

The Influence of Education Based on Transtheoretical Model (TTM) on Physical Activity of Patients with Chronic Obstructive Pulmonary Disease (COPD)

Afina Muharani Syaftriani¹, Setiawan², Nunung Febriany Sitepu³

¹Faculty of Nursing, Universitas Sumatera Utara, Indonesia

²Faculty of Nursing, Universitas Sumatera Utara, Indonesia

³Faculty of Nursing, Universitas Sumatera Utara, Indonesia

Abstract: Chronic obstructive pulmonary disease (COPD) is a breathing disorder which morbidity and mortality rate is increasing any time. It causes the patients to be unable to do his physical activity so that they need to increase and maintain their physical activity by changing their health behavior. The intervention can be done by doing transtheoretical model (TTM). The objective of the research was to identify the influence of education based on TTM on increasing physical activity of COPD patient at the Pulmonary Clinic of the USU Hospital. The research used quasi experiment with equivalent control group design. The samples were 92 respondents consisted of 46 respondents in the intervention group and 46 respondents in the control group, taken by using consecutive sampling technique. The data were analyzed by using paired t-test and independent t-test. The result of the research showed that there was the difference in physical activity in COPD patients between pre and post education intervention based on TTM at p-value = 0.000 ($p < 0.05$). The conclusion was that education based on TTM had the influence on the increase in the physical activity of COPD patients. It is recommended that nurses play their important role in educating COPD patient according to their behavioral changes based on TTM so that they are able to manage their sickness and to increase their health status.

Keywords: Education, Transtheoretical Model (TTM), Physical Acctivity, COPD

Date of Submission: 18-11-2019

Date of acceptance: 04-12-2019

I. Introduction

Chronic obstructive pulmonary disease (COPD) is one of a group of non-communicable diseases which is a public health problem in Indonesia. COPD is a disease with symptoms of continuous air flow obstruction and is associated with an inflammatory response to harmful particles or gases in the airways (Global Initiative for Chronic Obstructive Lung Disease [GOLD], 2018). COPD is caused by systemic extrapulmonary manifestations (Roos, Lucas, Strijbos and Trijffel, 2016), and is usually characterized by progressive air flow limitations (Andersson, Lindberg, Stridsman, Emtner and Ronmark, 2015). Limitations of expiratory flow that characterize COPD are usually accompanied by pulmonary hyperinflation (Troosters et al., 2018). Typical symptoms of COPD are cough, sputum production and dyspnea during activity (Vorrink, Kort, Troosters and Lammers, 2011).

The overall prevalence of COPD in the world increases by 10% in people aged > 40 years (Roos et al., 2016; Troosters et al., 2018). In Australia, COPD is estimated to affect around 14% of people aged 40 years or older (Alison and Jenkins, 2013). Whereas in the United States, COPD prevalence is 10.1% or around 15 million people (Burnett, 2018). Several countries in Southeast Asia have an estimated COPD prevalence of 6.3% with the highest prevalence in Vietnam at 6.7% (Oemiati, 2013). In Indonesia, COPD ranks second after asthma with a prevalence of 37% and for Sumatera Utara the prevalence of COPD disease is 3.6% (Riskasdas, 2013). The prevalence of COPD continues to increase, especially in developing countries, largely due to tobacco use (Raste, 2016).

Physical activity is a body movement that is produced by contraction of skeletal muscle which increases energy expenditure (Waschki et al., 2012). In the context of COPD, physical activity is defined as the activity that a person chooses to carry out within the available training capacity (Alison and Jenkins, 2013). Low physical activity of a person is a risk factor behind COPD (Mostafavi, Ghofranipour, Feizi and Pirzadeh, 2015; Pirzadeh, Mostafavi, Ghofranipour and Mansourian, 2017). In COPD, physical activity is determined by several causes, including physiological, behavioral, social and cultural factors (Shin, 2018).

In COPD patients the duration, intensity, and amount of physical activity usually decrease significantly (Park, Richardson, Holleman and Larson, 2013). Previous studies reported that only 26% of patients with COPD reached the recommended daily level of physical activity (Burnett, 2018). Decreased physical activity is also associated with decreased lung function, decreased heart function, systemic inflammation and muscle weakness

in patients with COPD (Shin, 2018). COPD patients usually spend most of their day sitting or lying down rather than doing more active activities and having a poor quantity and quality of sleep (Lewthwaite, Effing, Lenferink and Williams, 2018; Spruit, Pitta, McAuley, ZuWallack and Nici, 2015). Decreased physical activity in COPD patients causes dependence on people around and certainly greatly influences the quality of life of COPD patients (Burnett, 2018; Leidy et al., 2014).

Physical activity in patients with COPD depends on many factors, one of which is individual behavior (Spruit et al., 2015). Improving overall physical activity is an important goal of COPD disease management (Park et al., 2013). Therefore increasing physical activity allows patients to take productive parts of their daily lives and provide long-term health benefits (Troosters et al., 2013). Benefits of increasing physical activity in COPD include increasing physical capacity, decreasing anxiety about shortness of breath, greater independence in daily activities, reducing fatigue and improving quality of life (Dressendorfer et al., 2018).

To increase and maintain physical activity in COPD patients, it is necessary to change COPD patients in their health behavior. One of the most popular models for studying physical activity behavior is the transtheoretical model or stages of change (Moeini et al., 2010). Transtheoretical models (TTM) have been successful in promoting changes in health behavior in the general and clinical population (Wilson et al., 2016). The Transtheoretical Model helps individuals change and maintain their behavior by implementing various strategies and processes that are suitable for each stage.

