Perceived benefit is the strongest determinant factor of medication adherence in the elderly with hypertension

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Abstract

Background: The level of medication adherence among the elderly with hypertension is decreasing globally, including in Indonesia. Medication adherence is a major factor in treatment effectiveness for hypertensive patients. The Health Belief Model is one of the theories illustrating factors influencing patients' medication adherence.
Purpose: This study aimed to analyze determinant factors of medication adherence among the elderly with hypertension based on the application of the health belief model.
Methods: This is a descriptive-analytic study with a cross-sectional approach. Sampling used a proportional stratified random sampling technique involving 193 patients with hypertension recruited from one of the Regional General Hospitals in Denpasar City Center. Data were obtained using three questionnaires, namely demographic characteristics, the health belief model (HBM), and the Morisky Medication Adherence Scale (MMAS-8). Data were analyzed using binary logistic regression.
Results: The research results showed the majority of respondents (62.7%) were compliant in taking medication. Multivariate test results showed that perceived susceptibility (p <0.001; AOR: 5.163), perceived benefits (p <0.001; AOR: 12.061), self-efficacy (p <0.001; AOR: 3.213), perceived barriers (p <0.001; AOR: 0.133) and cues to action (p <0.001; AOR: 3.480) is related to medication adherence in the elderly with hypertension.
Conclusion: Perceived benefit is the strongest determining factor of medication adherence among the elderly with hypertension. Respondents with high belief in perceived benefits tend to adhere to medication 12.061 times compared to respondents with low belief in perceived benefits. Health workers are advised to increase the elderly's belief in the perceived benefits and perceived susceptibility to increase their medication adherence.

Keywords: elderly; health belief model; hypertension; medication adherence

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Introduction

The incidence of hypertension in the world is increasing with increasing age groups. The World Health Organization (WHO) estimates that, by 2021, as many as 1.28 billion adults aged 30-79 years worldwide will suffer from hypertension. Riskesdas in 2019 also stated that more than 63.3 million people live with hypertension in Indonesia and most of them are elderly, numbering 135.4 thousand people (Ministry of Health, 2019). It indicated that hypertension is more prevalent among elderly.

The elderly with hypertension are at risk for complications. According to the WHO (2021), uncontrolled hypertension in patients, especially the elderly, can increase the risk of complications, namely heart disease, stroke, and kidney failure (WHO, 2021). Complications can be minimized by adhering to treatment because hypertension is incurable (WHO, 2021).

The increased risk of complications and even death can be caused by low medication adherence. Low medication adherence minimizes

therapeutic effects and resulting in an increased risk for complications, even death (Burnier, 2017). Patients' medication adherence is challenging as hypertension medication is a lifelong action. The tendency of low medication adherence is more commonly found in the elderly with hypertension. Several studies found that only 30.8% (Amry et al., 2021) and 37.5% (Asseggaf & Ulfah, 2022) of the elderly with hypertension adhered to the recommended medication. However, the elderly are classified as compliant with taking medication if the percentage is > 80%. Based on several studies, it can be concluded that compliance with taking medication for elderly people is currently still low.

An increase in medication adherence in the elderly with hypertension can occur when the elderly recognize the benefits of changing lifestyle behaviors and believe that they are vulnerable to complications of hypertension (Notoatmodjo, 2010; Raingruber, 2014). According to the health belief model (HBM), medication adherence among elderly with hypertension is based on the patient's beliefs about the disease and prevention or management behavior. The HBM states that individual behavior is based on beliefs regarding perceived susceptibility, perceived severity, perceived benefit, perceived barrier, self-efficacy, and cues to action (Rosenstock et al., 1988). Among elderly with hypertension who have self-confidence (Harmili & Huriah, 2019; Shen et al., 2020), a belief in perceived vulnerability and severity can take action to control hypertension by trying to adhere to taking medication (Joho, 2021; Suhat et al., 2022). The elderly then assess the perceived benefits and perceived barriers in medication adherence so that they can encourage medication adherence (Amry et al., 2021; Arindari & Suswitha, 2020; Joho, 2021; Obirikorang et al., 2018). Cues to act can also encourage a person's involvement in health-promoting behavior, thereby increasing adherence to taking medication (Onoruoiza et al., 2015). Based on these studies, it can be concluded that each component of HBM has been proven to influence medication adherence in hypertension patients.

