



Original Research

Impact of Telenursing Implementation on Diet Compliance and Blood Pressure in Patients with Hypertension

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ABSTRACT

Introduction: Diet compliance remains a major issue in the management of hypertension. To the most recent, face to face and telenursing interventions were implemented in hypertension management. However, the impact of telenursing on diet compliance remains unknown. This study aims to determine the impact of telenursing on diet compliance and blood pressure of patients with hypertension.

Methods: A quantitative quasi-experimental design with a pretest-posttest without a Control Group was applied in this study. A purposive sampling technique was applied, and 30 individuals were selected. Data were analysis with inferential statistics McNemar test and the Paired Sample T-test.

Results: There was an increase in hypertension patients' dietary compliance after telenursing intervention, from 6.7% to 100%. Additionally, there was a decrease in the average systolic blood pressure from 156.8 mmHg to 145.3 mmHg and diastolic blood pressure from 105 mmHg to 94.3 mmHg. There is an influence of Telenursing on improving dietary compliance and reducing blood pressure in hypertensive patients, with respective p -value <0.001 .

Conclusions Telenursing positively impacts on the diet compliance and blood pressure of patients with hypertension. Further research on telenursing development and innovation was warranty.

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1. INTRODUCTION

Hypertension can lead to extremely dangerous conditions and is often asymptomatic or presents no noticeable symptoms in affected individuals. Hypertension is a degenerative disease that can affect both young and old individuals (Manik & Wulandari, 2020). In most cases, hypertension is detected during physical examinations due to specific health concerns, earning it the nickname of the 'silent killer.' Hypertension is referred to as a silent killer because its prevalence is very high and is expected to increase in the future. Additionally, it is characterized by its high severity, resulting in permanent disability and sudden death (Widianto et al., 2019). Hypertension is a health issue that garners attention from all sectors

of society, requiring comprehensive and integrated long-term management (Imelda et al., 2020).

In Indonesia, with a lower awareness of health, there is a higher likelihood of patients not being aware of their hypertension condition and not complying with medication. This change in trend can be attributed to increased knowledge of healthcare and medicine, as well as socioeconomic changes within Indonesian society that affect cultural and lifestyle choices. Within the scope of cardiovascular diseases, hypertension ranks as the most prevalent (Triyanto, 2014).

Based on data from the Basic Health Research (Riskesdas) in 2018, the prevalence of hypertension increased from 25.8% to 34.1%, estimating a total of 63,309,620 cases of hypertension in Indonesia, with

427,218 deaths attributed to hypertension. The prevalence of hypertension by age groups was as follows: ≥ 18 years (32.1%), 31-44 years (31.6%), 45-54 years (45.3%), and 55-64 years (55.2%) (Kementrian Kesehatan Indonesia, 2019). According to data from the West Java Provincial Health Office in 2020, the prevalence of hypertension among individuals ≥ 18 years of age was 34.7%.

Hypertension is caused by various risk factors, including age, gender, family history, genetics, smoking habits, salt consumption, saturated fat intake, trans fat consumption, obesity, stress, alcohol consumption, estrogen use, and lack of physical activity (Manik & Wulandari, 2020). Factors that frequently lead to hypertension include both non-modifiable factors like gender, age, genetics, and modifiable factors like dietary patterns, exercise habits, and more (Imelda et al., 2020).

Dietary patterns refer to a person's daily eating habits in terms of the types and frequencies of meals consumed. Each individual requires a healthy and balanced diet to maintain their health. An imbalanced diet in terms of quantity, frequency, and types of food, such as high-fat foods, inadequate consumption of vegetables and fruits, and high sodium intake, can increase the risk of developing hypertension. The habit of consuming saturated fat is closely related to weight gain, which is a risk factor for hypertension. Saturated fat consumption also increases the risk of atherosclerosis, which is linked to increased blood pressure. Sources of saturated fat are found in animal proteins, and excessive intake of animal protein can elevate blood cholesterol levels (Harun, 2019).

Therefore, dietary patterns should be carefully considered, as they are one of the factors that can lead to hypertension due to the consumption of unhealthy foods high in sodium and fat, which can cause blockages in blood vessels, leading to increased strain on the heart (Ngasu & Fitriزيا, 2018). Salty foods can contribute to high blood pressure because sodium tends to retain water, leading to increased blood volume. Insufficient consumption of potassium-rich or fiber-rich foods can result in the accumulation of sodium, increasing the risk of hypertension due to increased pressure on the heart's pumping action (Manik & Wulandari, 2020).