Transtheoretical model has four constructs namely stage of changes, processes of change, self efficacy, and decisional balance (Pirzadeh et al., 2015). Stage of changes include: (1) precontemplation, where at this stage individuals do not think about changing their behavior; (2) contemplation, where at this stage the individual realizes he has a problem and seriously considers changing his behavior; (3) preparation where when individuals perform cognitive activities and behaviors that prepare individuals to change; (4) action, where at this stage individuals actively implement behavioral and cognitive strategies to change previous patterns of behavior and adopt new behaviors; and (5) maintenance, where at this stage the individual integrates recently adopted behavior patterns into his lifestyle (Kozier et al., 2010).

One of the management of promotion of physical activity based on the Transtheoretical model that can be done is by education. Education based on transtheoretical models can be done with the hope of increasing patient knowledge about the importance of physical activity (Lee, Park and Min, 2015). Education based on the Transtheoretical Model aims to increase patient knowledge about the importance of physical activity (Zare et al., 2016).

Education based on a transtheoretical model by a nurse must promote behavior that helps individuals reach the maintenance stage, so as to increase their physical activity. Research Mostafavi et al. (2015) showed that education based on a transtheoretical model significantly increased physical activity in the intervention group over time with a p value < 0.05. Research by Zare et al. (2016) also found that education based on a transtheoretical model significantly increased physical activity in the intervention group (p < 0.01) after the intervention was carried out.

The problem in this study is how is the effect of education based on a transtheoretical model on physical activity of chronic obstructive pulmonary disease patients (COPD). This study aims to identify the effect of education based on the transtheoretical model (TTM) on increasing physical activity of COPD patients.

II. Research Methods

This research is a quasi-experimental study with the equivalent control group design research design that uses the same number of samples so as to provide basic data to compare the effectiveness and influence of the experimental variables. In this study respondents were given a pretest before an educational intervention based on a transtheoretical model (TTM) to assess physical activity of COPD patients, then respondents were given a post test after an educational intervention based on a transtheoretical model (TTM) to reassess physical activity and identify effectiveness or differences in groups intervention and control group.

The research data collection was conducted in May - June 2019 at USU Hospital, Medan. The population in this study were all COPD patients who were outpatient at Pulmonary Clinic of the USU Hospital, Medan. The sampling technique used was nonprobability consecutive sampling by selecting subjects who met the study inclusion criteria included in the study so that the specified number of samples could be met (Polit and Beck, 2012).

The sample in this study was COPD patients with inclusion criteria as follows: 1) Patients with a diagnosis of COPD stable, 2) Able to communicate verbally (able to communicate actively and well), 3) Able to read and write, 4) Having hearing and seeing good, 5) Willing to be a respondent and be present in every education session.

The number of samples used in this study was calculated using power analysis. Power analysis is a method used to reduce the risk of Type II errors, estimate the risk of Type II errors, and estimate the number of samples needed to obtain significant results (Polit and Beck, 2012).

This method uses previous research to determine the sample needed to obtain significant results. This study uses the Cohen formula as follows:

$$d = \frac{\mu_1 - \mu_2}{\sigma}$$

Previous research used to determine the number of samples in this study was a study conducted by Posri, Lagampan, Pichayapinyo and Kalampakorn (2017) aimed at evaluating the effect of a transtheoretical nursing intervention model on physical activity behavior in the prevention of metabolic syndrome in populations at risk in the Udon Thani area, Thailand. In this study respondents numbered 32 respondents for each group. In this study, the mean value in the group before the intervention was 38.13 and the mean value after the intervention was 35.53 and the mean difference between groups (σ) was 4.71, so the d value was:

$$d = \frac{35.53 - 38.13}{4.71}$$
$$d = 0.6$$

The large number of samples is obtained based on the power analysis table to determine the effect size for the two different test mean, where the equal power is 0.80 with an estimated effect size 0.6, so the sample size is 44 for each group. To prevent drop out, 10% is added so that the number of samples is 48 people for each intervention group and control group. So that the total number of samples in this study was 96 people. But during the data processing 4 of 96 respondents were dropped out because they were identified as outliers so that the total sample in this study was 92 people.

The preparatory stage for data collection begins after obtaining ethical clearance and then continues with taking care of the research location permit by submitting a request for a research permit from the Dean of the Faculty of Nursing, Universitas Sumatera Utara and addressed to the education and research department of the USU Hospital, Medan. After the research permit was issued, the researchers then asked permission from the head of the Pulmonary Polyclinic of the USU Hospital, Medan and explained the purpose and made a work contract for the duration of the study.

The next stage, in the first week of the study, the researcher identified the study sample based on the inclusion criteria that had been made previously. Next the researcher introduces himself, explains the purpose and procedure of the research intervention and asks the respondent's willingness to actively participate in the research by asking the respondent to sign an informed consent sheet that has been provided. On the informed consent sheet, respondents were asked to include the full address of the telephone number that could be contacted as the communication medium.

The next stage the researcher prepares an instrument sheet for data collection in the form of a patient demographic data questionnaire, a transtheoretical model stage questionnaire, a questionnaire to measure the patient's physical activity, a module or an educational implementation booklet based on a transtheoretical model (TTM). Modules or booklets will be given as a material guide and as an educational medium for respondents at home and are recommended to be taken at each educational session.