Regardless of those facts, little is documented the assessment of the health belief model variable in determining medication adherence, particularly among the elderly with hypertension. In fact, the HBM factor has proven useful for analyzing an individual's beliefs to potentially predict a patient's healthy actions. Therefore, this study aims to analyze determinant factors of medication adherence among the elderly with hypertension based on the application of the health belief model.

Materials and Methods

Design

This study employed a cross-sectional design that examined the correlation between demographic characteristics (age, gender, education level, income), length of hypertension, perceived susceptibility, perceived severity, perceived benefit, self-efficacy, perceived barrier, and cues to action with medication adherence.

Sample and setting

The sample criteria were determined by the researcher to anticipate bias. The inclusion criteria in this study were elderly aged more than 60 years who had systolic blood pressure ≥150 mmHg and diastolic blood pressure ≥90 mmHg, received antihypertensive treatment for at least six months, elderly with hypertension who visited for treatment at one of the Regional General Hospitals in Denpasar City Center, elderly who can read and write, as well as patients willing to become respondents and sign informed consent. Hypertensive patients with physical limitations (blind, speech impaired, deaf), hypertensive patients whose medical records showed they experienced mental disorders, and hypertensive patients who were uncooperative and withdrew were excluded from this study.

Sampling was conducted using a simple random sampling technique involving 193 respondents. The minimum sample size for the study was calculated using the WHO sample size application. Considering that the estimated proportion in the population is unknown, we applied P1=0.5 (Sastroasmoro & Ismael, 2014). The population proportion that researchers expect is P2=0.67 in accordance with previous research. The power of the test uses 90% with a precision degree of this research of 5%, so the minimum sample size in the research is 175 samples. To anticipate anticipating non-response or missing data, the sample was added by 10%. Therefore, the minimum sample obtained in the research was 193 samples.

Previous researchers found the population by looking at medical record data and found 201 people. Then the random method was used, namely random numbers, by assigning a number to each sample unit; when the same number is found or a number that is greater than the total sample units, it is ignored and random selection continues until the required number of samples is acquired. Anonymity was assured in all processes.

Data collection

The data were obtained using questionnaires. Data were obtained using several questionnaires. Data collection was carried out by the first researcher meeting predetermined hypertension patients by looking at the patient's medical record data to confirm the patient's hypertension status. Then the second researcher explained the objectives, benefits of the research, and guaranteed confidentiality to the respondents. Next, the first and second researchers asked for the research subjects' willingness to become respondents by filling out a statement of consent from research respondents. Data collection was carried out in October-December 2022.

Table 1. Characteristics of the respondents (n=193)

Variable	Medication Adherence				Total	p-value
	Adhere		Non-Adhere			
	n	%	n	%		
Age (years)						0.275
60-69	88	72.7	47	65.3	135	
≥70	33	27.3	25	34.7	58	
Gender						0.027
Male	54	44.6	44	61.1	98	
Female	67	55.4	28	38.9	95	
Education level						<0.001
Low	16	13.2	28	38.9	44	
High	105	86.8	44	61.1	149	
Income						0.198
<UMR	62	51.2	30	41.7	92	
≥UMR	59	48.8	42	58.3	101	
Length of suffering						0.015
< 5 years	59	48.8	48	66.7	107	
≥ 5 years	62	51.2	24	33.3	86	
Perceived susceptibility						<0.001
High	67	55.4	10	13.9	77	
Low	54	44.6	62	86.1	116	
Perceived severity						0.012
High	81	66.9	35	48.6	116	
Low	40	33.1	37	51.4	77	
Perceived benefit						<0.001
High	74	61.2	12	16.7	86	
Low	47	38.8	60	83.3	107	
Self-efficacy						<0.001
High	106	87.6	43	59.7	149	
Low	15	12.4	29	40.3	44	
Perceived barrier						0.001
High	36	29.8	38	52.8	74	
Low	85	70.2	34	47.2	119	
Cues to action						<0.001
High	77	63.6	27	37.5	89	
Low	44	36.4	45	62.5	104	

Variables

The selection of independent variables in this study is based on the health belief model conceptual framework. Independent variables of this study were age, gender, education level, income, length of hypertension, perceived susceptibility, perceived severity, perceived benefit, perceived barrier, self-efficacy, and cues to action, while the dependent variable was medication adherence among the elderly with hypertension.

