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Level I Progressive Mobilization effected on Improvement Pulmonary Oxygenation Ventilation Function in Non Hemorrhagic Stroke Patients

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Abstract

Immobilization in non-hemorrhagic stroke patients can lower lung expansion due to an accumulation of secretions resulting in impaired oxygenation ventilation function of the lungs, thus facilitating the growth of bacteria that cause pneumonia. Switching the patient's position every 2 hours allows the lung area to re-expand and to increase the transport of oxygen which will improve oxygenation ventilation function of the lungs. Various research results concluded that a measure to prevent changes in the oxygenation ventilation function of the lungs is to maintain the airway effective. This can be done by putting the patient in a sloping or semi-prone position, heightening the head of the bed to a 30-degree angle. Level I progressive mobilization is a preferred intervention that is safe to do to maintain the lung's oxygenation ventilation function. Objective: To evaluate the effect of progressive mobilization of level I on the pulmonary oxygenation ventilation function in non-hemorrhagic stroke patients. Methods: Design of experimental research. Sampling was done using random allocation with the number of samples that were 52 people, using the Wilcoxon and Man Whitney test analysis. The results showed that the measurement of the pulmonary oxygenation ventilation function using the peak flow meter seen in the intervention group had a significant increase in air volume, from before the intervention of 220 ± 78,9 to 263,65 ± 61.6 after 5 days of intervention, with p-value <0.001. While in the control group there was a significant decrease of air volume from 255 ± 58,94 to 225 ± 53,16 with p-value <0.001. The oxygenation ventilation function average increase in the intervention group was 43.65, higher than the increase in the control group, which decreased by -30. The Mann Whitney test result obtained p-value <0.001. In conclusion. there was a significant difference in the pulmonary oxygenation ventilation functions in the intervention and control groups after the level I progressive mobilization in non-hemorrhagic stroke patients at Dr.Adhyatma Semarang Hospital, which means that there was an impact of the level I mobilization on the lung oxygenation ventilation function on non-hemorrhagic stroke patients in Dr. Adhyatma Semarang Hospital.

Keywords: *level I progressive mobilization, pulmonary oxygenation ventilation function, non hemorrhagic stroke*

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INTRODUCTION

Lifestyle changes that sweep across the world also occur in Indonesia, such as changes in diet rich in fat and cholesterol. This is one of the causes of the increasing number of stroke patients. Basic Health Research Results showed an increase in stroke prevalence in Indonesia from 8.3 per 1000 in 2007 to 12.1 per 1000 (1). Stroke may cause the patient to be immobilized and restocked (2–4). Immobilization can decrease lung expansion because of excessive pressure on the surface of the lungs. Decreased pulmonary expansion occurs due to decreased ventilation function of pulmonary oxygenation, which is characterized by decreased incoming air volume (5–8). Management in improving lung oxygenation ventilation function in bed rest patients is divided into 2 categories: pharmacological and non pharmacological. Non pharmacological management is given more to the prevention of adequate nutrition, deep breathing exercises, maintaining the effectiveness of airway clearance with one of the program over lying (5–11).

Various research results concluded that efforts in improving the function of ventilation of lung oxygenation can be done by improving the effectiveness of airway clearance and improve the capacity of lung development by giving the position in the baring outline every 2 hours that support the development (9,10). This can be done by giving it a sloped or semi-faced position, the height of the head of the bed at a 30-degree angle that is done regularly. Progressive mobilization of level I is the preferred and safe intervention in maintaining lung oxygenation ventilation function because there are some positive effects from lying over (9). But the implementation is still low and the benefits are still considered less impact. But the implementation is still low and the benefits are still considered less impact. This study aims to determine whether there is influence of progressive mobilization level I to lung oxygenation ventilation function.

MATERIALS AND METHODS

The research type is experiment with pretest-posttest approach with control group design. The study was conducted in Dr.Adhyatma Semarang Hospital with inclusion criteria of patient with age> 18 years, patient awareness of Compos mentis, result of Ct Scan Stroke non haemoragic +, patient agreed to be respondent by signing informed consent. While the exclusion criteria of patients with signs of increased ICT. This is because patients with increased ICT will be at greater risk of hemodynamic instability when interventions, patients with Spinal Cord Injury (SCI), patients with Fail Chest, patients and families who resist the continuation of progressive mobilization intervention level 1. Sample size involves patients with Non Stroke Haemorrhagic counted 26 patients in the control group and 26 patients in the intervention group.

