean value of 23.07, SD 1.624 with the overall value of p 0.000.

**Table 4 Analysis of differences in respiration rate differences between the intervention and control groups after being given chest physiotherapy therapy**

Group	Mean	SD	T	P value	Mean Diff.	95% CI		Eta squared
						Lower	Upper	
Intervention	20.80	1.656	-3.784	0.001*	-2.267	-3.494	-1.040	0.33
Control	23.07	1.624						

\*Independent t test

Table 4 above, we can see the results of data analysis calculations using Independent t-tests on variables respiration rate in the intervention group the mean value was 20.80, SD 1.656 while the rate respiration after the control group showed a mean value of 23.07, SD 1.624 with the overall p value 0.001.

## DISCUSSION

### Differences in rate respiration before and after treatment in the intervention group and control

Based on changes in respiration rate in asthma patients with prior chest physiotherapy and after administration of chest physiotherapy in the treatment group in the pulmonary inpatient room and IGD patuh patuh patju hospital based on the results of table 3 the mean value of respiration rate (RR) before chest physiotherapy was 26.13 down to 20.80 after chest physiotherapy was administered consisting of postural drainage for 15-20 minutes and followed by clapping (chest percussion) for 3-5 minutes and vibrations for 1-2 minutes have a rate of respiration rate of 20.80 or a decrease in 5.33.

This shows that there is an effect of chest physiotherapy on decreasing respiratory frequency (RR) in Asthma patients and the results of the study show that chest physiotherapy has an effect on reducing respiratory frequency in Asthma patients (p value = 0.0000 smaller than  $\alpha = 0.05$ ) hypothesis be accepted.

Research and observations that show changes in respiration rate in asthma patients are in line with Eva Fitriand's research. [14] From the data from the research findings related to Eva Fitriand with the effect of chest physiotherapy on the decrease in the frequency of coughing in children

with bronchitis acut was in a large hall in Surakarta lung health with the type of research used was quasy experimental with research randomized pre post test group control design. From the results of the statistical test with the paired t-test test, it obtained a significant value  $p < 0.05$  ( $p = 0.012$ ) and the results of the difference test between the control group and the treatment group using Independent t-test showed significant results with a value of  $p < 0.05$  ( $p = 0.0001$ ). There is the effect of chest physiotherapy on the decrease in the frequency of coughing in toddlers with acute bronchitis, and there is a difference in influence between the control group and chest physiotherapy to decrease the frequency of cough in children with acute bronchitis. [14]

In addition, changes in the value of respiration rates that occur in asthma patients given chest physiotherapy and nebulizer can improve respiratory muscles and improve breathing patterns. Patients with asthma will experience weakness in the breathing muscles. This is caused by the frequent occurrence of dyspnoe and the limitation of activities other than that the provision of proper chest physiotherapy will minimize complaints and have maximum activity. [13]

Giving chest physiotherapy can be beneficial for the body of people with asthma. Chest physiotherapy is one technique with the functioning of abdominal breathing that can improve cardiovascular ability and increase oxygen uptake by the lungs to oxygen used by the body will be quickly replaced. Chest physiotherapy is one way to practice effective breathing techniques in asthma patients, it is also one of the supports for the treatment of asthma because the success of asthma treatment is not only determined by asthma medication consumed, but also by nutrition and

exercise factors. This is in line with the theory developed by Dorothy E. Johnson, namely Behavioral System Model where this model is intended so that nursing develops functions of human behavior more effectively and efficiently. Johnson in this case also explained that human behavior is a system that will be influenced by its subsystems, namely environment, and health problems. Other subsystems that will also influence human behavior are the objectives of interventions carried out by nurses in order to regain stability. [16]

### **Analysis differences in respiration rate between intervention group and control after being given chest physiotherapy in asthma patients**

One way between groups of multivariate analysis of variance (manova) was used to analyze differences in respiration rate (RR) in the intervention groups and control. Initial analysis to check the requirements of the test manova: test normality, linearity, outlier, homogeneity and multicollinearity, the results of the analysis show the results of meeting the requirements.

From the table above respiration rate (RR) with a value of  $F(1,28) = 14.322$ ;  $p = 0.001$ , partial eta squared = 0.338 the mean value for respiration rate (RR) treatment group ( $M = 20.80$ ;  $SD = 1.656$ ) is lower than the mean value for respiration rate (RR) of the control group ( $M = 23.07$ ;  $SD = 1.624$ ).

The results of this study are in line with Hidayat's opinion that chest physiotherapy is a nursing action performed on patients with respiratory system disorders such as chronic obstructive pulmonary disease (asthma, chronic bronchitis and emphysema).<sup>11</sup> According to Hidayat This action is carried out with the aim of increasing the efficiency of the breathing pattern and cleaning the airway. Chest physiotherapy is shown to prevent and reduce pulmonary complications such as hypoventilation, hypoxemia, in order to help restore lung and lung muscle function quickly. [11]

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Chest physiotherapy consists of techniques postural drainage, clapping (chest percussion) and chest vibrations. This method can help patients breathe more freely and get more oxygen into the body. Postural drainage helps drain secretions from the lungs to the central airway. Postural drainage can be used to eliminate or prevent bronchial obstruction caused by accumulated secretions. [23] Clapping aims to release thick mucus secretions from the lungs, bronchias and bronchi and drain secret to larger channels.

Vibration is a technique of providing manual compression and vibration on the chest wall during the respiratory exhalation phase. This maneuver helps increase the velocity of air that is aspirated from a small airway so that it can free mucus and reduce uncoordinated breathing muscle activity, reduce respiratory frequency and increase cough effectiveness. [11]

In patients with asthma in addition to drug administration it is recommended to provide chest physiotherapy where therapy in the lungs will help remove mucus so that patients can breathe freely.

## **CONCLUSION**

Based on the results of the study concluded that chest physiotherapy is effective against increasing respiration rate (RR) in asthma patients as evidenced by:

1. From the results of studies that have been carried out there is an effect of the provision of chest physiotherapy on respiration rate in asthma patients where the value is significant  $p < 0,000$ .
2. The results of the test one way manova on the table show a significant difference between the treatment group and the control group in the dependent variable combination, when the dependent variable is examined separately the same rate respiration shows a significant difference which can be interpreted as having an effect on chest physiotherapy on respiration rate at the treatment group was compared with the control group with a  $p$  value of 0.001 where  $p < 0.05$ .



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