“Health Belief Model” in the Prevention of Chronic Disease in the Elderly

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Abstract
Chronic disease is a non-communicable disease categorized as a long-term disease due to physiological changes in the body in the elderly. Chronic disease can be prevented with a healthy lifestyle and education through the Health Belief Model with the belief that someone takes a series of actions to overcome disease and reduce side effects. This study aims to determine how the effect of the application of the “Health Belief Model” in the Prevention and Health Care of Chronic Disease in the Elderly, which was carried out with a total sample of 100 respondents. The research design used Quasi Experiment with a pre-test and post-test approach with a control group design, a knowledge questionnaire about chronic disease, disease prevention, and health care including pre-test and post-test, used Paired T-Test with knowledge result p-value 0.000 < α (α = 0.05) and health prevention and maintenance p-value 0.000 < α (α = 0.05) so it can be concluded that there is an effect of implementing the "Health Belief Model" in the prevention and maintenance of chronic disease health in the elderly.

Introduction
Chronic disease is a non-communicable disease and is categorized as a long-term disease because it undergoes physiological changes in the body (Ribeiro et al., 2014). Chronic illness can cause job loss, experience physical dependence, and require treatment assistance (Gonzalez, Maria, Roth, Gelehrter, & Lopes, n.d.). Indonesia has 20.24 million people in the elderly category, equivalent to 8.03% of the total population (Yuliani, Baroya, & Ririanty, 2014). The number has not been matched by good health. The elderly morbidity rate in Indonesia is calculated at 25.05%, meaning that out of every 100, there are 25 sick elderly. The morbidity rate of the elderly is moderate due to chronic diseases in the highest order, such as hypertension, arthritis, stroke, COPD, DM, cancer, coronary heart disease, kidney stones, heart failure, and kidney failure (Sudarmaja, Swastika, & Ariwati, 2020).

Chronic diseases generally attack the elderly, and this condition requires treatment until the end of life (Periyakoil, Neri, & Kraemer, 2016). The increasing population of chronic diseases affecting the elderly poses challenges for social care and health care. They experience the aging process, so they have a health burden. The decline in health functions prevents the elderly from being independent and participating in social activities (Perdamaian, Manus, Periska, & Steffiash, 2020). The incidence of elderly people with chronic diseases requires long-term care and increases the cost of health care. In addition, chronic conditions cause the elderly to experience an inability to perform activities independently due to aging, disease conditions, and cognitive abilities that can make them dependent on care providers and require health services (Ondiege & Clarke, 2017).

The elderly with chronic diseases require long-term treatment. Treatment compliance is vital for them. Compliance is affected by several factors. Like medication, patient, physician, system-based factors, etc. Low medication compliance usually leads to poor compliance due to medication errors, misunderstanding of instructions, lack of knowledge, side effects, and non-compliance.
behavior in the elderly. The researcher would like to thank the Research Institute of the University of North Sumatra. This research was funded by the Research Institute of the University of North Sumatra by the Contract for the implementation of Talent Research at the University of North Sumatra, the Young Lecturer Research Scheme for the 2020 Fiscal Year Number: 307/ UN5.2.3.1/ PPM/TALENTA USU/2020 April 28, 2020.

Method

This study uses a quasi-experimental pretest-posttest control group design with one type of treatment and a purposive sampling approach. The number of samples consisted of the experimental group and the control group. The intervention was given for eight months and three times the intervention of the HBM cognitive model. The research took place in the working area of Medan Sunggal Health Center. The population in this study were elderly with chronic diseases as patients seeking treatment at the Medan Sunggal Health Center. A sample of 100 people, consisting of 50 in the intervention group and 50 in the control group. The instrument used in this study consisted of three types instruments. Demographic data questionnaire (age, gender, education, income, length of illness). Knowledge questionnaire about chronic disease, disease prevention, health care behavior includes pre-test and post-test. Data analysis was carried out in two ways, namely: univariate analysis which was carried out to analyze the characteristics of respondents, and pre-test and post-test questionnaires of knowledge about chronic disease, disease prevention, health care behavior then analyzed with frequency distribution tables and proportions. Bivariate analysis on the independent variable and the dependent variable used the statistical Paired t-test to determine the effect of the implementation of HBM on knowledge about chronic disease, disease prevention, health care behavior. Data analysis used a data processing program. This research has obtained an Ethical Approval permit from the Health Research Ethics Commission, Faculty of Nursing, the University of North Sumatra with Number: 2162/VI/SP/2020.
Results and Discussions