Interventions performed with progressive mobilization of level I for 5 days starting on the 1st day of inpatient and progressive mobilization level I done in accordance with standard operational procedures started by elevating the patient position> 300 then given passive ROM for two times a day, then continued with continuous lateraly rotation therapy exercise is done every 2 hours. Patient still get treatment and medical action according to hospital procedure. The control group is a group of patients who are not given progressive mobilization intervention level I but still get treatment and medical action according to hospital procedure. The instrument used to measure lung oxygenation ventilation function is by peak flow meter. Peak flow meter itself is a tool to measure the amount of air flow in the airway (12,13). The data analysis of this research consisted of univariate and bivariate analysis. Univariate analysis is numerical data

Table 1. Distribution of Respondents Based on Characteristics and Homogeneity Test in Intervention and Control Group in Dr Adhyatma Hospital Semarang June - August 2017 (n = 52)

Variable	Group of Respondents						*p*
	Intervention	Control	Intervention		Control		
	Mean±SD	Mean±SD	f	%	f	%	
Age	59±8.99	62.61±8.93					0.581
The Early Elderly 46-55 years			13	50.0	5	19.2	
The Late Elderly 56-65 years			4	15.4	12	46.2	
Seniors> 65 years			9	34.6	9	34.6	
Gender	1.46±0.5	1.4±0.5					1.000
Male			14	53.8	14	53.8	
Female			12	46.2	12	46.2	
BMI	25.66±1.89	27.76±1.64					0.654
Obesity Risk			16	61.5	0	0	
Obesity I			9	34.6	24	92.3	
Obesity II			1	3.8	2	7.7	

with a view of central tendency data (mean and median). While bivariate analysis, using Wilcoxon and Man Whitney because the data is not normally distributed.

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RESULTS AND DISCUSSION

Characteristics of respondents in this study and including disturbing variables. Data are grouped by age, gender, BMI. Characteristics of respondents can be seen in **Table 1**.

Based on Table 1 All characteristics of respondents have a p value of more than 0.05 so that the characteristics of respondents between the intervention group and the control group is homogeneous.

The results showed that age between the intervention group and the control group did not differ (p = 0,581), in the age intervention group was mostly in the early elderly category of 13 (50%) whereas in the age control group most were in the final elderly category 12 (46.2%). A person's age can affect lung function, that respiratory function and blood circulation will increase in childhood and reach maximum at age 20-30 years, then decrease again according to age (14). This is consistent with the theory that the age of a person affects lung function, with increasing age will occur biological processes that affect the decline in organ function including the lungs (15,16). A study revealed that the increasing age of the vital capacity of the lungs, lung ventilation, vital capacity of oxygen uptake and all other lung physiological parameters a person will decrease will decrease as age increases after reaching at the age of young adulthood (14). Other studies say that in old age there will be a decrease in the vital capacity of the lung, this is due to the calcification of the cartilage of ribs and the weakening of the intercostal muscles thus reducing the movement of the chest wall, the presence of vertebral osteoporosis, thus decreasing spinal flexibility, and further increasing the anterior posterior diameter of the cavity chest, and a flatter diaphragm and lose its elasticity (14).

The sexes between the intervention group and the control group did not differ (p = 1,000), the most being males (14) (53.8%) in both the intervention and control groups. Physiologically the lung complience capability of men is higher than that of women. There is a difference in respiratory muscle strength in men and women based on the anatomical structure of the human body, in men there is stronger shoulder muscles than women, and diaphragm muscles in men are broader and stronger than women. In addition, there are also different respiratory types between men and women, whereas in men the respiratory type is abdominal thoracal, with the dominant breathing is abdominal respiration, whereas in women the respiratory type is thoraco abdominal, with the dominant breathing is thoracal respiration. Therefore gender may affect the vital capacity of the lung (17).

BMI between the intervention group and the control group did not differ (p = 0.654), the respondents in the intervention group were the most in the category of obesity risk 16 (61.5%), while the control group was the most in the obese category I 24 (92.3%). Homogeneity test results in each variable obtained p-value> 0.05, which indicates that between the control group respondents and the intervention is homogeneous or equivalent. BMI is one of the factors that can be a confounder, because conceptually obesity can lead to decreased lung compliency, thoracic wall, and respiratory system as a whole. In addition, the respiratory muscles in obese patients should work harder to produce higher negative pressure in the pleural space to allow incoming airflow during inspiration. Resistivity of the respiratory system as a whole has increased in obese patients. This is most likely related to increased resistance to the small airways so that lung volume decreases. Respiratory system resistance will increase when the patient is in a position lying on his back because of the mass load by the fat in the supra-laring area of the respiratory tract, and an increase in pulmonary blood flow, which in turn leads to narrowing of the airways (3,18,19).

Table 2 shows the measurements of lung oxygenation ventilation function using peak flow meter seen in the intervention group there was a significant increase of air volume from before intervention of 220 ± 78,9 and after 5 day intervention 263,65 ± 61,6 with p-value <0,001. While in the control group there was a significant decrease of air volume from 255 ± 58,94 to 225 ± 53,16 with p-value <0.001.

