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# Giving the body position, nebulization and oxygen to the oxygen saturation of asthma patients

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## ABSTRACT

### Background

Asthma is a non-communicable disease which is a health problem that can be suffered by all ages both children to adults with the degree of disease ranging from mild to severe which causes increased morbidity and even death. Asthma can cause gas exchange disorders that cause hypoxemia, one indicator of the presence of hypoxemia is a decrease in oxygen saturation (SpO2). Efforts to treat asthma to increase oxygen saturation (SpO2) with pharmacological therapy are administering nebulizers using NRM and pouring 3 liters of oxygen per minute by adjusting body position of $60^o$ (fowler).

### Method

This research is a study true experimental with a pretest – posttest with control group design. This research arranged two groups: the intervention group that was given nebulization therapy using NRM masks (1-way valve) and 3 liters of oxygen per minute with 60° body position, while the control group was given nebulization therapy using nebulizer masks (2-way valve) and oxygen administration 3 liters per minute with 30° body position. Technique probability sampling with method stratified random sampling (per diagnosis of mild and medium asthma attacks). Were used to obtain 32 respondents were divided into 2 groups.

### Results

Results of test repeated measure ANOVA showed differences percent SpO2 levels were significant with p value <0.05 that means intervention group is better at increasing oxygen saturation (SpO2) than the control group, especially in mild asthma attacks.

### Conclusion

Giving pharmacological therapy nebulizer using NRM and pouring 3 liters of oxygen per minute with independent nursing measures body position of $60^o$ (fowler) within 30 minutes with 3 measurements in 1 time giving intervention is very effective in increasing oxygen saturation (SpO2) on asthma patients.

**Keywords:** *Body Position, Nebulizer, Oxygen, Oxygen Saturation (SpO2), Asthma.*

## INTRODUCTION

Current estimates of asthma patients show a high prevalence of around 339 million people worldwide. 420,000 people died of asthma, when averaged more than 1000 people per day. Based on data from the World Health Organization (WHO) and the Global Initiative of Asthma (GINA), it is estimated that in 2025 there will be an increase from the estimated number of previous sufferers of 300 million, which will then reach 400 million. At the age of adulthood, the diagnosis by a doctor is 4.3% [1].

Data from Riskesdas 2018 shows that the prevalence of asthma in Indonesia for the adult age category is 2.4% (1,017,290 people). As for the Province of North Kalimantan itself, it is at a prevalence of 3.3% or 0.9% greater than the Indonesian average. Data from the results of preliminary studies that have been conducted at the IGD RSUD Dr. H Soemarno Sosroatmodjo Tanjung Selor obtained the prevalence of visits of patients diagnosed with asthma in 2018 of 106 adult patients from a total visit of 199 asthma patients with a total number of 11,004 patients in 1 year. Asthma is one of those included in non-communicable diseases which is a health problem that can be suffered by all ages both children to adults with degrees of disease ranging from mild to severe which causes increased morbidity and even death. Asthma can cause gas exchange disorders that cause mild to severe hypoxemia from an acute attack. An indicator of hypoxemia is a decrease in oxygen saturation (SpO2). Oxygen saturation levels in the blood are the result of the percentage of oxygen that joins the Hemoglobin molecule (Hb). Oxygen saturation is examined using a pulse oxymetri device to reduce the need for arterial blood gas analysis (SaO2) because many patients are not at risk for respiratory failure, hypercapnea or metabolic acidosis but require examination of oxygen levels related to perfusion of body tissues so that it is practicable and does not always require analysis blood gas [1-5].

Oxygen (O2) is ranked first in the element of human physiological needs. Through the role of the respiratory system oxygen is inhaled from the atmosphere, then channeled into the lungs and there is a dialveoli process for the exchange of gas that is inhaled or inspired (with the result of obtaining oxygen) with exhaled or expiratory (with the output in the form of carbon dioxide), then the process of diffusion occurs, oxygen enters the blood capillaries and is utilized by cells in the metabolic process. The results obtained are to help expedite the work of other body organ systems, so that if there is an ineffectiveness of the respiratory system it can have an impact on the entire organ system that exists [6, 7].

Many ineffective events in the respiratory system, is asthma. Asthma is a condition in which bronchial constriction occurs that is reversible can occur because of hyperactive bronchial contamination with antigens. Asthma is a group of allergic and immunological lung disease, where in this case asthma the bronchus will experience hypersensitivity to stimulation and eventually experience constriction resulting in difficulty breathing. There have been efforts to provide nursing care to clients with asthma carried out in accordance with the management of asthma management independently and collaboratively, one of which is pharmacological therapy [8, 9].

Asthma management in terms of pharmacology has been carried out with asthma treatment protocols that are divided based on the clinical level of asthma found, such as giving medication aimed at improving symptoms by reducing airway obstruction, one of which is by doing nebulization. Nebulization is an ambulatory action to help in alleviating asthma in terms of pharmacology. The type, frequency, and number of therapeutic doses depend on the value of the degree of asthma attack. By judging from the characteristics of asthma symptoms such as the sound of wheezing breath, rapid and short breathing patterns, the swollen chest is sometimes accompanied by coughing, caused by limited air flow during aspiration. Because asthma is associated with airway hyper responsive to stimulation either directly or indirectly, which usually has a persistent characteristic even when symptoms are absent or lung function is normal, asthma can still return to normal with treatment [10].