The results showed that the demographic data of the respondents in the intervention group in this study were the majority female as many as 35 people (70%) for the control group and 36 people (72%) for the intervention group, the average age of the respondents ranged between the ages of 46-65, namely 39 people (78%) for the control group and 37 people (74%) for the intervention group, income <2 million as many as 28 (56%) for the control group and 23 people (46%) for the intervention group, the most education is SMA 16 people (32%) for the control group and 20 people (40%) for the intervention, the most religion is Islam, both from the intervention and control groups, namely 40 people (80%), Javanese ethnicity is the largest ethnic group with a total of 18 people (36%) for the control group and 21 people (42%) for the intervention, and the average respondent status was married as many as 33 people (66%) in the control group and 29 people (58%) in the control group. The disease suffered by the majority was hypertension 24 (48%) for the intervention group and 17 people (34%) in the intervention group, the duration of illness was around 1-10 years as many as 31 people (62%) for the control group and 25 people (50%) for the control group, the most sources of health-related information were obtained from the family of 26 people (52%) for the intervention group, and for the control group the most by health workers 26 people (52%), and 18 people who participated in elderly activities (36%) for the intervention group and 37 people (74%) for the control group.

The results showed that the p-value = 0.000 <0.05. It means that there is an effect of implementing the Health Belief Model on knowledge of chronic diseases in the elderly before and after being given the intervention. In line with the results of other studies showing that perceptions of vulnerability and seriousness of health outcomes are related to individual characteristics (i.e. gender, age), and those might influence the utilization of preventive services among those with health care coverage ((Luquis & Kensinger, 2019).

The results showed (Ng et al., 2014) that most health care behaviors were good, namely 44 people (58.7%). Health care behavior is vital in supporting the quality of life of the elderly in dealing with chronic diseases. Regarding symptom intensity and characteristics of chronic disease progression, participants with lower levels of schooling in the study (multiple and secondary education) showed more concern with possible symptoms. Because the representation of their perceived severity was higher than those at other school levels that would affect health care (Costa, 2020).

The results of other studies show that the quality of life associated with health maintenance in old age declines due to various causes, including physical inactivity and high blood pressure. In this regard, chronic diseases such as hypertension have affected 1.8 billion people worldwide. 50% of them are not aware of this condition. Only 25% of patients are aware of it. As a result, many elderly suffer from more severe chronic diseases. Unfortunately, they lack the necessary information and knowledge regarding health care and disease prevention and control. This problem has put 75% of the population with chronic diseases at risk for cardiovascular disease, heart failure or stroke, kidney failure, liver failure, and even sudden death (Onoruoiza, Musa, Umar, & Kunle, 2015).

A study on the elderly in Iran also showed that 48.1% of patients suffering from chronic diseases such as high blood pressure were undergoing treatment, and only 21.3% were under control. However, another opinion says about half of the patients who receive hypertension treatment do not continue their treatment for one year. Due to a lack of knowledge related to the problems that will arise due to the chronic disease. It will affect the prevention behavior of these chronic diseases (Mostafavi, Najimi, Sharifirad, & Golshiri, 2016).
Table 1. Distribution of Demographic Data Frequence