Table 2. Differences in Function of Lung Oxy Ventilation before and after intervention in Intervention and Control Group I in Dr Adhyatma Hospital Semarang June-August 2017 (n = 52)

	***Mean*±SD (Min-Max)**		***p-value***
	pre	**post**	
Intervention	220±78.9 (100–350)	263.65±61.6 (150–420)	0.000
Control	255±58.94 (150–350)	225±53.16 (140–320)	0.000

Table 3 shows that the average increase in oxygenation ventilation function in the intervention group was 43.65 higher than the increase in the control group decreasing by -30. The Mann Whitney test result obtained p value <0.001 which means that there is a difference in mean increase which was significant between the intervention groups versus the control group**.**

The results of this study are in line with some research results on the effect of mobilization on respiratory function, among others: The results obtained after the intervention given there is a change in the parameters of blood pressure and respiratory rate compared to the initial measurement (20).

The results of a study found that progressive mobilization level I can maintain the value of oxygen saturation in critical patients who installed ventilator (21). The study of 37 mobilization sessions for 31 obese critical patients showed an increase in SpO2 from 98% to 99% after mobilization and 23x / mnt Respiration to 25x / min (11). Other studies have shown that there is a significant difference in tidal volume after being given a semi-fowler position (22). In contrast to one other study which states that giving results

Table 3. Differences in Function of Lung Oxygenation at Intervention and Control Group in Dr Adhyatma Hospital Semarang June - August 2017 (n = 52)

	Peakflow	***p-value***
	Mean±SD (Min-Max)	**delta**
Intervention	43.65±38.09 (-50-150)	0.000
Control	-30±28.56 (-100-20)	

does not cause significant changes in oxygen saturation p> 0.005 while at respiratory rate p = 0.023 (23).

Another study showed a large size effect of progressive mobilization of oxygen and hemodynamic consumption by 0.5, indicating that progressive mobilization is effective in increasing oxygen consumption (10). The results of this study resulted in an effect size of 0.7 and this means that progressive mobilization of level I has a high effectiveness in improving the function of pulmonary oxygenation ventilation.

Non-haemorrhagic stroke patients who are lying down, if not intervened to address ineffective airway hygiene issues, will decrease lung function resulting in ineffective pulmonary oxygen ventilation. Self-care measures that nurses can perform include monitoring breathlessness, chest expansion, breathing frequency, observing regularity and respiratory characteristics and oxygenation to tissues by maintaining lung oxygenation ventilation function. This effort in improving ventilation of lung oxygenation can be done by increasing the effectiveness of airway clearance and increasing the capacity of lung development by providing a position in the baring that supports the development of lung.

This can be done by giving it a sloped or semi-faced position, the height of the head of the bed with a 30 degree angle, oral hygiene is done regularly. Prevention of hypostatic pneumonia or pneumonia due to immobilization can be done by changing position every 2 hours, including semi fowler position, deep breathing exercise, if any indication: postural drainage.

Progressive mobilization was introduced and developed by the American Association of Critical Care Nurses (AACN) and developed there in 2010. Progressive mobilization is a series of plans designed to prepare patients to move or move on in a tiered and sustainable way (20,23). The goal of this progressive mobilization is to reduce the risk of decubitus, decrease the duration of ventilator use, and to reduce the incidence of acute pneumonia, reduce sedation time, decrease delirium, improve the patient's ability to move and improve the functioning of the organs of the body. Implementation of progressive mobilization is held every 2 hours and has a break or rest time to change to another position of less than 5 - 10 minutes (20,23).

Progressive mobilization of level I consisting of Head of Bed (HOB) and Continus Lateral Rotation Therapy (CLRT), which positioned half-seated patients 300 and tilted right and left 30 degrees. Progressive mobilization is expected to generate a good haemodynamic response in patients. Lung performance will improve in the ventilation distribution process as well as perfusion will improve as long as given the mobilization especially in upright sitting position. Body position and gravitational changes will affect the process of blood circulation, so the process of perfusion, diffusion, distribution of blood flow and oxygen can flow to all parts of the body (24).

Progressive mobilization of level I is the preferred and safe intervention to maintain lung oxygenation ventilation function. This intervention is applicable and effective, it is also an easy and inexpensive intervention to do. In the future it is hoped that progressive mobilisai level I will be able to be applied intensively as a form of self-care nursing intervention and become part of standard operational procedures for the care of immobilized patients.

CONCLUSIONS AND SUGGESTIONS

In the intervention and control group there was a significant difference to pulmonary oxygenation function after progressive mobilization of level I intervention in non haemorrhagic stroke patients in RS.Dr.Adhyatma Semarang with an average increase in oxygenation ventilation function in the intervention group of 43.65 higher of the increase in the control group decreased by -30.

In the future it is hoped that progressive mobilisai level I will be able to be applied intensively as a form of self-nursing intervention and become part of the standard operational procedures for the treatment of immobilized patients by following the procedures in this study.

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