Research related to the administration of nebulizers is growing as technology changes, demands in the effectiveness and efficiency and interest of researchers to continue to search both based on techniques to the composition of therapy and supportive other optimal in the administration of aerosol drug therapy through inhalers and nebulization in various lung disease problems. Such as administering pressurized metered-dose inhalers

(PMM) or dry powder inhalers (DPIs) and nebulization through jet nebulizers, mask nebulizers, mesh nebulizers, to nasal high flow bronchodilators with or without the addition of oxygenation as a steam-producing even to modifications in the preparation of drugs bronchodilator themselves [11, 12].

In a study comparing the performance of jet and mesh nebulizer using three types of administration, namely with standard aerosol masks, adapters with valve mask, and mouthpiece through the method where the mesh nebulizer circulates aerosols with oxygen 2 liters per minute for children and without oxygen in adults, by comparison is a jet nebulizer that is driven in producing aerosols at 10 liters per minute based on the manufacturer's label. The results show that mesh nebulizer is better than jet nebulizer in that aerosol drug administration with the use of face masks and mouthpieces has a greater effect on spontaneous breathing. Administration of drugs with a mesh nebulizer has doubled in both adults and children by administering 2 liters of oxygen per minute. As for the use of standardized aerosol masks, the delivery of aerosols via a jet nebulizer is more efficient than a mesh nebulizer [13]. This is in line with the results of the study which showed that there was a significant difference in the effectiveness of giving a nebulizer using a mouthpiece compared to masks in asthmatics with a result of $p = <0.05$ that is 0.007 which illustrates the strong comparative strength [14]. Furthermore, other studies conducted to compare the administration of aerosol (therapy albuterol)using nasal high flow bronchodilators and jet nebulizer standard facial masks show that albuterol given through nasal high flow stimulates an increase in forced expiratory volume ($p = 0.001$) and patient comfort in aerosol therapy ($p = 0.34$) compared with jet nebulizer standard facial mask [15]. Other studies suggest that aerosols can be efficiently delivered via high flow nasal cannula at flows of 3 liters per minute with inhalation doses up to 28% using adult nasal cannula [16].

For aerosol drug therapy itself has been investigated about the effect of giving aerosol bronchodilator drugs with dilution and without dilution using 0.9% NaCl to the pulmonary function of asthmatic patients with the results showing that increased lung function in asthma patients is greater in patients given bronchodilator inhalation therapy without dilution (108.33±18.952) than with 0.9% NaCl dilution (96.67±12.668) [17].

In terms of human physiological needs, in asthma patients the initial treatment management is the fulfillment of oxygenation for treatment and prevention of respiratory failure or acute hypoxemia that is given according to the needs of patients, measured based on the results of initial screening percent of oxygen levels in the blood viewed using a standard measuring instrument that is pulse oxymetri. Oxygen is one of the fundamental and great potential elements in human physiological needs according to Maslow's Hierarchy theory expressed by Abraham Maslow. The chemical elements of the calcogen in oxygen readily react to almost all other elements, especially in the process of becoming oxide. In the universe 20.9% diatomic oxygen gas fills the volume of the earth's atmosphere that fills the lungs when the individual breathes normally. When oxygen therapy is needed and given through low flow and high flow adjusted the percentage of the body's needs. Low-flow oxygen therapy through the nasal nasal cannula in patients who develop hypercapnea gives good results without COretention2 [10, 18, 19].

In optimizing oxygenation and helping to reduce shortness of breath in asthma patients, positioning can be done which is an independent nursing action that has been widely carried out in the semi-Fowler and Fowler positions. The semi-fowler and high-fowler positions allow maximum chest expansion in bed rest clients and can affect oxygen supply in tissue perfusion [20]. In asthma patients, nursing problems arise where the body's physiology experiences disorders such as ineffectiveness in tissue perfusion, one of which is peripheral due to hypoxia and hypoxemia characterized by peripheral oxygen saturation ($SpO_2$ values) below 96% (range 91-95%) [4, 21]. Nursing independent measures aimed at addressing changes in the patient's physiological status are the regulation of body position that is set with the degree of tilt in the semi-fowler position (30° - 45°) or high fowler (60°- 90°) beneficial in maintaining circulating volume, ventilation and perfusion in the human body, as in studies of the body position of the fowler (90°) and semi fowler (45°) to the level of shortness of breath (dyspnea) shows that semi-fowler body position is more effective in reducing shortness of breath compared to the position of the fowler during the administration procedure Nebulizer therapy with p value = 0.000 (<0.05) [22]. In addition, other studies of body position during the fowler position in hemodynamics and cardiovascular regulation found that the upright body position during the 60° fowler can maintain stroke volume and can help reduce orthostatic stress with a p value of 0.05 [23]. For body position which directly affects the oxygen saturation of asthma patients most effectively obtained based on research on position analysis high fowler of changes in SpO2 in bronchial asthma patients with results that show the average difference in changes in oxygen saturation in positions high fowler by 3.6 from the mean pre and post intervention [24].