The habit of consuming foods such as meatballs ("baso") and instant noodles is one of the triggers for hypertension due to their high sodium content (Maesaroh, 2021). Additionally, the dietary patterns of people who enjoy salty, sweet, fatty foods, and caffeine-containing beverages also contribute to the occurrence of hypertension (Ngasu & Fitriزيا, 2018). Another type of food that can lead to hypertension is processed and fastfood containing preservatives, excessively high salt levels, and excess fat consumption (I et al., 2020).

Uncontrolled hypertension can lead to complications and damage to other organs. To prevent complications and organ damage in hypertensive patients, several aspects should be addressed, including dietary regulation such as a low-

salt diet, addressing obesity, and lifestyle modifications. Lifestyle changes are closely related to individual awareness in preventing hypertension (I et al., 2020).

Complications of high blood pressure can be prevented by adopting a healthy lifestyle and controlling risk factors. Changes in traditional dietary patterns to include excessive protein, high-calorie, sugary, low-fibre, and fatty foods can result in an imbalance in nutrient consumption, leading to degenerative diseases such as hypertension, coronary heart disease, diabetes mellitus, and others. According to the World Health Organization (WHO), preventing and controlling blood pressure involves reducing and managing stress, consuming a healthy diet that includes fruits and fresh vegetables providing nutrients like fiber and potassium, and reducing consumption of high-salt, high-sugar, alcoholic beverages, and coffee (Manik & Wulandari, 2020).

Patients who are unaware of proper care can also benefit from modern technology through smartphones. This issue is closely related to technological advances, where innovations and technology are rapidly evolving. In daily life, the majority of the population often uses internet connectivity to simplify their activities (Hasibuan, Shinta, and Hariyati, 2019). According to Voice of America Indonesia (2017), technology experts estimated that in 2020, 90% of adults would have access to smartphones, leading to a new method of nursing care known as telenursing.

Telenursing is a technology that serves to provide nursing care and practice remotely with the aim of improving the quality of life and healthcare for patients (Asiri & Househ, 2016). This technology is part of disease prevention measures aimed at reducing the burden on healthcare services and reducing the risk of disease transmission (Kementrian Kesehatan Indonesia, 2019). This greatly affects various aspects of life and the surrounding environment. Research by Bagus et al (2017) indicates that telenursing interventions are easier to accept and are efficient in terms of time and place. It also allows healthcare providers to reach patients more easily for education, thus promoting dietary compliance and patient independence.

According to studies by Patimah et al (2018) and (Amita, 2020), telenursing has a positive impact on blood glucose control. Telenursing affects the dynamic process of behavior change, specifically in raising awareness among type 2 diabetes mellitus patients about living a healthy and quality life. Supported by (Najafi et al., 2016), telenursing can improve and modify adherence to diet and medication regimens for myocardial infarction patients and reduce referrals to healthcare services.

The use of telenursing, leveraging the advancements in information technology, can provide optimal interventions. In Indonesia, the use of telenursing is gaining momentum in the world of research. One intervention that nurses can apply to

promote dietary compliance is through education and reminders using meal scheduling alarms for hypertensive clients. The reminder used is a software application (Jam Alarm Untukku) that has been created and can be used by all segments of the population (IAC Search & Media Technologies Limited, 2014). By planning meals, blood glucose levels can be controlled.

According to Nola J. Pender's health promotion model, which consists of four concepts: humans, the environment, health, and nursing. In the Health Promotion Model (HPM), humans can influence their behavior. The environment can facilitate changes in health behaviour. Nursing describes the conditions most favourable for expressing optimal health (Alligood, MR & Tomey, 2006). One way to address the issue of dietary compliance and blood pressure is through education to achieve behavioural change and ultimately improve well-being, control disease, and manage blood pressure. A preliminary study was conducted by interviewing nurses from the inpatient ward and several hypertensive patients who had been discharged through WhatsApp. From the interviews with patients and nurses, it was revealed that during their hospital stay, patients received general health education about hypertension and its management. However, upon returning home, many patients struggled to control their dietary patterns, leading to increased blood pressure.

This data highlights the importance of implementing telenursing for patients with hypertension. Given the significant benefits it offers in managing hypertension through dietary compliance, the researcher aims to realize these benefits through research. This research involves the application of telenursing through WhatsApp for patient education and the use of software application (Jam Alarm Untukku) to schedule meals for hypertensive patients (IAC Search & Media Technologies Limited, 2014). Additionally, the telenursing method has not yet been developed in the research location, so the researcher seeks to actualize it through the study titled "The Influence of Telenursing Implementation on Dietary Compliance and Blood Pressure in Patients with Hypertension at a district general hospital namely RSUD Cililin. The objective of this research is to analyse the impact of telenursing implementation on dietary compliance and blood pressure in patients with hypertension at RSUD Cililin. In the rest of the manuscript, RSUD Cililin was applied as it is referred to the district hospital.