Ethical consideration

This study was approved by the Research Ethics Committee of the Institute of Technology and Health Bali, number 04.0518/KEPITEKES-BALI/IX/2022, and the Research Ethics Committee at one of the Regional General Hospitals in Denpasar City Center, number 101/X.10/KEP/RSW/2022.

Instruments

Researchers used three research instruments, namely demographic characteristics of respondents,

Table 2. Logistic regression determinant factors of medication adherence in the elderly with hypertension in Wangaya Regional General Hospital (n=193)

Variable	p-value	Adjusted odds ratio	95% C.I for Odds Ratio	
			Lower	Upper
Education level	<0.001	11.286	3.231	39.422
Length of Suffering	0.006	3.587	1.439	8.942
Perceived susceptibility	0.004	5.163	1.694	15.734
Perceived benefit	<0.001	12.061	3.639	39.969
Self-efficacy	0.028	3.213	1.131	9.123
Perceived barrier	<0.001	0.133	0.050	0.358
Cues to action	0.007	3.480	1.396	8.680

the health belief model (to measure the health beliefs of the elderly with hypertension (Rusmadi et al., 2021), and the Morisky Medication Adherence Scale (MMAS-8) to measure the medication adherence variable (Sinuraya et al., 2018). Demographic characteristics of respondents' instruments included questions about age, gender, education level, and income. We categorized age into a dichotomous variable, 60-69 and, 70 years plus, educational level of no formal school to high school graduates as low educational level, and university graduates as high educational level. For income, we categorized the incomes of those lower than the regional minimum wage as low and equal to or higher than the regional minimum wage as high.

The HBM instrument used in this research is the Indonesian version which has been used in previous research (Rusmadi et al., 2021). This instrument has been tested for validity (r>0.361) and reliability (Cronbach's alpha of 0.927) and was declared valid and reliable. The questionnaire consists of six dimensions (37 question items), namely perceived susceptibility (8 items), perceived severity (3 items), perceived benefits (7 items), perceived barriers (6 items), self-efficacy (6 items), and cues to action (7 items). A Likert scale consists of four option answers ranging from 1 (strongly disagree) to 4 (strongly agree) The results were categorized into high (the confidence value is ≥ the average of the total scores from all questions related to each HBM component) and low (the value is < the average of the total number of answer scores from all questions related to each HBM component (Rusmadi et al., 2021).

The MMAS-8 instrument used in this research is the Indonesian version which has been used in previous research (Sinuraya et al., 2018). This instrument has been tested for validity (r>0.45) and reliability (Cronbach's alpha of 0.764) and has been declared valid and reliable. The questionnaire contains eight questions with the answer "yes" or "no," where the answer "yes" has a score of 0 and the answer "no" has a score of 1. Determining the level of compliance is obtained from the total score entered into the "comply" category (total score 6-8), and "non-compliant" (total score <6) (Sinuraya et al., 2018).

Data Analysis

The chi-square test was applied for bivariate analyses. All statistical analyses were two-tailed with statistical significance defined as p<0.05. Logistic regression was conducted to identify determinants-squared factors by entering all variables that showed p < 0.25 in bivariate analyses (Bursac et al., 2008). We entered several variables simultaneously in the logistic regression model to obtain the adjusted odds ratio. The output variables in this study are binomial scale data so they meet the logistic regression assumptions. To reduce bias in this research, we carried out a data cleaning process which aims to avoid missing data or errors in data input, then carried out a bivariate and multivariate testing or data analysis process to remove bias or confounding variables.