After filling in the respondent characteristic data and filling out the physical activity questionnaire in the first week, then in the second to fourth week of the study, respondents in the intervention group were given educational interventions based on a transtheoretical model in each respondent's home for three weeks to reach five educational meetings. Before conducting education based on the transtheoretical model (TTM) to the intervention group respondents, the respondent is first given a transtheoretical model (TTM) questionnaire whose results will tell the respondent to be in the stages of pre-contemplation, contemplation, preparation, action or maintenance.

The frequency of education three times a week with 30-60 minutes for each session. To remind respondents in their physical activities and to continue to participate in every education session, researchers will use mobile communication media. Whereas the control group received routine care from the hospital without being given an educational intervention based on a transtheoretical model (TTM). After that, researchers conducted a post-test to identify changes in physical activity using a physical activity questionnaire after five meetings over three weeks in the intervention group and the control group.

Data analysis was performed using a computerized program that is univariate analysis using frequency and percentage distributions. Paired t-test bivariate analysis to identify differences in physical activity of COPD patients before and after education was carried out based on the transtheoretical model (TTM) in each intervention group and control group. Independent bivariate t-test analysis to identify differences in physical activity of COPD patients after education based on a transtheoretical model (TTM) between the intervention group and the control group.

III. Results and Discussion

3.1 Results

Frequency distribution and percentage of demographic data characteristics of COPD patients in the intervention and control groups can be seen in Table 1. Table 1 shows the characteristics of respondents in the

intervention group the majority of respondents (47.8%) are aged over 65 years (old age). More than half of the respondents were male as many as 36 people (78.2%). Based on the level of education the majority of respondents had a high school education of 27 people (58.7%) and based on work the majority of respondents were private workers (self-employed) as many as 24 people (52.2%). Respondents from the majority intervention group had suffered COPD for less than 10 years by 26 people (56.5%), with the classification of the majority of heavy smokers by 33 people (97%) and smoking history in the majority intervention group respondents had stopped smoking by 34 people (26.1%).

In the control group, the majority of respondents aged between 56-65 years (late elderly) were 23 people (50%), with the sex of the majority of respondents being male as many as 36 people (78.2%), based on the level of education the majority of respondents were educated high school as many as 27 people (58.7%) and based on work the majority of respondents are private workers as many as 23 people (50%). Respondents from the majority control group had suffered from COPD for less than 10 years as many as 40 people (87%), with the classification of the majority of heavy smokers as many as 30 people (83.3%) and smoking history in the majority control group respondents had stopped smoking as many as 36 people (78.3%). Of the two groups of research respondents, the majority of respondents had never received education about physical activity.

Table 1. Frequency Distribution and Percentage Characteristics of Demographic Data of COPD Patients in the Pulmonary Polyclinic of Universitas Sumatera Utara Hospital

| Characteristics of Demographic Data | Intervention Group (n=46) | | Control Group (n=46) | |
|--|---------------------------|------|----------------------|------|
| | f | % | f | % |
| Age | | | | |
| Late adulthood (36-45 Year) | 4 | 8,7 | 1 | 2,2 |
| Early Elderly (46-55 Year) | 4 | 8,7 | 9 | 19,6 |
| Late Elderly (56-65 Year) | 16 | 34,8 | 23 | 50,0 |
| Old Age (> 65 Year) | 22 | 47,8 | 13 | 28,3 |
| Gender | | | | |
| Male | 34 | 73,9 | 36 | 78,2 |
| Female | 12 | 26,1 | 10 | 21,8 |
| Education | | | | |
| Elementary school | 15 | 32,6 | 14 | 30,4 |
| Middle School | 5 | 10,9 | 4 | 8,7 |
| High School | 23 | 50,0 | 27 | 58,7 |
| Perguruan Tinggi | 3 | 6,5 | 1 | 2,2 |
| Job | | | | |
| Housewife | 6 | 13,0 | 4 | 8,7 |
| Retired | 8 | 17,4 | 8 | 17,4 |
| Farmers | 8 | 17,4 | 10 | 21,7 |
| Private Sector Worker | 24 | 52,2 | 23 | 50,0 |
| Civil Servants | - | - | 1 | 2,2 |
| Marital Status | | | | |
| Married | 44 | 95,7 | 45 | 97,8 |
| Widow | 2 | 4,3 | 1 | 2,2 |
| Long Suffered From COPD | | | | |
| <10 tahun | 26 | 56,5 | 40 | 87,0 |
| > 10 tahun | 20 | 43,5 | 6 | 13,0 |
| Smoking Status History | | | | |
| Has Stopped | 34 | 73,9 | 36 | 78,3 |
| Never | 12 | 26,1 | 10 | 21,7 |
| Classification of Smokers | | | | |
| Heavy Smoker (> 600) | 33 | 97 | 30 | 83,3 |
| Medium Smoker (200-599) | 1 | 3 | 6 | 16,7 |
| Never Given Education About Physical Activity Before | | | | |
| Never | 46 | 100 | 46 | 100 |
| | - | - | - | - |

Physical Activity of COPD Patients Before (Pre Test) and After (Post Test) Education Based on Transtheoretical Model (TTM) in Intervention and Control Groups

Frequency distribution and percentage of physical activity of COPD patients can be seen in Table 2. Table 2 shows that physical activity before education was carried out based on the transtheoretical model (pre-test) in the intervention group, the majority of respondents had mild physical activity categories of 37 respondents (80.4%). Physical activity after education was carried out based on the transtheoretical model (pre-test) in the intervention group the majority of respondents had physical activity categories of 31 respondents (67.4%).