2. METHODS

2.1 Design

This research design employs a quasi-experimental approach aimed at assessing the effectiveness of telenursing on dietary compliance and blood pressure in hypertension patients. The design utilized in the study is a pre-test – post-test without a control

group design, meaning that the grouping of experimental group members is done purposively. This study involves a systematic investigation of the relationships among variables, wherein the research develops connections between independent and dependent variables. The research was conducted in July 2023.

2.2 Population, Sample, and Sampling

Population comprises all subjects (humans, experimental animals, laboratory data, and others) (Riyanto, 2019). The population in this study consists of all hypertension patients who underwent inpatient treatment at RSUD Cililin within the last 3 months (from April to June), with a recorded total of approximately 90 patients. The sample in this study consists of hypertension patients who have undergone inpatient treatment at RSUD Cililin, with a total of 30 patients. However, inclusion criteria of the sample are elderly 60-75 years old with hypertension and exclusion criteria are elderly without hearing loss and co-morbid diseases history.

The sampling technique used in this research is purposive sampling, which is a sampling method based on specific considerations made by the researcher, relying on characteristics or qualities of the population known in advance (Riyanto, 2019).

2.3 Variable

The independent variable in this study is "Telenursing through the WhatsApp application with the "Jam Alarm Untukku" provided to the intervention group. The dependent variable in this study is the change in 'Dietary compliance and blood pressure levels of hypertension patients. The level of compliance consists of compliant and non-compliant.

2.4 Instruments

The research instrument for providing health education through smartphones and the WhatsApp application consists of a compliance questionnaire containing 20 questions. These questions are divided into favorable and unfavorable categories. There are 4 questions in total, comprising 3 favorable questions (numbers 1, 2, 3) and 1 unfavorable question (number 4) related to timeliness. For the dietary type, there are 11 questions, consisting of 6 favorable questions (numbers 5, 6, 7, 8, 9, 10) and 5 unfavorable questions (numbers 11, 12, 13, 14, 15). Regarding quantity, there are 17 favorable questions (numbers 16-31) and 1 unfavorable question (number 32).

Height and weight data were obtained from patient medical records (documentation) as the data source. The instrument used to assess blood pressure is a digital sphygmomanometer brand Omron. Blood pressure measurements were taken in the intervention group before (pre-test) and after (post-test) the intervention. The measurements were conducted using the digital sphygmomanometer following the manual book and had been standardized by healthcare analysts before use.

Table 1. Description of Dietary Compliance Before and After Health Education Intervention Through Telenursing in Hypertensive Patients at RSUD Cililin

| | Diet Compliance | Frequency (n) | | Presentation (%) | |
|-----------------|-----------------|---------------|---------|------------------|---------|
| | | Comply | Disobey | Comply | Disobey |
| Pretest | Comply | 2 | 28 | 6,7 | 93,3 |
| | Disobey | | | | |
| Posttest | Comply | 30 | - | 100 | 0 |
| | Disobey | | | | |

Table 2. Description of Blood Pressure Before and After Health Education Intervention Through Telenursing in Hypertensive Patients at RSUD Cililin.

| | Respondents | Mean Blood Pressure | | The Mean Difference in Blood Pressure | | Deviation Standard | |
|-----------------|-------------|---------------------|-------------------|---------------------------------------|-----------|--------------------|-----------|
| | | Systolic (mm Hg) | Diastolic (mm Hg) | Systolic | Diastolic | Systolic | Diastolic |
| | | Pretest | 30 | 156.8 | 105 | 11.3 | 10.7 |
| Posttest | 30 | 145.3 | 94.3 | | | 6.5 | 5.8 |

Table 3. The Diet Compliance During Pre-test and Posttest.

| | Diet Compliance | Frequency (n) | | Presentation (%) | | P value |
|-----------------|-----------------|---------------|---------|------------------|---------|---------|
| | | Comply | Disobey | Comply | Disobey | |
| Pretest | Comply | 2 | 28 | 6.7 | 93.3 | <0.001 |
| | Disobey | | | | | |
| Posttest | Comply | 30 | - | 100 | 0 | |
| | Disobey | | | | | |

Table 4. Testing the Effectiveness of Health Education Through Telenursing on Blood Pressure in Hypertensive Patients at RSUD Cililin.