Results

General Characteristics of the Respondents

Respondents in this study were primarily male (50.8%), aged 60-69 years (69.9%), highly educated (77.2%) and income above the minimum wage (52.3%). The duration of most respondents in this study suffering from hypertension was <5 years (55.4%) (Table 1).

A total of 121 (62.7%) respondents adhered to taking medication. Most of the respondents had low perceptions of several variables, namely perceived susceptibility (60.1%), perceived benefits (55.4%), and perceived barriers (61.7%). In contrast to other health belief variables, it was found that the majority of respondents had high perceptions of severity (60.1%), self-efficacy (77.2%), and cues to act (53.9%) (Table 1).

This research also found the highest score for each factor determining compliance based on the HBM approach as seen from the results of respondents' responses. In responses regarding perceived susceptibility, it was found that the majority of respondents responded that, if they did not comply with the medication given, they agreed that they were susceptible to peripheral vascular disease. In responses regarding perceived severity, it was found that the majority of respondents responded that, if they did not comply with the medication given,

they did not agree that it would be fine. In responses regarding perceived benefits, it was found that more respondents felt that the benefits of explaining information obtained from pharmacists or doctors regarding drugs could prevent errors in drug use. In responses regarding self-efficacy, it was found that most agreed that they felt that their confidence in medicine had currently increased. In responses regarding perceived barriers, it was found that the majority of respondents did not agree that they did not understand how to use drugs correctly. In responses regarding cues to action, it was found that the majority of respondents agreed that information and education from pharmacists would be very important to help them undergo treatment.

Determinant Factors of Medication Adherence in Elderly with Hypertension

Factors that significantly related to medication adherence among the elderly with hypertension were gender, education level, length hypertension, perceived susceptibility, perceived severity, perceived benefit, self-efficacy, perceived barrier, and cues to action ($p<0.005$). Age and income were not significantly related to medication adherence in the elderly with hypertension (Table 1).

Logistic regression was performed to assess the impact of several factors on medication adherence in the elderly with hypertension. Independent variables were analyzed with a significance value limit ($p<0.25$) totaling 10 variables (gender, education level, income, length of suffering, perceived susceptibility, perceived severity, perceived benefit, self-efficacy, perceived barrier, and cues to action). Perceived benefits were the strongest predictor with an AOR value of 12.061, which means that respondents who had high perceived benefits were 12.061 times more likely to comply with taking hypertension medication compared to respondents who had low perceived benefits. The level of education also had a strong correlation with medication compliance, which means that respondents with a higher level of education (diploma to doctoral education programs) were 11.286 times more likely to comply with medication compared to those with a low level of education (not attending school until graduating from high school/equivalent). In contrast, respondents with high perceived benefits were less likely to comply with medication adherence with AOR 0.133 (Table 2).

Discussion

This study analyzed the factors correlated to the medication adherence in elderly with hypertension who go to the heart polyclinic at Wangaya Regional General Hospital based on the HBM theory. This study found that there was a positive relationship between education level, length of suffering, and medication adherence. We also found that significant predictors of using the HBM construct were perceived susceptibility, perceived severity, perceived benefit, self-efficacy, perceived barrier, and cues to action. After controlling for all factor variables among the HMB constructs, the strongest predictor was the perceived benefit of using the medicine.

High perceived benefits have a strong influence on elderly people with hypertension who adhere to taking medication due to the earlier actions taken by the elderly for their health depending on the perceived benefits (Notoatmodjo, 2010b). Belief in perceived benefits will change individual beliefs to adhere to taking antihypertensive medication, as seen by the majority of respondents who adhere to taking medication who have high perceived benefits (55.4%). The HBM theory also states that someone who has a high belief in benefits will get rid of various obstacles experienced and have a positive influence on himself (Notoatmodjo, 2010b; Raingruber, 2014).