| Demographic Data | Intervention Group | Control Group |
|------------------|--------------------|---------------|
|                  | f      | %   | f      | %   |
| Gender           |        |     |        |     |
| Male             | 14     | 28  | 15     | 30  |
| Female           | 36     | 72  | 35     | 70  |
| Age              |        |     |        |     |
| 46-55 years      | 9      | 18  | 15     | 30  |
| 56-65 years      | 28     | 56  | 24     | 48  |
| 66-75 years      | 10     | 20  | 8      | 16  |
| 76-85 years      | 3      | 6   | 3      | 6   |
| Education        |        |     |        |     |
| Elementary       | 12     | 24  | 8      | 16  |
| Junior High School | 8   | 16  | 12     | 24  |
| Senior High School | 20  | 40  | 16     | 32  |
| Graduate         | 8      | 16  | 10     | 20  |
| No education     | 2      | 4   | 4      | 8   |
| Religion         |        |     |        |     |
| Islam            | 40     | 80  | 40     | 80  |
| Christian        | 7      | 14  | 3      | 6   |
| Catolic          | 3      | 6   | 5      | 10  |
| Hindu            | 0      | 0   | 2      | 4   |
| Ethnic           |        |     |        |     |
| Karo             | 5      | 10  | 4      | 8   |
| Java             | 21     | 42  | 18     | 36  |
| Malay            | 2      | 4   | 5      | 10  |
| Batak            | 19     | 38  | 17     | 34  |
| Aceh             | 0      | 0   | 3      | 6   |
| Others           | 3      | 6   | 3      | 6   |
| Diseases:        |        |     |        |     |
| Hipertension     | 17     | 34  | 24     | 48  |
| Diabetes         | 9      | 18  | 8      | 16  |
| Gout             | 8      | 16  | 11     | 22  |
| Rheumatism       | 9      | 18  | 4      | 8   |
| Others           | 7      | 14  | 3      | 6   |
| Period of sickness|       |    |        |     |
| 1-5 years        | 14     | 28  | 14     | 28  |
| 6-10 years       | 11     | 22  | 17     | 34  |
| > 10 years       | 25     | 50  | 19     | 38  |
| Health Related Information Source | | | | |
| Family           | 20     | 40  | 26     | 52  |
| Health Attendant | 26     | 52  | 21     | 42  |
| Friend/Relative  | 3      | 6   | 2      | 4   |
| Self sourcing    | 1      | 2   | 1      | 2   |
| Elderly Activity |        |     |        |     |
| No               | 37     | 74  | 32     | 64  |
| Yes              | 13     | 26  | 18     | 36  |

Source = Primary Data, 2020

Table 2. Distribution of Respondent's Knowledge Frequence

| Respondent | Pretest | Posttest |
|------------|---------|----------|
|            | F   | %   | F  | %   |
| **Intervention Group** | | | | |
| Good       | 29  | 58  | 50 | 100 |
| Enough     | 16  | 32  | 0  | 0   |
| Poor       | 5   | 10  | 0  | 0   |
| **Control Group** | | | | |
| Good       | 29  | 58  | 29 | 58  |
| Enough     | 16  | 32  | 16 | 32  |
| Poor       | 5   | 10  | 5  | 5   |

Source = Primary Data, 2020
The results of previous studies also show that the elderly with chronic diseases have low health behavior in treatment. So it will have an impact on maintaining their health. In this case, Lo et al. (2016), conducted a study on knowledge and health care for chronic hypertension in the elderly with high blood pressure in Hong Kong. The results revealed that more than half of these people (55.9%) reported low levels of knowledge and adherence to treatment. In this case, influenced by seniority, living alone, and perceptions of independent treatment control accompanied by greater adherence to treatment. This study proves that the unmarried elderly in China are more likely to adhere to treatment which can determine the influence of cultural factors on adherence level. So the elderly’s health can be maintained properly (Lo, Chau, Woo, Thompson, & Choi, 2016).

Other studies explain that health maintenance efforts are not solely related to the disease. Psychological problems will also affect health care. Others researches show that when old, most people live alone and have small social networks and low participation in social activities (Cornwell & Waite, 2009), making them more vulnerable to feelings of loneliness. Loneliness is a common, painful, emotional experience, and it is a significant public health problem, especially among the elderly (Gerst-Emerson & Jayawardhana, 2015). There is increasing evidence documenting that loneliness in old age appears to be a vital risk factor for inactivity (Shankar, McMunn, Banks, & Steptoe, 2011), and poorer health, including morbidity and mortality (Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015), depression (Bodner & Bergman, 2016), lower levels of self-assessment of physical health (Cornwell & Waite, 2009), and hypertension (Christiansen, Larsen, & Lasgaard, 2016), as well as cardiovascular disease, diabetes, and migraine (Momtaz et al., 2012).