Positioning and administering oxygen in tissue perfusion can be assessed for effectiveness in perfusion, one of which is by measuring peripheral oxygen saturation (SpO2), which is the expression form of arterial oxygen saturation measurements in the form of blood oxygen levels obtained through clinical monitoring results by pulse oxymetri devices. It is carried out by direct methods which can be carried out in any anatomical position and are, however, simple and noninvasive [25].

In the management of asthma patients, especially in terms of pharmacology the first thing is the provision of inhalation therapy to open the airway then followed by oxygen administration (if possible). The patient's condition and the availability of a nebulizer mask that cannot be directly given oxygen when inhalation therapy is given make it difficult to do [26].

A study on "The Effectiveness of Nebulizer Therapy with Ipratropium and Phenoterol on Oxygen Saturation" has obtained the results of an increase in SpO2 with a value of p= 0.001, after intervention in a total sample of 16 respondents by giving through a nebulizer that is higher phenoterol therapy by an average of 5,375 improvement compared to Ipratropium therapy by an average of 3,750.1 Likewise in other studies concerning the use of oxygen flowed through a nebulizer mask during the process of handling the condition of shortness of breath but in the COPD population with a sample size of 85 respondents. In the research described a significant relationship to the use of masks during therapy nebulizer lid on levels of SpO2 in COPD patients where as many as 82 respondents (96.5%) of the 85 respondents that is experiencing normal saturation in post treatment [27].

In other studies about the effectiveness of the nebulizer on "Evaluation of the Use of Oxygen as a Steam Producer Nebulizer Therapy in Asthma Patients" shows the difference in each variable measured to determine the effectiveness of the treatment compared to the values pre and post. On the increase in O2 saturation levels, the average was obtained at pre 93.8±4.1% and at post treatment there was an increase of 97.8±1.5%, so the results of the analysis showed the nebulizer using oxygen as a vaporizer was still effective against an increase in SpO2 in the blood with a value of $p<0.005$ ($p = 0.000$) [28].

Asthma patients who became the population in the study experienced difficulty breathing (dyspnea) due to airway obstruction that had bronchospasm so that they needed help in managing nebulizer therapy to assist in vasodilation the airway and fulfilling oxygenation to meet the oxygen supply according to the body's needs. Standards in the administration of oxygen therapy there are two types, namely low flow systems and high flow systems. Low flow oxygen therapy is a safe therapy system to be given periodically or periodically in the range <36% (<4 liters per minute). Oxygenation assistance of 3-4 liters per minute (33-36%) is the right choice to meet the lack of oxygen supply whenever there is a problem with oxygenation fulfillment. As stated in the results of research on low-flow oxygen therapy which is used as a treatment in cases of trauma related to the primary survey. Oxygen therapy is given as a form of treatment in emergencies which if not done can be fatal. Someone who does not get oxygen <4 minutes will result in brain damage that cannot be repaired resulting in death. Research conducted found the results that the lighter the changes in physiological status (awareness, breathing frequency, and systolic blood pressure) of respondents, the more dominant the use of low-flow oxygen [29].

Changes in physiological status that are mild can occur in asthma attacks in mild and moderate conditions that cause decreased oxygen flow to the lungs and disrupt gas exchange. The inhibited gas exchange interferes with the process of sending oxygen to the tissues which results in hypoxemia, breathing muscles that are increasingly working hard and an increase in carbon dioxide

(COproduction2) accompanied by a decrease in alveolar ventilation which can result in COretention2 (hypercapnea) and the occurrence of respiratory acidosis that has the potential to experience respiratory failure (organ failure). Optimal achievement in handling asthma conditions other than oxygen therapy and medication can be supported by independent nursing measures, namely the posture or body position that meets the needs of patients in achieving normal breathing. The act of adjusting the body's position is an independent nursing action that can relieve pressure on the diaphragm and is very possible for greater volume exchange and helps in withdrawal of the earth's gravitational force, so that the lungs are free to exhale and inhale inhalation therapy given to enter the respiratory tract optimally [18, 30]

In the process, so far the handling of nebulization in asthma uses a nebulizer mask to then be given a drug that was originally liquid into vapor by a nebulizer device that is used with a certain pressure, and sometimes also assisted by giving oxygen at the beginning of treatment through nasal cannula 1- 5 liters per minute or as needed by the patient can be seen from the percent of oxygen saturation found during the examination. Results of a preliminary study at RSD dr. H. Soemarno Sosroatmodjo Tanjung Selor obtained by asthmatic patients who experience respiratory problems are often reluctant to put a mask on the face which is giving non-invasive ventilation that can add to the feeling of tightness that had previously existed. This is consistent with the results of research which states that intolerance and discomfort of patients who are attached masks can cause initial disturbances in up to 22% of patients [31].