Physical activity before without education based on transtheoretical model (pre-test) in the control group the majority of respondents had mild physical activity category of 30 respondents (65.2%). While physical activity after without education is based on the transtheoretical model (post test) in the control group the majority of respondents still have mild physical activity categories as many as 29 respondents (63.0%).

Table 2. Frequency Distribution and Percentage of Physical Activity of COPD Patients Pre Test and Post Test in the Intervention and Control Groups

| Physical Activity | Intervention Group (n=46) | | | | Control Group (n=46) | | | |
|--------------------------|---------------------------|------|-----------|------|----------------------|------|-----------|------|
| | Pre test | | Post test | | Pre test | | Post test | |
| | f | % | f | % | f | % | f | % |
| Light Physical Activity | 37 | 80,4 | - | - | 30 | 65,2 | 29 | 63,0 |
| Medium Physical Activity | 9 | 19,5 | 15 | 32,6 | 16 | 34,8 | 17 | 37,0 |
| High Physical Activity | - | - | 31 | 67,4 | - | - | - | - |

Transtheoretical Model (TTM) Stages in COPD Patients

To find out the stages of the transtheoretical model in COPD patients the intervention group before and after being given education based on the transtheoretical model (TTM) at the Pulmonary Clinic of the USU Hospital, Medan can be seen in Table 3. Based on the results of the frequency distribution of the transtheoretical model (TTM) stages in 46 intervention group respondents before and after being given education based on transtheoretical model (TTM) can be seen from the frequency and percentage in Table 3 shows that before being given education based on transtheoretical model (TTM) the majority of respondents in the intervention group were in the contemplation stage of 26 people (56.5%) and after providing education based on the transtheoretical model (TTM) the majority of the intervention group respondents were in the maintenance stage of 24 people (52.2%).

Table 3. Frequency Distribution and Percentage of Transtheoretical Model Stages in COPD Patients Intervention Groups Before and After Providing Education Based on Transtheoretical Model (TTM) in Pulmonary Polyclinic of the USU Hospital, Medan

| Transtheoretical Model (TTM) Stages in COPD Patients | Before Education Based on The Transtheoretical Model (TTM) | | After Education Based on The Transtheoretical Model (TTM) | |
|--|--|------|---|------|
| | f | % | f | % |
| | Stages of Transtheoretical Model (TTM) | | | |
| Pre Contemplation | 2 | 4,3 | - | - |
| Contemplation | 26 | 56,5 | - | - |
| Preparation | 14 | 30,4 | - | - |
| Action | 4 | 3,7 | 22 | 47,8 |
| Maintenance | - | - | 24 | 52,2 |

Differences in Physical Activity of COPD Patients Before and After Education Based on The Transtheoretical Model (TTM) in The Intervention and Control Groups

According to Polit and Beck (2012), paired t test is a test used to identify differences in the mean dependent (physical activity) before (pre test) and after (post test) educational measures based on the transtheoretical model (TTM) in the intervention and control groups .

The results showed that there were significant differences in physical activity ($\alpha = 0.000, p < 0.05$) in the intervention group before and after education based on the transtheoretical model (TTM) and in the control group ($\alpha = 0.000, p < 0.05$) which is not educated based on the transtheoretical model (TTM). The results of paired t-test analysis before and after education based on the transtheoretical model (TTM) in the intervention group and the control group can be seen in Table 4.

Table 4. Difference in Mean Physical Activity Value of COPD Patients Before (Pretest) and After (Posttest) Education Based on Transtheoretical Model (TTM) in Intervention and Control Groups (N = 92)

| Variabel | Intervention Groups | | | Control Groups | | |
|----------|---------------------|---------|-------|----------------|-------|-------|
| | Mean Diference | t | Sig | Mean Diference | t | Sig |
| Activity | -31,935 | -36,360 | 0,000 | -0,522 | - | 0,000 |
| Physical | | | | | 4,528 | |

Differences in Physical Activity of COPD Patients After Education Based on Transtheoretical Model (TTM) in Intervention Groups and Control Groups

The influence of education based on transtheoretical model (TTM) on physical activity of COPD patients can be seen by identifying the differences in physical activity of COPD patients between the intervention groups after an education based on transtheoretical model (TTM) with a control group without education based on the transtheoretical model (TTM). Based on Table 5 using the independent t-test statistical test, it was found that there were significant differences in physical activity ($\alpha = 0,000$, $p < 0,05$) after education based on the transtheoretical model (TTM). Based on the significance value obtained p value ($\alpha = 0,000$, $p < 0,05$), it can be concluded that H_0 is rejected. Thus the results of the study showed that there were significant differences between physical activity in the intervention group after an education based on the transtheoretical model (TTM) and a control group that did not receive educational treatment based on the transtheoretical model (TTM) in the Pulmonary Clinic of the USU Hospital, Medan

3.1 Discussion

The results showed that respondents suffering from COPD disease varied between late elderly and elderly, which ranged from 56 to more than 65 years. The results of this study are in line with the results of Holm et al. (2014) which states COPD patients are in the age range of 32-84 years. This is because in elderly patients the cardio-respiratory system has decreased endurance and decreased function. Changes in the chest wall cause chest wall compliance is reduced and there is a decrease in the elasticity of the lung parenchyma, increased mucous glands and thickening of the bronchial mucosa. There is an increase in airway resistance and a decrease in pulmonary physiology such as forced vital capacity (FVC) and first-second forced expiration volume (FEV1).