| | Respondents | Mean Blood Pressure | | The Mean Difference in Blood Pressure | | P Value |
|-----------------|-------------|---------------------|-------------------|---------------------------------------|-----------|---------|
| | | Systolic (mm Hg) | Diastolic (mm Hg) | Systolic | Diastolic | |
| | | Pretest | 30 | 156.8 | 105 | |
| Posttest | 30 | 145.3 | 94.3 | 11.3 | 10.7 | <0.001 |

Validity and reliability testing of the research instrument. The compliance questionnaire has a validity with P values ranging from 0.05 to 0.000 and R values ranging from 0.563 to 0.789. The instrument items have been tested for reliability with a Cronbach's alpha value >0.60.

2.5 Procedure

The researcher obtained research permits, and then the researcher began collecting data from 30 respondents based on specific criteria, including diagnosis, name, phone number, age, and gender. This data was recorded in the patient register and medical records book. During the first week, the researcher communicated with the respondents via telephone and provided a brief explanation of the purpose, objectives, and activities of the research.

In the final stage, the researcher measured blood pressure and hypertension dietary compliance levels before conducting telenursing education. The

education involved video presentations and evaluation via video calls using WhatsApp. Additionally, the researcher installed reminder alarms for hypertension patients. This intervention was conducted twice a week for three weeks, with each session lasting approximately 15 minutes.

After completing the telenursing intervention, the researcher measured blood pressure and dietary compliance again. Once the data was collected, the researcher processed it for presentation in the research results in English.

2.6 Data Analysis

For the dietary compliance instrument, paired sample data were analyzed using the McNemar test through computer software with a significance level of ≤ 0.05 . The McNemar test was conducted on the respondents before and after the intervention. Regarding blood pressure, the data were assessed for normality using the Shapiro-Wilk test. Subsequently, to measure and

analyze the pre and post-test data, the Paired Sample T-Test (paired t-test) was employed.

2.7 Ethical Clearance

This research has been conducted ethical feasibility test and received approval from Ethical Committee of Jend. A. Yani University Bandung Indonesia Number 048/KEPK/FITKes-UNJANI/VII/2023.

3. RESULTS

Table 1 shows that before the health education intervention through telenursing, the level of dietary non-compliance in hypertensive patients was 28 individuals (93.3%), and after the health education intervention through telenursing, the level of dietary compliance in hypertensive patients increased to 30 individuals (100%).

Based on Table 2, it was found that, out of 30 hypertensive patients, before the health education intervention through telenursing, the average systolic blood pressure was 156.8 mmHg, and the diastolic blood pressure was 145.3 mm Hg. However, after the health education intervention through telenursing, the average systolic blood pressure was 105 mmHg, and the diastolic blood pressure was 94.3 mm Hg. The difference in blood pressure reduction before and after was 11.3 for systolic pressure and 10.7 for diastolic pressure.

Based on Table 3, it is evident that there was a significant change in the number of compliant patients, which increased to 30 individuals (100%) from the initial 28 individuals who were non-compliant. The McNemar test resulted in a p-value of <0.001, which is less than 0.05, indicating that the null hypothesis (H_0) is rejected. Therefore, it can be concluded that Telenursing is effective in improving dietary compliance in hypertensive patients.

Based on Table 4, the p-value in the paired sample t-test is <0.001, which is less than 0.05, indicating the rejection of the null hypothesis (H_0). There was a decrease in blood pressure in hypertensive patients. Therefore, it can be concluded that Telenursing is effective in reducing blood pressure in hypertensive patients. This is supported by the reduction in the mean pre-test and post-test values of systolic blood pressure by 11.3 mm Hg and diastolic blood pressure by 10.7 mm Hg.

4. DISCUSSION

The previous study by Bagus et al (2017) demonstrates the influence of Telenursing intervention on nutritional management in patients with chronic diseases in the Mawar and Ratna wards of RSUP Sanglah Denpasar. This result suggests that Telenursing facilitates healthcare professionals in reaching patients to educate them about nutritional management for chronic diseases. The method involves remote communication through telephone, SMS, and social media. Patients find it easier to access information related to nutritional management through Telenursing. The ease of reaching patients

through Telenursing allows for regular interventions, thus improving patient compliance and independence (Bagus et al., 2017). A similar study also revealed that remote care can improve and modify adherence in myocardial infarction patients (Najafi et al., 2016)

Adherence is the level of a patient's behavior directed toward instructions or guidance provided in any form of therapy, including diet, exercise, treatment, or keeping appointments with doctors. Therefore, counseling for diabetes patients and their families is essential (Eliati et al., 2020). Long-term adherence to dietary planning is one of the most challenging aspects of diabetes management. To assist patients in adhering to diet therapy, incorporating new dietary habits into their lifestyle is highly recommended, such as providing health education through Telenursing.