Based on the results of the expert consul (expert) on nebulization therapy and pulmonary specialists, an instrument-related trial was conducted in the intervention of the body position of 60° patients who received nebulization using NRM and flowed oxygen 3 liters per minute during the nebulization process from 5 asthma patients with mild attacks and moderate which shows the result of an increase in oxygen saturation values from the values before and after the intervention. For the of nebulization with a body position of 30° (semi-fowler effectiveness), its effectiveness has been known, but for the administration of nebulization using NRM with the help of oxygenation of 3 liters per minute during nebulization and 60° body position (fowler) it needs to be evaluated statistically and significantly in the field.

This research could be a renewal in the standard operational procedures for asthma management in the handling protocol in the Emergency Room at UPT RSD Dr. H. Soemarno Sosroatmodjo. Based on the existing background, this research needs to be done in order to determine the giving the body position, nebulization and oxygen to the oxygen saturation of asthma patients, which can be judged from the level of oxygen saturation (SpO2).

## METHODS

This type of research uses a research True Experiment with a approach pre-test – post-test with control group design. This research arranged two groups, namely the intervention group who were given nebulization therapy using NRM masks (1-way valve) with the help of giving oxygen 3 liters per minute with a body position of $60^o$, while the control group was given nebulization therapy using nebulizer masks (2-way valve) with administration oxygen 3 liters per minute with a body position of 30°. The act of giving nebulization and oxygenation by adjusting body position was carried out for 30 minutes in 3 measurements that received 1 intervention. Measurement of oxygen saturation (SpO2) can be done using an oxymetri instrument and results are recorded on the observation sheet. Measurement of oxygen saturation levels (SpO2) of respondents who have asthma is done before and after the action of the therapy (pre-test / 0 minutes, post-test / 15 minutes and post-test / 30 minutes).

The population in this study was asthma patients who visited the emergency room of regional hospital dr. H. Soemarno Sosroatmodjo Tanjung Selor which is a type C hospital. Determination of the minimum sample size using technique probability sampling with method stratified random sampling (per diagnosis of asthma mild and moderate attacks) and is based on the inclusion and exclusion criteria of 32 respondents divided into two groups with two groups with each of the 16 respondents in the intervention group (nebulization therapy using NRM masks (1-way valve) and the help of administering 3 liters of oxygen per minute with body position 60°) and 16 respondents in the control group (nebulization therapy using a nebulizer mask (2-way valve) and administering 3 liters of oxygen per minute with body position 30°).

In this study, researchers conducted data collection by means of observation, identification, interviews and filling in the observation sheets. The data collected was analyzed through the IBM SPSS program version 24.0, and continued with a different test that is parametric test (Paired t test and Repeated Measure ANOVA). The processed data is used as a basis for discussing statement matters, which are then presented in tabular form so that conclusions can be drawn.

## RESULTS

**Table 1 Frequency distribution of respondents from age, sex, jobs, allergic status, long history of diseases and medical diagnosis of asthma attacks based on demographic data**

| Characteristics | Intervention (n=16) | | Control (n=16) | | P |
|---|---|---|---|---|---|
| | n | % | n | % | |
| **Age** | | | | | 0.072 |
| <20 Years | 1 | 6.25 | 1 | 6.25 | |
| 20-30 Years | 5 | 31.25 | 6 | 37.50 | |
| 31-40 Years | 5 | 31.25 | 5 | 31.25 | |
| 41-50 Years | 4 | 25 | 4 | 25 | |
| >50 Years | 1 | 6.25 | 0 | 0 | |
| Total | 16 | 100 | 16 | 100 | |
| **Gender** | | | | | |
| Male | 4 | 25 | 7 | 43.75 | |
| Women | 12 | 75 | 9 | 56.25 | 0.053 |
| Total | 16 | 100 | 16 | 100 | |
| **Jobs** | | | | | |
| Farmers | 4 | 25 | 3 | 18.75 | 0.304 |
| Planters | 2 | 12.5 | 5 | 31.25 | |
| Industrial Workers | 3 | 18.75 | 0 | 0 | |
| Civil Servants | 3 | 18.75 | 1 | 6.25 | |
| Housewives | 3 | 18.75 | 5 | 31.25 | |
| Students | 1 | 6.25 | 2 | 12.5 | |
| Total | 16 | 100 | 16 | 100 | |
| **Allergic Status** | | | | | |
| Yes | 10 | 62.5 | 11 | 68.75 | 0.481 |
| No | 6 | 37.5 | 5 | 31.25 | |
| Total | 16 | 100 | 16 | 100 | |
| **Long history of disease** | | | | | |
| Acute | 11 | 68.75 | 12 | 75 | 0.452 |
| Chronic | 5 | 31.25 | 4 | 25 | |
| Total | 16 | 100 | 16 | 100 | |
| **Medical Diagnosis Asthma Attack** | | | | | |
| Mild | 8 | 50 | 8 | 50 | 1.000 |
| Medium | 8 | 50 | 8 | 50 | |
| Total | 16 | 100 | 16 | 100 | |

**Homogeneous test*

Based on table 1 obtained data that the mean age, sex, jobs, allergic status, long history of diseases and medical diagnosis of asthma attacks in the intervention group and the control group had the same significant value p > 0.05 meaning the same or homogeneous.