In this study the majority of patients had COPD for < 10 years where the intervention group were 26 (56.5%) respondents and the control group were 40 (87%) respondents. The results of this study are in line with research conducted by Sharma et al. (2016) which states that the length of suffering from COPD is found to be less than 10 years by 90% and the length of time a person suffering from COPD is also related to the quality of life, where the longer suffering from COPD disease causes the patient's condition to decrease and certainly affects the deterioration in quality (Uppal, Gupta, Suri and Mittal, 2014).

The majority of COPD patients from each group in this study had a history of smoking status that had stopped smoking where the intervention group were 34 (73.9%) respondents and the control group were 36 (78.3%) respondents. Research Kourlaba et al. (2016) also found that most COPD patient respondents had quit smoking. According to Laborin (2009) that individuals who stop smoking reduce about 50% the risk of developing COPD disease.

More than 4000 substances including nicotine which is very addictive found in cigarettes that cause various other medical conditions due to smoking including heart disease and chronic lung disease means that smoking factors or history are factors that greatly contribute to the increase in various diseases, especially chronic obstructive pulmonary disease (COPD) . So the most important way to improve the prognosis in COPD patients is to stop smoking (Rosdahl and Kowalski, 2014).

In this study shows that the number of cigarettes smoked by the respondents is the majority of more than one pack per day. According to PDPI (2016) states that the risk of COPD occurrence in smokers depends on the number of cigarettes smoked, age of starting smoking, number of cigarettes per year and duration of smoking (Brikman Index).

The number of cigarettes smoked can be an indicator of whether an individual is included in the category of light, moderate and heavy smokers. If calculated based on the Brikman Index (the average number of cigarettes smoked per day (sticks) multiplied by the length of smoking (years)), the majority of COPD patients from each group were classified as heavy smokers where the intervention group was 32 (88.9%) respondents and the control group 34 (87.2%). The results of the Naser, Medison, and erly study (2016) obtained data that from the 20 samples studied there were 15 respondents with a heavy category Brikman Index and concluded that there was a significant relationship between the degree of smoking and the severity of COPD with value of $p = 0.033$.

Prolonged use of tobacco in this case smoking is very closely related to respiratory symptoms and COPD. Smoking is a major risk of COPD, a number of irritants contained in cigarettes stimulates excessive mucus production, coughing, damaging ciliary function, causing inflammation, bronchial damage and alveolar walls (Black and Hawks, 2014).

Physical activity of COPD patients prior to (pretest) educational actions based on the transtheoretical model (TTM) in the majority of the intervention group were in the category of mild physical activity as many as 37 (80.4%) respondents. While physical activity after (posttest) educational actions based on transtheoretical model (TTM) the majority are in high physical activity as many as 31 (67.4%) respondents.

Many factors affect physical activity in patients with chronic diseases, especially COPD. Several factors that affect a person's physical activity include age, cardiovascular function, breathing, motivation and psychosocial factors (O'Donnell, 2018). In COPD, physical activity is determined by several causes, including physiological and behavioral factors (Shin, 2018). This implies that the level of physical activity is not only influenced by physiological disorders such as in the lungs, cardiovascular and musculoskeletal systems but also by other factors such as habits or behavior, self-efficacy and health beliefs (Alison and Jenkins, 2013). This was also obtained from research respondents who said that they were sure to be healthy and could increase their physical activity after being given education based on the transtheoretical model (TTM).

One of the interventions used to study physical activity behavior is the transtheoretical model or stages of change (Moeini et al., 2010). The nurse has an important role to play in the success of the program. One of the management of promotion of physical activity based on the transtheoretical model that can be done is by education. Education based on the transtheoretical model can be done with the hope of increasing patient knowledge about the importance of physical activity. Knowledge of the importance of physical activity is one of the foundations for self-management in chronic diseases (Lee, Park and Min, 2015).

Education is an interactive process that encourages learning and learning is an effort to add new knowledge, attitudes, and skills through the strengthening of certain practices and experiences (Smeltzer and Bare, 2008). One of COPD's management strategies is education with the hope to increase knowledge about physical activities where physical activity knowledge is the basis for self-management of chronic diseases.

Based on the results of research conducted that supporting data obtained from the results of questionnaires where the majority of 80.4% of respondents were in the category of mild physical activity. The role of physical activity for people with COPD is very important meaning that physical activity carried out regularly will increase the work of muscles so that muscles will become stronger including respiratory muscles. So it can be concluded that the low physical activity of the respondent can affect a variety of health conditions so that it needs an action from the respondent himself so that his physical activity is fulfilled with the direction and guidance of the health worker.

Data relating to the description of the value of physical activity after intervention in COPD patients is shown in Table 2 that the results of physical activity after the intervention with the category of moderate physical activity there are 15 (32.6%) respondents and high physical activity there are 31 (67.4%) respondent. The results of the paired t-test analysis obtained p value < 0,000, which is less than the p value (0.05) contained in Table 4 so that it can be concluded that there are differences in the value of physical activity before and after an educational intervention based on the transtheoretical model (TTM) means that the action or intervention carried out has an influence on increasing respondents' physical activity.