Another study observed that people’s knowledge and perception of disease, their understanding of the disease burden, and their beliefs on treatment could be vital in predicting health care. Therefore, the higher the knowledge about the threat of disease, the higher the level of one’s health care the prevention. Proper understanding and knowledge can also contribute to future interventions, which will affect the economy, such as high hospital costs (Rajpura J, Nayak R, 2014).

Other studies have shown that negative age beliefs harm health care (Gonzalez et al., n.d.) and emotional responses to stress (Bellingtier & Neupert, 2018) from those around them. In addition, age, which includes negative age stereotypes, can have a detrimental effect at the community level. For example, in terms of health care costs, age can incur high costs for countries, which can exacerbate economic pressures (Levy, Slade, Chang, Kannothe, & Wang, 2020).

In other studies related to health care behavior in the European countries as well as in the US, more than 60% of health care spending is for people who have chronic diseases. The findings suggest that the problem of various chronic conditions is not limited to older adults. But also in men and women under 65 years of age, possibly due to the increasing epidemic of chronic diseases associated with overweight and obesity due to excessive caloric intake, an unhealthy diet, and a lack of physical activity. Health care behavior is the main thing that must exist and must be applied to these problems.

Table 3. Distribution of Frekuensi Respondent’s Prevention and Care

| Respondent | Pretest F | Pretest % | Posttest F | Posttest % |
|------------|-----------|-----------|------------|------------|
| **Intervention Group** | | | | |
| - Good care | 20 | 60 | 50 | 100 |
| - Enough care | 30 | 40 | 0 | 0 |
| - Poor care | 0 | 0 | 0 | 0 |
| **Control Group** | | | | |
| - Good care | 20 | 60 | 20 | 60 |
| - Enough care | 30 | 40 | 30 | 40 |
| - Poor care | 0 | 0 | 0 | 0 |

Source = Primary Data, 2020
Until efforts to prevent chronic diseases in the elderly can be maintained (Atella et al., 2015; Fontana & Hu, 2014 & Heymsfield & Wadden, 2017).

Another related study was conducted on 86 percent of Italian adults over the age of 65 now living with at least one chronic condition and 56.7 percent with more than one. They contribute a relevant share of the annual public health care budget (about 23 billion euros and 20% of the total budget). Without integrated strategic preventive interventions, the number is likely to increase and become unsustainable as the total Italian population aged over 65 is projected to increase sharply over the next 15 years, which is alarming. Thus patients’ earlier exposure to chronic disease combined with a longer life expectancy extends the period of living in poor health. Moreover, obesity is the main problem in many other developed countries and developing countries worldwide because individuals with obesity are more likely to develop various chronic diseases, which have a high economic cost in direct and indirect health care costs (Atella et al., 2015; Fontana & Hu, 2014; Heymsfield & Wadden, 2017).

It should be noted that health care, especially in patients with chronic diseases, is of the utmost importance because these conditions have a progressive tendency, and low prevention rates lead to progression, decreased quality of life, and ultimately treatment failure. So they will experience health threats to the elderly and patients with chronic diseases (Rajpura & Nayak, 2014). In the study, many efforts by health attendants to prevent and keep the elderly away from chronic diseases. Such as approaching, promoting health, and providing support to the elderly and their families. In addition, social support such as promoting health because it facilitates healthier behavior and adherence will influence better behavior towards treatment and health care (Uchino, 2006). As getting older, the elderly are easier to experience physical complaints. Whether due to physiological changes or disease conditions. The aging process that occurs in the elderly will usually cause a decrease in the quality of life (Mulyawati, 2015), when older adults who perceive to have good social support are more likely to have better health outcomes and care. Previous studies revealed that adequate social support has a positive correlation with the physical and mental quality of life in older adults with chronic diseases (Yue, Li, Weilin, & Bin, 2015). As getting older, the elderly are easier to experience physical complaints. Whether due to physiological changes or disease conditions. The aging process that occurs in the elderly will usually cause a decrease in the quality of life (Sutikno. 2011).