The Telenursing method is quite appealing because it allows patients to be monitored by nurses and provides access to healthcare services according to the patient's preferences through remote communication. Telenursing has several advantages, including effectiveness, efficiency, a reduction in hospital visits for acute conditions between chronic periods, and cost savings for patients (Pratama et al., 2019). Telenursing can help reduce the length of stay for patients with chronic diseases in the hospital because patients can be remotely monitored regarding their condition and complaints once they are at home (Pratama et al., 2019). This is consistent with the findings of Nur and Lestari (2020), titled "Behavioral changes in meeting adolescent developmental tasks through increased family knowledge," which states that there was a change in family behavior into the "good" category in meeting adolescent developmental tasks after receiving health education.

The use of electronic media has proven to be one of the most effective choices for providing ongoing education more efficiently. Mobile technology and the internet are widely available, accessible 24 hours a day, and can be used to promote disease management and facilitate behavior modification. Electronic media education programs provide a simple communication and consultation system for patients to stay directly connected with the healthcare team and provide access to effective educational materials to help improve metabolic control for type 2 diabetes mellitus patients (Kusnanto et al., 2019). According to Pratama et al (2019), the purpose of providing remote nursing care using communication media or Telenursing is not to clarify the patient's medical diagnosis but rather to focus on support, information, and increasing patient knowledge.

The results of this study are supported by the treatment applied to hypertensive patients, which involves educating them about meal planning (diet) through Telenursing. This education is delivered via video calls on WhatsApp twice a week for three weeks, with each session lasting approximately 15 minutes. The management provided includes a video education about hypertension and its management,

including the right types, right amounts, and right meal schedules. For the meal schedule variable in this study, an alarm was used, set to remind hypertensive patients to eat at the recommended times, which amounts to six times a day, including three main meals and three snacks. After posttest, there are awareness to comply diet for avoiding hypertension.

In this study, providing education through video calls can facilitate communication between nurses and patients, especially in delivering information, and can monitor patients remotely. Video calls can provide effectiveness in terms of time and location. Additionally, using an alarm application for scheduling hypertensive patients' meals can remind them to adhere to their meal schedules, thus promoting compliance.

Based on the research by Dwi (2020), it was found that out of 81 respondents with positive healthcare professional support, the majority had good dietary compliance (83.8%). Conversely, respondents with negative family support had less satisfactory dietary compliance (53.8%). Lari et al. (2018) found similar results to this study. Lack of support from family has strong influence to patient compliance to diet. It is shown by the research that family can remind patient to comply the diet so that there is a correlation between family support with diet compliance of patient (Tumenggung, 2013). Providing education through electronic media can significantly increase self-efficacy. The use of a telephone in education provides individual support and allows patients to feel heard and understood, gathering trust when done effectively (Swoboda et al., 2017). These findings align with the research by Bagus et al (2017), which suggests that nutritional management through Telenursing is more readily accepted and efficient in terms of time and location.

In this study, respondents had a positive response to the research. The use of Telenursing in education can provide individual support, and with effective communication, it can build trust among patients who feel heard and understood (Swoboda et al., 2017). Therefore, this method can be one way to change dietary compliance behavior in hypertensive patients and control blood pressure.

5. CONCLUSION

The description of dietary adherence among hypertensive patients before Telenursing showed that the majority were non-compliant, with 28 individuals (93.3%). However, after Telenursing, all respondents adhered to their hypertensive diets. The description of blood pressure among hypertensive patients before Telenursing showed an average systolic blood pressure of 156.8 mmHg and diastolic blood pressure of 105 mmHg. After Telenursing, the average systolic blood pressure was 145.3 mmHg, and diastolic blood pressure was 94.3 mmHg. The provision of health education through Telenursing has proven to be effective in improving the level of dietary adherence among hypertensive patients. The

provision of health education through Telenursing has proven to be effective in improving the level of dietary adherence among hypertensive patients.

It is recommended that for nurses in hospitals, health education Telenursing in providing and monitoring nursing care to hypertensive patients. It can also serve as a form of prevention for complications arising from the disease. For patients, this approach encourages greater adherence to dietary restrictions, both in terms of food and beverage consumption, and helps control blood pressure to return to normal.

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