After being given an educational intervention that includes knowledge about COPD respondents and the management of physical activities in accordance with the conditions of the majority of respondents were able to carry out their physical activities independently. The results of this study are in line with the statement of Zwerink et al. (2014) that educational interventions help patients with chronic obstructive pulmonary disease (COPD) gain knowledge and practice daily skills that allow patients to control their own illnesses so that changes in health behavior occur.

According to Lee, Park and Min (2015) to change someone's behavior can be done by providing health education. Education provided is a process of developing abilities, skills and adding knowledge. One way to support the implementation of education is the need for the use of health education media such as booklets that are useful to stimulate the interests of educational goals, overcome the limitations of time, place, language and sensory power and overcome the passive attitude of respondents, can stimulate experience and lead to the same perception.

The use of modules (booklets) that contain COPD disease and physical activity of COPD patients with images as an educational medium will also increase the effectiveness of education in improving behavior. According to Sudiharto (2007), the provision of informative and interesting educational materials, as a very strong supporter in providing education. Interesting educational material, will increase understanding and stimulate the enthusiasm of patients in following the material exposure. Previous studies reported that the use of modules (booklets) during the health education session was effective in increasing knowledge and behavior both in the short term (5 weeks) (Sae-Sia et al., 2013), and long term (6 months) (Vatankhah et al, 2009). The module

(booklet) allows respondents to reread, looking for further information related to the material that has been given.

Changes in COPD patient behavior so that they can control their illnesses such as exacerbation attacks carried out with education which is one aspect that plays an important role in COPD management can be given to patients with the aim of increasing patient knowledge and skills so that patients have preventive behavior in their lifestyles to avoid and control exacerbation attacks (PDPI, 2016).

This is in line with Disler et al. (2012) with regard to chronic and progressive COPD disease conditions that are very burdensome to the patient's condition, the most appropriate education given to COPD patients is education by involving patients in various self-care management strategies to make patients independent.

The aim of health education is to improve individual and community healthy behavior, knowledge relevant to interventions and strategies for maintaining health status, disease prevention, and managing (providing care) for chronic diseases (Nursalam, 2008). Saldana et al. (2013) states that health education interventions provided based on individual needs and monitoring carried out by nursing professionals, make it possible to achieve permanent behavior in connection with changes in behavior patterns, in addition to mastery of skills and knowledge.

The research has described education based on the transtheoretical model (TTM) in COPD patients showing the achievement of health education goals, namely the occurrence of changes in behavior intact (knowledge, affective and psychomotor) and reciprocal relationships between health professionals and patients where patients develop skills, knowledge, and confidence to determine the focus of his health care.

IV. Conclusion and Suggestion

4.1 Conclusion

Based on the results of this study it was found that there was an educational effect based on the transtheoretical model (TTM) on the physical activity of patients with chronic obstructive pulmonary disease (COPD) in the intervention group. This study also identified that the physical activity ability of the intervention group before education based on the transtheoretical model (TTM) was in the category of mild physical activity and after the intervention was in the category of high physical activity. Meanwhile, the control group showed that the ability of physical activity before and after education based on the transtheoretical model (TTM) remained in the category of mild physical activity. This study also found that there was a significant difference between physical activity in the intervention group after an education based on the transtheoretical model (TTM) and a control group that did not receive educational treatment based on the transtheoretical model (TTM).

4.2 Suggestion

Education based on the transtheoretical model (TTM) is expected to be one of the general materials for nursing. Nursing education, especially surgical medical nursing, should emphasize the role of nurses as educators of the need to provide education based on the transtheoretical model (TTM) in patients with chronic diseases, especially COPD.

It is recommended for nursing services that education based on the transtheoretical model (TTM) be used as a baseline for hospitals to develop education. Nurses also need to add an assessment of physical activity, especially COPD patients to get a picture of the patient's physical activity so that education is given right on target. For hospital management, especially in the field of nursing, it is expected to be able to make policies on the implementation of patient education programs as SOPs and to be specifically scheduled and to provide educational media in the form of booklets.

For further research, it is hoped that it can be used as a basis for further research on the effectiveness of educational programs in COPD patients. The implementation of educational interventions should be carried out in a longer time, more samples and control samples, and it is recommended that future studies conduct qualitative or mixed design research to dig deeper into physical activity in COPD patients.

Reference

- [1]. Alison, J., and Jenkins, S. (2013). Optimising function in copd physical activity and pulmonary rehabilitation. *Medicine Today*, 14(3), 34-40.
- [2]. Andersson, M., Lindberg, A., Stridsman, C., Emtner, M., and Ronmark, E. (2015). Physical activity and fatigue in chronic obstructive pulmonary disease-a population based study. *Respiratory Medicine*, 109(1), 1048-1057. <http://dx.doi.org/10.1016/j.rmed.2015.05.007>.
- [3]. Black, J. M., and Hawks, J. H. (2014). *Keperawatan medikal bedah manajemen klinis untuk hasil yang diharapkan*. Jakarta: Elsevier.
- [4]. Burnett, D. (2018). Copd and physical activity: a call to action for respiratory therapists and patients. *Respiratory Care*, 63(1), 121-122. doi: 10.4187/respcare.05992.
- [5]. Disler, R.T., Gallagher, R.D., and Davidson, P.M. et al. (2012). Factors influencing self-management in chronic obstructive pulmonary disease: An integrative review. *International Journal of Nursing Studies*. Page 230-242. doi:10.1016/j.ijnurstu.2011.11.005.

