

Application of Social Cognitive Theory for Tertiary Preventive Behavior in Elderly with Hypertension: A Multilevel Analysis

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ABSTRACT

Background: Hypertension is the first non-communicable disease diagnosed in various health facilities up to 185,857 cases. Hypertension is one of the main causes of mortality and morbidity in Indonesia, so the management of this disease is a very common intervention carried out at various levels of health facilities, especially in the elderly. This study aims to analyze the influence of the application of social cognitive theory on the preventive behavior of the elderly tertiary with hypertension in Cirebon Regency.

Subjects and Method: The study was conducted with a cross-sectional study design involving as many as 200 research subjects, including 102 positive tertiary preventive behavior research subjects and 93 negative tertiary preventive behavior research subjects. This research was conducted in 25 elderly posyandu in Cirebon Regency, West Java. This research was conducted in March-April 2024. The sample was selected using simple random sampling to select elderly research subjects with hypertension and stratified random sampling to select the type of Posyandu. The dependent variable is tertiary preventive behavior behavior in the elderly with hypertension. The independent variables were knowledge, expectations, self-regulation, self-efficacy, reinforcement and observational learning. Data collection was carried out using questionnaires and data were analyzed using a multilevel analysis model.

Results: Tertiary preventive behavior in older age with hypertension was influenced by knowledge ($b = 1.89$; 95% CI = 1.54 to 2.23; $p < 0.001$), expectations ($b = 0.15$; 95% CI = 0.01 to 0.29; $p = 0.031$), self-regulation ($b = 0.15$; 95% CI = 0.01 to 0.29; $p = 0.035$), self-efficacy ($b = 0.14$; 95% CI = 0.00 to 0.29; $p = 0.042$), reinforcement ($b = 0.15$; 95% CI = 0.00 to 0.29; $p = 0.042$), reinforcement ($b = 0.36$; 95% CI = 0.22 to 0.50; $p < 0.001$), and observational ($b = 0.22$; 95% CI = 0.07 to 0.38; $p = 0.004$). Posyandu has a contextual influence on tertiary preventive behavior in the elderly with hypertension with ICC = 40%.

Conclusion: Tertiary preventive behavior in the elderly with hypertension is influenced by knowledge, expectations, self-regulation, self-efficacy, reinforcement and positive outcomes of observational learning. Thus, social cognitive theory can be used to explain and predict tertiary preventive behavior in the elderly with hypertension. Variations at the Posyandu level have a strong contextual effect on tertiary preventive behavior in the elderly with hypertension.

Keywords: hypertension, social cognitive theory, old age, tertiary preventive behavior.

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BACKGROUND

Hypertension is a condition in which systolic blood pressure is greater than or equal to 140 mmHg or diastolic blood pressure is greater than or equal to 90 mmHg (Carey et al., 2021). High blood pressure is a strong risk factor for cardiovascular disease (Bustang et al., 2020). Cardiovascular disease in general is more common in the elderly because of the narrowing of blood vessels which will increase with age and is the main cause of death in the world community. According to the World Health Organization (WHO), the elderly will experience physical and physiological changes that can affect blood pressure (Potter et al., 2015), so that with increasing age the systolic will be isolated (isolated systolic hypertension) and there is an increase in systolic blood pressure accompanied by a decrease in diastolic blood pressure of $\geq 140/90$ mmHg. Increased systolic blood pressure is caused by arterial stiffness or reduced aortic elasticity, thus the elderly will be more at risk of hypertension (Manurung, 2018).

According to the World Health Organization (WHO) in 2019, there was an increase in the prevalence of hypertension in 2018 by 34.11%, increasing to 39.9% in 2020. In the Asian region, hypertension has killed as many as 1.5 million people every year, indicating that one in three elderly people suffer from hypertension (Ministry of Health of the Republic of Indonesia, 2019). About 1.13 billion elderly people in the world suffer from hypertension. The elderly number of hypertension patients in the world continues to increase every year, and by 2025 it will increase to 1.5 billion elderly people who will be affected by