**Table 2 Analysis of the effectiveness of body position 60º and 30º patients receiving nebulization and 3 liters of oxygen per minute against oxygen saturation based on asthma attacks (n=32)**

| Group | Variable | | Mean±SD | Difference | | p |
|---|---|---|---|---|---|---|
| | SpO2 | Asthma Attack | | (Mean±SD) | IK 95% | |
| **Treatment** | **Pre test** | Mild (n=8) | 94.13±0.641 | 1.000±0.417 | 92.49-93.76 | 0.031 |
| | | Medium (n=8) | 93.13±0.991 | | | |
| | **Post-test 1** | Mild (n=8) | 97.13±1.126 | 1.625±0.515 | 94.72-96.28 | 0.007 |
| | | Medium (n=8) | 95.50±0.926 | | | |
| | **Post-test 2** | Mild (n=8) | 98.63±0.916 | 1.125±0.460 | 96.80-98.20 | 0.028 |
| | | Medium (n=8) | 97.50±0.926 | | | |
| **Control** | **Pre test** | Mild (n=8) | 93.50±1.195 | 0.000±0.598 | 92.59-94.41 | 1.000 |
| | | Medium (n=8) | 93.50±1.195 | | | |
| | **Post-test 1** | Mild (n=8) | 96.13±0.641 | 1.500±0.438 | 93.96-95.29 | 0.004 |
| | | Medium (n=8) | 94.63±1.061 | | | |
| | **Post-test 2** | Mild (n=8) | 97.13±0.641 | 1.500±0.438 | 94.96-96.29 | 0.004 |
| | | Medium (n=8) | 95.63±1.061 | | | |

**Repeated ANOVA Test*

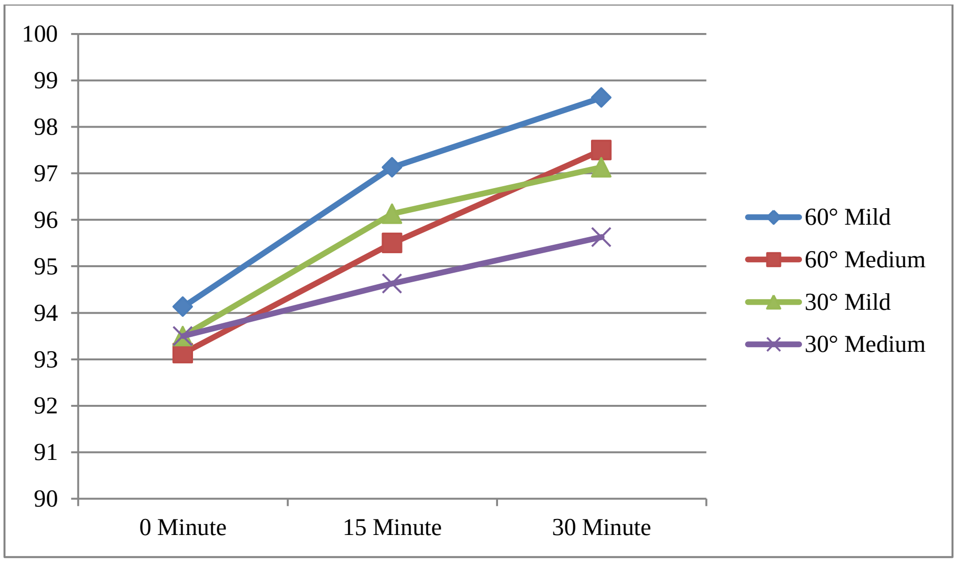
Based on table 2 shows the effectiveness of each measurement time to changes in oxygen saturation in the treatment group to determine the effect of body position of 60° patients receiving nebulization using NRM masks and 3 liters of oxygen per minute on oxygen saturation based on mild asthma attacks and medium asthma attacks, found significant differences (p<0.05) starting at the pre-test (p value = 0.031), post-test 1 (p value = 0.007), and post-test 2 (p value = 0.028). Thus the mild asthma attack group who were given a body position of 60° patients who were nebulized using NRM masks and 3 liters of oxygen per minute had a higher increase in oxygen saturation compared to the medium asthma attack group with values of 98.63±0.916, which means more intervention influence the increase in oxygen saturation value of mild asthma attacks with a value of p <0.05 (p=0.028).