- [6]. Dressendorfer, R. H., Haykowsky, M. J., and Eves, N. (2018). Exercise for persons with chronic obstructive pulmonary disease. *American College of Sports Medicine*, 1-2.
- [7]. Global Initiative for Chronic Obstructive Lung Disease (GOLD). (2018). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. National Institutes of Health. National Heart, Lung and Blood Institute.
- [8]. Holm, K.E., Plaufcan, M.R., Ford, D.W., MD, Sandhaus, R.A., Strand, M., Strange, C., and Wamboldt, F.S., (2014). The impact of age on outcomes in chronic obstructive pulmonary disease differs by relationship status. *J Behav Med.* 37(4): 654–663. doi:10.1007/s10865-013-9516-7.
- [9]. Kourlaba, G., Hillas, G., Vassilakopoulos, T., Maniadakis, N. (2016). The disease burden of chronic obstructive pulmonary disease in Greece. *International Journal of COPD*.
- [10]. Kozier, B., Glenora, E, Audrey, B and Shirlee J.S. (2010). *Buku Ajar Fundamental Keperawatan*. Jakarta: EGC.
- [11]. Laborin, R.L., (2009). Smoking and chronic obstructive pulmonary disease (COPD). Parallel epidemics of the 21st century. *Int. J. Environ. Res. Public Health*, 6, 209-224. doi:10.3390/ijerph6010209.
- [12]. Lee, J. Y., Park, H., and Min, Y. H. (2015). Transtheoretical model-based nursing intervention on lifestyle change: a review focused on intervention delivery methods. *Asian Nursing Research*, 9(1), 158-168.
- [13]. Leidy, N. K., Kimel, M., Ajagbe, L., Kim, K., Hamilton, A., and Becker, K. (2014). Designing trials of behavioral interventions to increase physical activity in patients with copd: insights from the chronic disease literature. *Respiratory Medicine*, 108, 472-481. <http://dx.doi.org/10.1016/j.rmed.2013.11.011>.
- [14]. Lewthwaite, H., Effing, T. W., Lenferink, A., and Williams, M. T. (2018). Improving physical activity, sedentary behaviour and sleep in copd: perspectives of people with copd and experts via a delphi approach. *Peer Journal*, 46(1): 1-23. doi: 10.7717/peerj.4604.
- [15]. Moeini, B., Rahimi, M., Hazaveie, S. M. M., Allahverdipoor, H., Moghimbeygi, A., and Mohammadfam, I. (2010). Effect of education based on trans-theoretical model on promoting physical activity and increasing physical work capacity. *Iranian Journal of Military*, 12(3), 123-130.
- [16]. Mostafavi, F., Ghofranipour, F., Feizi, A., and Pirzadeh, A. (2015). Improving physical activity and metabolic syndrome indicators in women: a transtheoretical model-based intervention. *International Journal of Preventive Medicine*, 6(28), 1-8. doi: 10.4103/2008-7802.154382.
- [17]. Naser, F., Medison, I., and Erly. (2016). *Gambaran Derajat Merokok Pada Penderita PPOK di Bagian Paru RSUP Dr. M. Djamil. Jurnal Kesehatan Andalas*. Vol 5 (2). <http://jurnal.fk.unand.ac.id>.
- [18]. Nursalam and Efendi, F. (2008). *Pendidikan dalam keperawatan*. Jakarta: Salemba Medika.
- [19]. O'Donnell, D.E. (2018). Increasing physical activity in copd one step at a time. *American Thoracic Society*, 1-8. doi: 10.1164/rccm.201804-0755ED.
- [20]. Oemiati, R. (2013). *Kajian epidemiologis penyakit paru obstruktif kronik (ppok)*. Pusat teknologi intervensi kesehatan masyarakat badan penelitian dan pengembangan kesehatan, kementerian kesehatan ri. *Media Litbangkes*, 23(2), 82-88.
- [21]. Perhimpunan Dokter Paru Indonesia (PDPI). (2016). *Penyakit paru obstruksi kronik diagnosis dan penatalaksanaan*. Jakarta: Universitas Indonesia (UI-Press).
- [22]. Pirzadeh, A., Mostafavi, F., Ghofranipour, F., and Feizi, A. (2015). Applying transtheoretical model to promote physical activities among women. *Iran Journal Psychiatry Behavior Science*, 9(4): 1-6. doi: 10.17795/ijpbs-1580.
- [23]. Pirzadeh, A., Mostafavi, F., Ghofranipour, F., and Mansourian, M. (2017). The application of the transtheoretical model to identify physical activity behavior in women. *Iranian Journal of Nursing and Midwifery Research*, 22(4), 299-302. doi: 10.4103/1735-9066.212979.
- [24]. Polit, D. F., and Beck, C. T. (2012). *Resource manual for nursing research. Generating and assessing evidence for nursing practice*. Ninth Edition. USA: Lippincott.
- [25]. Posri, S., Lagampan, S., Pichayapinyo, P., and Kalampakorn, S. (2017). The effects of nursing intervention for metabolic syndrome prevention applying the transtheoretical model in dietary and exercise behaviors among the population at risk. *The National and International Graduate Research Conference*, 291-301.
- [26]. Raste, Y. (2016). *Physical activity in copd. (Disertasi)*. London: The National Heart & Lung Institute, Imperial College.
- [27]. *Riset Kesehatan Dasar (Riskesdas)*. (2013). Badan penelitian dan pengembangan kesehatan kementerian kesehatan RI. Jakarta.
- [28]. Rosdahl, C.B., and Kowalski, M.T. (2014). *Buku Ajar Keperawatan Dasar*. Edisi 10. Jakarta. Penerbit Buku Kedokteran. EGC.
- [29]. Sae-Sia, W., Maneeawat, K., and Kurniawan, T. (2013). Effect of a self-management support program on diabetic foot care behaviors. *International Journal of Research in Nursing*, 4(1), 14.
- [30]. Sharma, M. K., Kumar, A., and Venkateshan, M. (2016). Effectiveness of self-instructional module on knowledge of self-care management of chronic obstructive pulmonary disease among patients with chronic obstructive pulmonary disease. *International Journal of Research in Medical Sciences*, 4(5), 1604-1608. <http://dx.doi.org/10.18203/2320-6012.ijrms20161234>.
- [31]. Shin, K. C. (2018). Physical activity in chronic obstructive pulmonary disease: clinical impact and risk factors. *The Korean Journal Of Internal Medicine*, 33(1), 75-77. <https://doi.org/10.3904/kjim.2017.387>.
- [32]. Smeltzer, S. C., Bare. G., Hinkle, J.L., and Cheever . (2010). *Brunner and suddarth's text book of medical surgical nursing (11 th ed)*: Lippincott Williams and Wilkins.
- [33]. Spruit, M. A., Pitta, F., McAuley, E., ZuWallack, R. L., and Nici, L. (2015). Pulmonary rehabilitation and physical activity in patients with chronic obstructive pulmonary disease. *American Journal of Respiratory and Critical Care Medicine*, 192(8), 924-933.
- [34]. Sudiharto. (2007). *Asuhan keperawatan keluarga dengan menggunakan pendekatan keperawatan transkultural*. Jakarta: EGC.
- [35]. Thomson, E.F., Rachel, S. Chisholm, R.S., and Brennenstuhl, S. (2016). COPD in a population-based sample of never-smokers: interactions among Sex, gender, and race. *International Journal of Chronic Diseases*. <http://dx.doi.org/10.1155/2016/5862026>.
- [36]. Troosters, T., Molen, T., Polkey, M., Rabinovich, R. A., Weisman, I., Kulich, K., & Vogiatzis, I. (2013). Improving physical activity in copd: towards a new paradigm. *Respiratory Research*, 14(115), 1-8. doi:10.1186/1465-9921-14-115.
- [37]. Troosters, T., Janssens, W., Maltais, F., Aymerich, J. G., Korduck, L., Hamilton, A., Leidy, N., Lavoie, K. L., Erzen, D., Bourbeau, J., Sedeno, M., & Sousa, D. D. (2018). Effect of bronchodilation and exercise training with behavior modification on exercise tolerance and downstream effects on symptoms and physical activity in copd. *American Thoracic Society*, 10(1), 91-94. doi: 10.1164/rccm.201706-1288OC.
- [38]. Uppal, M., Gupta, B., Suri, J.C., & Mittal, V. (2014). Factors affecting severity, functional parameters, and quality of life in COPD patients. *Journal, Indian Academy of Clinical Medicine*. Vol. 15, No. 1.
- [39]. Vorrink, S. N. W., Kort, H. S. M., Troosters, T., & Lammers, J. W. J. (2011). Level of daily physical activity in individuals with copd compared with healthy controls. *Respiratory Research*, 12(33), 1-8. doi:10.1186/1465-9921-12-33.
- [40]. [40]Waschki, B., Spruit, M. A., Watz, H., Albert, P. S., Shrikrishna, D., Singer, R. ., Groenen, M., Edwards, L. D., Smith, C., Calverley, P. M. A., Magnussen, H., Polkey, M.I., Man, W. D. C., and Wouters, E. F. M. (2012). Physical activity monitoring in