hypertension (AHA, 2017). The prevalence of hypertension in the elderly based on the age group of 55-64 years is 45.9%, the age of 65-74 years is 57.6% and 63.8% for the age of over 75 years (Ministry of Health of the Republic of Indonesia, 2019). It is estimated that in 2025 10.4 million people will die due to hypertension with complications so that the number of hypertension sufferers in the elderly will continue to increase every year (Tirtasari et al., 2019). Nationally, the results of Basic Health Research (RISKESDAS) in 2018 show that the prevalence of the population in Indonesia with hypertension sufferers is 34.11%. The prevalence of women (36.85%) is higher than that of men (31.34%). Based on data from the Ministry of Health in 2018, Hypertension became the first non-communicable disease diagnosed in various health facilities up to 185,857 cases. Hypertension is one of the main causes of mortality and morbidity in Indonesia, so the management of this disease is a very common intervention carried out at various levels of health facilities (Indonesian Ministry of Health, 2018). Hypertension Disease in West Java Province in 2018 based on the results of measuring the population aged ≥ 18 years old cases of 39.60% (Risksesdas, 2018).

In 2020, hypertension in Cirebon City ranked second with 26,574 cases (Cirebon City Information Communication and Statistics Office, 2021), while in Cirebon Regency, West Java, in 2020 the number of hypertension cases was 644,577 and the number of hypertension patients receiving health services was 27.1% of the total number of patients (Cirebon Regency Health Office, 2020). Thus, it is necessary to handle, emphasize, and pay special

attention to the dangers of hypertension so that people in Indonesia can know and understand the factors and symptoms of hypertension. Risk factors that can cause hypertension include, advanced age, family history of high blood pressure, smoking habits, drinking alcoholic beverages and obesity or excess weight followed by lack of exercise and consumption of fatty foods and high salt levels (Smeltzer & Bare, 2013; Lewis, et al., 2014). Prevention and control of hypertension requires cooperation between individuals, the government and the health sector. With efforts to increase risk awareness and implement preventive measures, it can be expected that hypertension levels can be controlled, thereby reducing the burden of disease and improving the overall quality of life of the community Uhlig et al. (2013).

Social cognitive theory serves to understand tertiary preventive behaviors in the elderly with hypertension because it can explain and explain how individuals can develop and maintain behaviors to prevent disease complications. In the context of older people with hypertension, this theory helps in understanding how self-confidence, expectation of outcomes, and learning from the experiences of others and the environment influence and maintenance of healthy behaviors such as proper diet, managing blood sugar levels, and adherence to medication (Shamizadeh et al., 2019). Social cognitive theory directs attention to improving knowledge, self-efficacy, and skills to encourage tertiary preventive behaviors (Ghoreishi et al., 2019). Based on the phenomenon found, researchers have a desire to be able to explain tertiary preventive behavior for the elderly with hypertension in Cirebon Regency, West Java Province.

SUBJECTS AND METHOD

1. Study Design

This was a cross-sectional study conducted in the Cirebon Regency, West Java, Indonesia, from March-April 2024.

2. Population and Sample

A sample of 200 elderly was selected using simple random sampling to select elderly and stratified random sampling was implemented to select the integrated health post (posyandu).

3. Study Variables

The dependent variable is tertiary preventive behavior behavior in the elderly with hypertension. The independent variables are knowledge, expectations, self-regulation, self-efficacy, reinforcement and observational learning.

4. Operational Definition of Variables

Tertiary Preventive Behavior: Individual actions that arise as an effort to improve or maintain health. Data were collected using a questionnaire in the form of a continuous scale.

Knowledge: An understanding of disease, condition management, and an understanding of the importance of diet, exercise, and blood pressure measurement. Data were collected using a questionnaire in the form of a continuous scale.

Expectation: The positive outcome that an individual expects for the chosen behavior, in this case is a positive tertiary preventive behavior in the elderly with hypertension. Data was measured using a questionnaire with a continuous scale.

Self-Regulation: Behavior that controls the consumption of high-salt foods, manages blood pressure, and maintains a healthy lifestyle. Data was measured using questionnaires. The scale was continuous.

Self Efficacy: Belief or confidence in a person about their ability to manage hypertension conditions effectively. Data was

measured using a questionnaire with a continuous scale.

Reinforcement: Positive reciprocity that can increase self-confidence and self-ability in maintaining and making healthy behaviors. Data is measured through a questionnaire with a continuous scale.

5. Study Instruments

The research instrument used for data collection is using questionnaires.

6. Data Analysis

Univariate analysis was carried out with the aim of determining the frequency distribution and percentage of each variable studied, namely smoking cessation behavior and social cognitive theory. The next

analysis is bivariate which is carried out on each independent variable, namely tertiary preventive behavior against dependent variables, i.e., and using a multilevel analysis model.