**Table 3 Analysis of oxygen saturation before and after cast intervention in treatment group and control group based asthma attacks (n=32)**

| Group | Asthma Attacks | Measurement | Pre | Post | Mean | SD | Delta | p |
|---|---|---|---|---|---|---|---|---|
| **Treatment** | Mild | SpO2 0’-15’ | 94.13 | 97.13 | 3.000 | 1.309 | 3.00 | 0.000 |
| | | SpO2 0’-30’ | 94.13 | 98.63 | 4.500 | 1.195 | 4.50 | 0.000 |
| | | SpO2 15’-30’ | 97.13 | 98.63 | 1.500 | 0.535 | 1.50 | 0.000 |
| | Medium | SpO2 0’-15’ | 93.13 | 95.50 | 2.375 | 1.188 | 2.38 | 0.001 |
| | | SpO2 0’-30’ | 93.13 | 97.50 | 4.375 | 1.408 | 4.38 | 0.000 |
| | | SpO2 15’-30’ | 95.50 | 97.50 | 2.000 | 0.926 | 2.00 | 0.000 |
| **Control** | Mild | SpO2 0’-15’ | 93.50 | 96.13 | 2.625 | 1.506 | 2.63 | 0.002 |
| | | SpO2 0’-30’ | 93.50 | 97.13 | 3.625 | 1.506 | 3.63 | 0.000 |
| | | SpO2 15’-30’ | 96.13 | 97.13 | 1.000 | 0.535 | 1.00 | 0.001 |
| | Medium | SpO2 0’-15’ | 93.50 | 94.63 | 1.125 | 1.126 | 1.13 | 0.026 |
| | | SpO2 0’-30’ | 93.50 | 95.63 | 2.125 | 1.126 | 2.13 | 0.001 |
| | | SpO2 15’-30’ | 94.63 | 95.63 | 1.000 | 0.535 | 1.00 | 0.001 |

**Dependent Test T Test*

Based on table3 shows there are differences in oxygen saturation levels before and after the intervention in both the treatment group and the control group in mild and medium asthma attacks. Oxygen saturation value in the mild asthma attack in treatment group from 94.13% to 98.63% and medium asthma attack from 93.13% to 97.50%, While in the control group that is mild asthma attacks from 93.50% to 97.13 % and medium asthma attacks from 93.50% to 95.63%. Delta increased oxygen saturation in the mild asthma attack in treatment group was better than medium asthma attack and the control group with delta values at the first measurement (0 minutes) 3.00, the second 4.50, and the third 1.50. It can be concluded that the minor hypothesis 1 is accepted, that there is a percent difference in oxygen saturation increase in asthma patients (mild attacks and moderate attacks) before and after giving body position (60° and 30°), nebulization and oxygen (3 liters per minute) with values p <0.05).




**Graph 1 Increased of oxygen saturation levels (SpO2) based on asthma attack the mild and medium in the intervention group and control group**

Graph 1 show that the levels of SpO2 in both groups were equally increased by asthma attack of mild and medium, but the treatment group showed improvement more mild asthma attacks than in the control group that is of 98.63%.

**Table 4 Analysis of oxygen saturation levels (SpO2) before and after treatment in the intervention group and control group**

| Group | Source (Variant Distribution) | Type III sum of squares | Df | Mean Square | F | P |
|---|---|---|---|---|---|---|
| **Intervention** | Time Greenhouse Geisser | 9.771 | 1.295 | 7.545 | 6.986 | 0.002 |
| | Error (Time) Liniear | 41.958 | 38.849 | 1.080 | | |
| **Control** | Time Greenhouse Geisser | 9.766 | 1 | 9.766 | 10.157 | 0.003 |
| | Error (Time) Liniear | 28.844 | 30 | 0.961 | | |

**Repeated ANOVA test*

Based on the above table shows that the results repeated ANOVA test with correction greenhouse greisser there are differences in oxygen saturation significantly in the three measurements in group intervention with a value of F = 6.986 and a value of p = 0.002 while the control group with a value of F = 10.157 and a value of p = 0.003.

**Table 5 Analysis of oxygen saturation levels (SpO2) between the intervention group and control group**

| | Type III Sum of Squares | Df | Mean | F | P |
|---|---|---|---|---|---|
| Between Group | 20.167 | 1 | 20.167 | 8.213 | 0.008 |

**Repeated Anova Test*

Based on the table above shows that there are significant saturation differences between groups with value of F = 8.213 and value of p = 0.008 (<0.05) indicates that the F value for the "Oxygen Saturation Between Groups" was statistically significantly different, so it can be said that there were significant differences in oxygen saturation between the intervention group and control group.

## DISCUSSION

The bivariate analysis in this study uses the Repeated Measure ANOVA test and the results of F values in tables 4 and 5 show that there are overall significant differences in oxygen saturation values after giving intervention body position of $60^o$ patients who get nebulization using NRM and 3 liters of oxygen per minutes at 0 minutes up to 30 minutes. Results in the intervention group after being given a 60° body position for patients receiving nebulization using NRM and 3 liters of oxygen per minute were measured 3 times starting from 0 minutes, 15 minutes to 30 minutes of intervention in 1 time giving intervention in mild asthma attacks and medium asthma attacks, proven effective in increasing the value of oxygen saturation in patients with asthma mild attacks starting at post-test 1 to post-test 2 with $p=0.007$ and $p=0.028$. As for the results of the study in the control group after being given the action body position of 30° patients who received nebulization using a nebulizer mask and 3 liters of oxygen per minute were measured 3 times starting from 0 minutes, 15 minutes to 30 minutes of intervention in 1 time intervention in mild asthma attacks and medium asthma attacks, proven to be effective in increasing the oxygen saturation value in asthma patients with mild attacks starting at post-test 1 to post-test 2 with $p=0.004$ and $p=0.004$.