Although changing disease risk factors reduces overall chronic disease risk, modifiable risk factors such as sedentary behavior are associated with increased risk for chronic disease. Non-modifiable risk factors are traits that cannot be changed, such as age, ethnicity, and genetics. However, although not changed directly, genes are strongly influenced by the environment and lifestyle that affect gene expression. Modifiable risk factors are positively affected by lifestyles, such as daily physical activity, regular exercise, healthy diet, social involvement, spirituality, and stress management. However, other modifiable risk factors are not directly related to lifestyles, such as education level, socioeconomic status, and occupation (Kirwan, Sacks, & Nieuwoudt, 2017).

The health improvements seen with activity are not limited to the cardiovascular system. Once physically active, elderly with chronic diseases such as type 2 diabetes improve their overall insulin sensitivity and positively alter skeletal muscle proteins and enzymes associated with glucose metabolism and insulin signaling. As a result, structured exercise programs are becoming a vital part of prevention and treatment management (Kirwan et al., 2017).

The same factors that make individuals more vulnerable are also related to a reduced ability to access and understand health information, make well-informed decisions, and take actions that promote optimal health skill set, commonly referred to as “health literacy”. It is especially true if the health information itself is not timely, reliable, consistent, or actionable. Health literacy has emerged over the past three decades as one of the strongest psychological
Table 4. Effect of Implementation to Health Prevention and Care

| Variable                                      | Mean | SD   | T    | p-value |
|-----------------------------------------------|------|------|------|---------|
| **Intervention Group**                        |      |      |      |         |
| Pre-post test Health Prevention and Care      | 7.800| 0.788| 9.901| 0.000   |
| **Control Group**                             |      |      |      |         |
| Pre-post test Health Prevention and Care      |      |      |      |         |

(There is effect with p-value = 0.000 <0.05)

The study found an effect of providing intervention with the health belief model application on the prevention of chronic diseases in the elderly. The study revealed that the implementation of HBM-based educational interventions can improve patient adherence to the treatment of chronic diseases in the elderly such as hypertension (Yue et al., 2015). Therefore, medication compliance in older adults, attention to the prevention, control of different complications and diseases is critical. Based on the results of previous investigations, the most common self-care problems experienced by the elderly are associated with inadequate education for this population (Ghasemi, Moonaghi, Mohajer, Mazlom, & Shoeibi, 2018).

Appropriate educational interventions seem to be able to improve medication adherence in the elderly and patients in terms of prevention and control of chronic diseases in the elderly. The statistics provided have also emphasized greater attention to cardiovascular risk factors. As well as the importance of primary prevention more than ever. Therefore, HBM-based education program for the control and prevention of hypertension in elderly patients has a significant effect. The results of other studies also show that the implementation of this model-based education program in the elderly can increase the rate of medication adherence by approximately 59%. Therefore, in the post-intervention phase, the mean score for prevention and maintenance of chronic disease in the elderly in the intervention group was significantly higher than in the control group. In addition, in the comparison of the average score of prevention and health maintenance by doing treatment by the elderly, the intervention group has increased significantly after being given the HBM cognitive model intervention, compared to before. However, there was no significant difference in the control group. Therefore, this study shows the positive effect of the HBM-based education program on medication adherence and disease control and prevention in the elderly with hypertension (Yazdanpanah, Moghadam, Mazlom, Beigloo, & Mohajer, 2019).

The results of this study indicate that the HBM can predict 48.8% of behavior changes with an accuracy of 82.8%. After moderating risk factors, HBM can also estimate a 50.5% change in medication adherence with an accuracy of 86.2%, which means that HBM can significantly affect control and prevention behavior in hypertensive patients (Yue et al., 2015). Perceptions and attitudes may determine how people practice and behave under certain conditions. HBM is widely used in health promotion and health education situations. Found to predict various health behaviors such as performing prognostic tests, choosing to use any treatment type or medication, or taking precautions regarding any disease (Albashtawy et al., 2016).

Conclusions

The cognitive models (HBM) application can change health-related behavior in preventive efforts. It is based on the expectancy-value theory. Assuming that individuals value disease avoidance or recovery and people expect certain health actions can prevent or improve disease. Based on the results of this study, HBM is effective in preventing chronic diseases and changing health care behavior in the elderly. Health attendants are expected to be the primary source of education for the elderly in providing health services and prevention efforts to maintain the health of the elderly in the community continuously.
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