7. Research Ethics

Research ethics including informed consent, anonymity, and confidentiality, are handled with care throughout the research process. The approval letter for the research ethics permit was obtained from the Research Ethics Committee of Dr. Moewardi Hospital in Surakarta on March 26, 2024 with the number 771/III/-HREC/2024.

Table 1. Characteristics of the research subject of multilevel analysis of tertiary preventive behavior in the elderly with hypertension in Cirebon Regency.

Variable	n	%
Gender		
Male	68	34
Female	132	66
Age		
60-69 Years	111	55.5
>70 Years	89	44.5
Occupation		
Not working	20	10
Housewife	82	41
Farmer/Merchant	77	38
Entrepreneur	8	4
Civil Servant/Private Employee	3	1.4
Pension	10	5
Education		
PS	69	34.5
JHS	58	29
SHS	53	26.5
College	20	10
Number of Children		
1 child	5	2.5
2 children	47	23.5
≥ 3 children	148	74
Income		
≤ minimum wage	115	57.5
≥ minimum wage	85	45.5
Families with Hypertension		
Yes	107	53.5
No	93	46.5

2. Bivariate Analysis

The study shows that bivariate analysis helps researchers recognize patterns of relationships between two variables, as well as build and compare theoretical expectations with existing evidence. Using this approach, researchers can explore and understand more deeply about how variables are interrelated in the context of research, allowing researchers to test and confirm the hypothesis that the researcher proposes. Table 2 shows the relationship between the dependent variables of tertiary preventive behavior and the independent variables of knowledge, expectation, self-regulation, self-efficacy, reinforcement, and observational learning.

Knowledge and tertiary preventive behavior

Knowledge with a good category is more common in the elderly with positive tertiary preventive behavior, which is as much as 95.3%, while knowledge with a category is more or less common in the elderly with negative tertiary preventive behavior, which is as much as 75.2% with an analysis obtained a value of $p < 0.001$. So that knowledge has a role in adopting skills when the elderly receive information.

Expectations and tertiary preventive behavior

The elderly with positive tertiary preventive behavior have more good expectations which is as much as 96.2%, compared to the elderly with negative tertiary preventive behaviors have more bad expectations which is as much as 86.2%, with the analysis obtaining a p value of < 0.001 .

Self-regulation and tertiary preventive behavior

Self-regulation with a good category is more common in the elderly with positive tertiary preventive behavior, which is as much as

82.2%, while self-regulation with a category is more or less frequent in the elderly with negative tertiary preventive behavior, which is as much as 76.3% with an analysis obtained a p value of < 0.001 . so that self-regulation also affects the elderly in making decisions to live healthier.

Self-efficacy and tertiary preventive behavior

Self-efficacy with a good category is more common in the elderly with positive tertiary preventive behavior, which is 78.5%, compared to the elderly who have negative tertiary preventive behavior, self-efficacy with a poor category is more frequent, which is 80.6%. With the analysis, a p value of < 0.001 was obtained.

Reinforcement and tertiary preventive behavior

In the elderly, with positive tertiary preventive behavior, more had high reinforcement, which was 88.2%, while in the elderly, with negative tertiary preventive behavior, there were more people who had low reinforcement, which was 77.4%. With the analysis, a value of $p < 0.001$ was obtained.

Observational learning and tertiary preventive behavior

In observational learning, the elderly who have positive tertiary preventive behaviors and negative tertiary preventive behaviors have a good observational learning value, which is as much as 77.5% for the elderly who have positive tertiary preventive behaviors and as much as 62.3% with a p value of 0.019 for the elderly who have negative tertiary preventive behaviors. The existence of the same value in observational learning indicates that observational learning does not necessarily require reinforcement, but depends on the presence of others, which is called the social model.

Table 2. The relationships of tertiary preventive behavior, knowledge, self-regulation, expectation, self-efficacy, reinforcement, and observational learning.