Oxygen saturation value in the mild attack asthma treatment group from 94.13% to 98.63% and medium attacks asthma from 93.13% to 97.50%, while in the control group mild asthma attacks from 93.50% to 97.13 % and medium asthma attacks from 93.50% to 95.63%, with delta values obtained showing differences in oxygen saturation levels before and after the intervention in both the treatment group and the control group in mild and medium asthma attacks. Delta increased oxygen saturation in the mild attack asthma treatment group was more than medium asthma attack with delta values at the first measurement (0 minutes) 3.00, second 4.50, and third 1.50.

The analysis shows that the minor hypothesis 1 is accepted, that there is a percent difference in oxygen saturation increase in asthma patients (mild attacks and medium attacks) before and after giving body position (60° and 30°), nebulization and oxygen (3 liters per minute) with values $p <0.05$.

This study shows that oxygen saturation has not reached normal values in the control group with a diagnosis of moderate asthma attack, but there is oxygen saturation that reaches a maximum normal value in the treatment group with a diagnosis of mild asthma attack. The characteristics of these two asthma attacks are indeed different. According to GINA and the Republic of Indonesia Decree No. 1023 / MENKES / SK / XI / 2008 concerning Guidelines for the Control of Asthma, mild asthma attacks have a classification where the patient can still walk, lie down, say a few sentences, awareness may be interrupted, with increased breathing frequency, no retraction respiratory aids, wheezing from weak to moderate, pulse frequency <100 x / minute, SaO2 value >95% (96-100%), whereas for moderate asthma attacks have limited walking, prefer to sit, in communicating limited sentences and awareness is usually disrupted, the frequency of breathing increases which is sometimes followed by the presence of respiratory aids, the wheezing sounds loud, the pulse frequency is 100-200 x / min, and SaO2 is 91-95% [33, 34].

This study provided body positions of 60° (fowler) and 30° (semi-fowler) of patients receiving nebulization. Body position regulation is a simple method to reduce the risk of a decrease in the development of the chest wall, which is the regulation of body position at rest. Position Fowler is the position of the bed where the position of the head and feet elevated 60° to 90° in which position of the knee can be / are not in a flexed position. While the semi-fowler position is the position of the bed where the position of the head and legs is elevated 15° to 45°, this position is usually called the fowler low and is usually elevated on average as high as 30° [32]. This is in line with the results obtained by Wijayati, that the position of the body of the Fowler 45° - 60° is more maximal in the development of chest expansion than the position of the body of the fowler low 15° - 30°. The gravitational force that occurs when the body is given the setting position fowler/fowler high cause attraction of the diaphragm down thus affecting more optimal lung expansion on the respondent [35].

This study used NRM masks as a substitute for conventional nebulizer masks. The use of a jet nebulizer with constant output as a standard tool in the administration of aerosol therapy at the study site used in this study also results in 3 µm aerosol particles which according to theory 3 µm particles are effectively reaching the respiratory tract until it reaches the bronchi in depth [36]. The use of 2-way nebulizer masks which are standardized accessories of jet nebulizers were given to the control group while NRM masks (1-way masks) were modified masks to be used instead of conventional nebulizer masks given to the treatment group. NRM masks are oxygen masks with one-way valves found on both sides of the mask so that gas passes from the mask through one-way valves at the time of expiration and is limited by the entry of gas through the valves during inspiration [37]. According to the theory of administering aerosol drugs using jet nebulizer with constant output using standardized nebulizer masks, the amount of aerosols given can be inhaled as much as 45% of which the drug enters the lungs at inspiration and 55% is wasted at expiration [38]. This is in line with the statement by Lin, et al that the use of face masks containing one-way valves (valve masks) has been shown to increase efficiency in aerosol inhalation which results in an increased ability to spontaneously breathe compared to standard aerosol masks from a nebulizer [39].

This study provides a collaborative measure of 3 liters of oxygen therapy per minute as an intervention. In patients with asthma, the condition of patients experiencing shortness of breath or dyspnea can reduce oxygen saturation levels and can cause hypoxia [40]. Hypoxia is a condition that is a major cause of death that occurs in cases of asthma, and pharmacological management to reduce shortness of breath in addition to using drugs is to provide oxygen therapy that can reduce shortness of breath, help in bronchodilation, help expedite the work of the heart, and minimize risk of arrhythmia [41].

Oxygen therapy is given to patients with the aim of correcting the incidence of hypoxemia where oxygen levels in the blood are low and can be corrected through this therapy. Oxygen therapy in addition to improving the state of hyposemia, also reduces the work of breathing and reduce the work of the heart (myocardium). How to administer oxygen can affect oxygenation in the body. This is because each type of oxygen administration has different levels of FiO2 concentration (Inspiration oxygen fraction) so that the more amount of oxygen is given, the faster the increase in oxygen saturation [42]. This theory is in line with the results found in studies by Firdaus which shows that administering nasal oxygen cannula 2 liters per minute can increase the oxygen value by 4.56%, while administering nasal oxygen cannula 3 liters per minute can increase oxygen by 5.64% , with the percentage of SpO2 in the position semi-fowler from 93.10% to 98.00% and in the position fowler from 92.60% to 98.00% [43]. In previous studies the two groups received the same results, but in the current study different results were obtained where the increase in oxygen saturation of asthma patients with mild asthma attacks could reach 98.63% or 0.63% higher than the SpO2 results in the study previous. According to Kozier & Erb's required competence and accuracy of the measuring instrument due to the contribution of excessive activity (movement) factors can affect the measurement of the oxymetric sensor area, thus affecting the SpO2 reading results [32].