- copd: compliance and associations with clinical characteristics in a multicenter study. *Respiratory Medicine*, 106(1), 522-530. doi:10.1016/j.rmed.2011.10.022.
- [41]. Wilson, J. J., Kirk, A., Hayes, K., Bradbury, I., McDonough, S., Tully, M. A., O'Neill, B., and Bradley, J. M. (2016). Applying the transtheoretical model to physical activity behavior in individuals with non-cystic fibrosis bronchiectasis. *Respiratory Care*, 61(1), 68-77. doi:10.4104/pcrj.2009.00044.
- [42]. Zare, F., Aghamolaei, T., Zare, M., and Ghanbarnejad, A. (2016). The effect of educational intervention based on the transtheoretical model on stages of change of physical activity in a sample of employees in iran. *Health Scope*, 5(2), 1-8. doi: 10.17795/jhealthscope-24345.
- [43]. Zwerink, M., Brusse, K.M., Vander, V.P., Zielhuis, G.A., Monninkhof, E.M., Vander. P.J., Frith, P.A., and Effing, T. (2014). Self management for patients with chronic obstructive pulmonary disease. *Cochrane Database Syst Rev*.19(3).

Afina Muharani Syaftriani. " The Influence of Education Based on Transtheoretical Model (TTM) on Physical Activity of Patients with Chronic Obstructive Pulmonary Disease (COPD)." *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, vol. 8, no.06 , 2019, pp. 81-90.