Variable	Tertiary Preventive Behavior				p
	Positive		Negative		
	n	%	n	%	
Self-regulation					
Good	88	82.2	22	23.6	<0.001
Lacking	19	17.7	71	76.3	
Knowledge					
Good	102	95.3	23	24.7	<0.001
Lacking	5	37.5	70	75.2	
Expectation					
Good	103	96.2	13	13.9	<0.001
Lacking	4	3.7	80	86.2	
Self-efficacy					
Good	84	78.5	18	19.3	<0.001
Lacking	23	21.5	75	80.6	
Reinforcement					
Good	88	82.2	21	22.5	<0.001
Lacking	19	17.7	72	77.4	
Obeservational learning					
Good	83	77.5	58	62.3	0.019
Lacking	24	22.4	35	37.6	

1. Multiple linear regression Analysis

Table 3 shows the results of a multiple linear regression. Tertiary preventive behavior in hypertensive elderly significantly increased with knowledge (b= 1.81; 95% CI= 1.47 to 2.16; p <0.001), outcome expectation (b= 0.16; 95% CI= 0.01 to 0.30; p=

0.026), self-efficacy (b= 0.15; 95% CI= 0.00 to 0.30; p= 0.037), self-regulation (b= 0.15; 95% CI= 0.01 to 0.29; p= 0.035), reinforcement (b= 0.35; 95% CI= 0.20 to 0.49; p <0.001), and observational learning (b= 0.24; 95% CI= 0.08 to 0.40; p= 0.003).

Table 3. Results of multiple linear regression analysis of the relationship between tertiary preventive behavior, knowledge, self-regulation, expectation, self-efficacy, reinforcement, and observational learning

Independent Variable	Cofisien regression (b)	CI 95 %		p
		Lower Limit	Upper Limit	
Knowledge	1.81	1.47	2.16	<0.001
Expectation	0.16	0.02	0.30	0.026
Self-regulation	0.15	0.10	0.29	0.035
Self-efficacy	0.15	0.00	0.30	0.037
Reinforcement	0.35	0.20	0.49	<0.001
Obeservational learning	0.24	0.08	0.40	0.003

Table 4 shows the results of mixed-effect analysis of multiple multilevel linear regression in factors related with tertiary preventive behavior in hypertensive elderly. Table 4 showed that tertiary preventive

behavior in hypertensive elderly was significantly increased with knowledge (b= 1.89; 95% CI= 1.54 to 2.23; p <0.001), outcome expectations (b= 0.15; 95% CI= 0.01 to 0.29; p= 0.031), self-regulation (b=

0.14; 95% CI= 0.00 to 0.28; $p= 0.037$), self-efficacy variable ($b= 0.14$; 95% CI= 0.01 to 0.29; $p= 0.042$), reinforcement ($b= 0.36$;

95% CI = 0.22 to 0.50; $p < 0.001$), and observational learning ($b= 0.22$; 95% CI= 0.07 to 0.38; $p= 0.004$).

Table 4. Mixed fixed effect analysis of multiple multilevel linear regression in factors related with tertiary preventive behavior in hypertensive elderly

Independent Variables	b	95 % CI		p
		Lower Limit	Upper Limit	
Fixed Effect				
Knowledge	0.89	1.54	2.23	<0.001
Expectation	0.15	0.01	0.29	0.031
Self-regulation	0.14	0.01	0.28	0.037
Self-efficacy	0.14	0.01	0.29	0.042
Reinforcement	0.36	0.22	0.50	<0.001
Obeservational learning)	0.22	0.07	0.38	0.004
Random Effect				
Integrated health post (constant)	0.06	0.00	0.90	
N observation = 200				
N group = 25				
Average of group = 8				
min = 8				
max = 8				
Log likelihood = -332.82				
Prob: 0.19				
ICC = 40%				

Integrated health post (posyandu) has strong contextual effect on the tertiary preventive behavior among the elderly with hypertension (ICC= 40%).

DISCUSSION

1. The relationship between knowledge and tertiary preventive behavior

Knowledge has a positive relationship with tertiary preventive behavior among the elderly. This finding aligns with the study by Tobias and Mardijanto (2017), which examined the relationship between knowledge about hypertension and preventive behavior among elderly individuals at the Elderly Posyandu in Jember Regency, East Java, Indonesia. Their study found a significant relationship, with a $p < 0.001$. These results are supported by Sumadi (2018), whose research at the Elderly integrated health post in Gunung Kidul, Yogyakarta,

also demonstrated a relationship between the elderly's knowledge of hypertension and their efforts to control the condition. Furthermore, according to Soejati (2015), as cited in Kristina (2018), psychological readiness, which is determined by knowledge, is one of the key factors that influence changes in understanding, attitudes, and behaviors, including the willingness to adopt new health-related practices.