The results of this study prove that the body position of 60° patients who are nebulized using NRM and oxygen 3 liters per minute with a duration of 30 minutes can increase the oxygen saturation value by the Cohen's d Effect value for Independent T-Test = 1.537 which means it is very strong. So the researchers concluded that 60° intervening body position of patients who received nebulization using NRM and 3 liters of oxygen per minute was effective or had a strong effect in increasing oxygen saturation values. Interventions showed significant results to be carried out in the provision of nursing services. This is in line with the results of the effect size of Andani, study of the influence of the position of high fowler and semi-fowler by providing a combination of interventions to increase oxygen saturation based on the results of calculations on the post test results obtained cohen's d effect of 1.976, which means very strong [44]. Butresults are different cohen's d effect with research by Meilirianta, et al who also have body position interventions high fowler and body positions semi-fowler on oxygen saturation in asthma patients where the calculated result is 0.235 which means it is very weak [45]. In a study by Meilirianta, et al conducted an intervention with a total sample approaching the current study, 30 respondents consisting of 15 in the position group semi-fowler and 15 respondents in the group high-fowler who were given body position interventions for 30 minutes and measured the value of oxygen saturation as the dependent variable. Although the time of administration is the same, there are differences between the current and previous studies, namely the frequency in measurements where Meilirianta took measurements 2 times (1/15pre and post) while the current study was 3 times (pre-test /0 minutes, post testminutes, post test 2/30 minutes) so that a difference in the SpOvalue can be seen2 which is more indicated from the results of repeated measurements both in the treatment group (body position 60º / high fowler) and the control group (body position 30º / semi fowler).

In addition, the measurement results after the intervention showed different results were in the Meilirianta study the SpO2 value was still below the normal standard value while the results of this study showed an increase to reach the normal saturation value in the treatment group. Another thing in the Meilirianta study was that interventions were given in the form of body position semi-fowler and high fowler, whereas in the present study there were interventions of body position (60º and 30º), nebulization and oxygen, where in the treatment group was given body position 60º (high fowler) patients who received nebulization using NRM and 3 liters oxygen per minute and in the control group were given a body position of 30º (semi fowler) patients who received nebulization using a nebulizer mask and 3 liters of oxygen per minute. Giving nebulization and oxygen therapy is known to influence bronchospasm and changes in hypoxia / hypoxemia status so that tissue perfusion that initially changes physiological status becomes effective again marked by oxygen saturation values >96%.21 So that this difference becomes a possible result of effect size in previous and current studies, with the conclusion that the current study is better than previous studies with differences in values effect size that are clinically significant in intervening body positions of 60º patients receiving nebulization and oxygen 3 liters per minute to oxygen saturation in asthma patients, with account cohn's d effect of 1.537, which means it is very strong.

The results of the calculation Relative Risk Reduction (RRR) for oxygen saturation values are 100%, which means intervening body position of 60° patients receiving nebulization using NRM masks and 3 liters of oxygen per minute can reduce therapy failure by as much as 100% with the body position of 30° patients receiving nebulization uses a nebulizer mask and 3 liters of oxygen per minute, with the value of Absolute Risk Reduction (ARR) or the difference in therapy failure to increase oxygen saturation in the treatment and control groups by 25%. The Number of Needed (NNT) value is 4, meaning it takes 4 people who are given body position interventions 60° patients who get nebulised using a nebulizer mask using NRM masks and 3 liters oxygen per minute to be able to avoid 1 person from an asthma attack. Based on the analysis of RRR, ARR and NNT data, it was concluded that giving 60° body position for nebulized patients using NRM masks and 3 liters oxygen per minute was effective in increasing oxygen saturation in asthma patients.

## CONCLUSION

Based on data processing and analysis regarding the pharmacological treatment of nebulizer using NRM and flowing 3 liters of oxygen per minute with body position regulation $60^{o}$ (fowler), it can be concluded that there is a percent difference in oxygen saturation increase in asthma patients (mild attacks and medium attacks) before and after administration of body position (60° and 30°), nebulization and oxygen (3 liters per minute) with a p value <0.05. Oxygen saturation value in the mild asthma attack treatment group from 94.13% to 98.63% and medium asthma attack from 93.13% to 97.50%, while in the control group mild asthma attacks from 93.50% to 97.13 % and medium asthma attack from 93.50% to 95.63%, with Delta increasing oxygen saturation in the mild attack asthma intervention group more than medium asthma attack and the control group with delta values on the first measurement (0 minutes) 3.00, the second 4.50, and the third 1.50.

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