2. The relationship between outcome expectations and tertiary preventive behavior

Outcome expectation was positively associated with tertiary preventive behavior in elderly individuals with hypertension. This is consistent with the findings of Chian et al. (2020), who studied elderly individuals aged 50 to 60 years with hypertension. Their study found that while elderly individuals with hypertension had a relatively high expectation rate (91.08%), it was

slightly lower compared to those without hypertension. The difference in average outcome expectations between the two groups was approximately 2%, with a one-year difference in the average expectation duration. These findings suggest that elderly individuals with hypertension can maintain positive outcome expectations, especially when supported by appropriate treatment. Conversely, inadequate treatment may lead to diminished expectations and reduced motivation to engage in preventive behaviors.

3. The relationship self-regulation and tertiary preventive behavior

There was a positive relationship between self-regulation and tertiary preventive behavior in elderly individuals with hypertension. Self-regulation plays a crucial role in influencing the elderly's decision-making toward adopting a healthier lifestyle. A study by Angeli et al. (2018) demonstrates that self-regulation can enhance self-care behaviors and support the adoption of healthy living practices. Moreover, self-regulation has been found to have a significant positive correlation with physical activity. It involves the ability to manage one's behavior through planning, goal setting, and self-monitoring, allowing individuals to take control of their actions and maintain consistent health-promoting behaviors.

4. The relationship self-efficacy and tertiary preventive behavior

There was a positive relationship between self-efficacy and tertiary preventive behavior in elderly individuals with hypertension. According to Nwine (2011), internal factors influencing self-care include disease-related values, self-efficacy, and knowledge, while external factors include social support. Elderly individuals with hypertension who believe in their ability to manage their condition are more likely to

carry out self-care behaviors effectively. Similarly, Pakseresht et al. (2010) define self-efficacy as an individual's confidence in their ability to successfully perform specific behaviors. Thus, higher levels of self-efficacy contribute to greater engagement in preventive actions aimed at managing hypertension and maintaining health.

5. The relationship between reinforcement and tertiary preventive behavior

There was a positive relationship between reinforcement and tertiary preventive behavior in elderly individuals with hypertension. This finding is supported by Maharani (2016), Setyaningsih (2019), Herlinah (2013), Irani (2019), Saraswati (2018), and Huda (2015), which consistently found a significant association between family support and blood pressure control behavior among hypertensive patients. These studies align with the hypothesis that family support plays a critical role in influencing elderly behavior in managing and controlling hypertension. Families who provide comprehensive support—such as fulfilling the elderly's daily needs, offering encouragement, and giving consistent reminders—help facilitate better engagement in tertiary preventive behaviors. In particular, informational support from family members enhances the elderly's knowledge, enabling them to take appropriate action based on what they have learned. As aging often comes with a decline in physical and psychological capacity, family support becomes essential in assisting the elderly in maintaining preventive practices and managing their blood pressure effectively.

6. The relationship between observational learning tertiary preventive behavior

There was a positive association between observational learning and tertiary preven-

tive behavior among elderly with hypertension. According to Bandura (1986) as cited in Morse (2017), most people learn by observing others. Observational learning is recognized as a vital area in psychology and behavioral science, with behavior analysts developing robust theories on how behavioral changes can occur through observation. This study supports the idea that observational learning is shaped by general behavioral conceptualizations. Groenendijk et al. (2013) noted that the inter-behavioral perspective helps address some limitations of traditional behavioral analytic models. Furthermore, Manjarresposada and Onofrerodrí (2020) emphasized that observational learning involves a hands-on process in which cognitive processes play a significant role in influencing behavior.

7. The contextual role of *posyandu* on tertiary preventive behavior

The contextual influence of Posyandu accounted for a significant variation in tertiary preventive behavior among elderly individuals with hypertension, with an Intraclass Correlation Coefficient (ICC) of 40%. This indicates that 40% of the variation in tertiary preventive behavior among the elderly with hypertension in Cirebon Regency in 2024 can be attributed to factors at the Posyandu level. Given that the ICC exceeds the commonly accepted threshold of 8–10%, the contextual influence of Posyandu cannot be overlooked. These findings are consistent with Khairiyyah (2023), which also demonstrated a substantial contextual effect of Posyandu on tertiary preventive behavior in elderly patients (ICC = 35.99%). In her study, the role of Posyandu included enhancing elderly individuals' understanding of its functions and increasing their participation through more frequent visits.

AUTHOR CONTRIBUTION

All authors have made significant contributions to data analysis as well as preparing the final manuscript.

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CONFLICT OF INTEREST

There is no conflict of interest in this study.

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