The possibility that an individual will take action to prevent the disease from worsening depends heavily on considerations about the perceived benefits followed by the magnitude of the threat to health, namely perceived susceptibility (Soesanto, 2022). In line with this research, it proves that what most influences adherence to taking medication in the elderly with hypertension is the elderly's high belief in perceived benefits. Then, this research found that, after the perceived benefits, it was followed by other beliefs that could influence medication adherence, namely perceived susceptibility, cues to act, self-efficacy, and perceived barriers.

Considerations of benefits and the magnitude of threats can also be influenced by cues to act originating from information or advice regarding health problems and individual views about one's ability to adhere hypertension medication (Yanti et al., 2020). In line with this research, this study also found that most of the elderly with hypertension who adhered to taking medication had high cues to act (63.6%) and respondents who received cues to act high were likely to adhere to taking hypertension medication by 3.480 times more than respondents with low cues to act. The elderly with hypertension who have high cues to act in this study can mean that they are actively seeking information related to hypertension medication by consulting a doctor and getting education from health workers so that they know more about the benefits of taking medication. This active activity of gathering information has been proven to encourage elderly people to adhere to taking medication in previous research (G/Tsadik et al., 2020).

Differently, research by Amry et al. (2021) found there was no relationship between cues to action and medication adherence among elderly with hypertension. The level of education factor can be the reason for the lack of interest of the elderly in their research to seek information on social media, peers, and health workers. Most of the education levels of the elderly in the study were low (80.77%), in contrast to this study, where most of their last education levels were tertiary education (77.2%). This study

also proves that the level of higher education is at the second highest level after perceived benefits in influencing the compliance of elderly people with hypertension with taking medication based on the results of logistic regression analysis. The level of higher education is proven to be closely related to the level of knowledge and activeness of a person in seeking information (Chasanah & Supratman, 2018; Krisnandari & Rahyanti, 2022; Sutrisno et al., 2018). The HBM theory also states that cues to action can be achieved through encouragement to trigger health-related decision-making processes, both internally and externally, for example, through information from the media and health services about the benefits of adhering to taking medication (Raingruber, 2014).

Perceived benefits of taking hypertension medication are also said to show a significant negative relationship with perceived barriers; this means that the higher the perceived benefits the lower the perceived barriers (Joho, 2021). This study also found the same thing, namely the elderly who were most compliant with taking medication were those who had high perceived benefits (61.2%), but low perceived barriers (70.2%). This indicates that the majority of elderly with hypertension in this study felt more benefits when they adhered to taking medication and most did not experience significant barriers when they adhered to taking medication. This is in line with the HBM theory which states that, even though a person feels a health condition is a threat and believes that certain actions will effectively reduce the threat, beliefs about obstacles can prevent them from taking recommended health actions (Raingruber, 2014). The perceived benefits must outweigh the perceived barriers for behavior change to occur. Therefore, health workers play an important role in knowing the management and ways of dealing with medication problems for the elderly, so that they can reduce medication errors and increase medication adherence in the elderly with hypertension (Suyasa & Sutini, 2021).

Perceived benefits are also influenced by the culture and social demographics of the individual (Hastuti & Mufarokhah, 2019). This study found that the majority of respondents who adhered to taking medication were elderly people who had suffered from hypertension for ≥5 years (51.1%). However, this is not in line with previous research which found that the longer a person suffers from hypertension, the less likely they are to adhere to taking medication (Said, 2022). The difference found in the 2022 study could be because the majority of respondents had hypertension for <5 years so respondents still felt they did not benefit from taking hypertension medication. In contrast to the findings of this study, the majority of elderly people who adhere to taking medication are that those who have suffered from hypertension for ≥5 years have a high perception of benefit, and are also more compliant with taking medication (61.2%). Elderly people who suffer from hypertension for a longer time often benefit from treatment, so they tend to have high self-efficacy regarding their health (Liberty et al., 2018; Raingruber, 2014; Sekunda et al., 2021). This research found that elderly people who adhere to taking medication have high self-efficacy regarding their health (87.6%). A high perception of health is important to increase the elderly's commitment to taking medication and will also influence their quality of life for the better (Kamaryati et al., 2019; Zangiabadi et al., 2022).

Four variables have been released in a multivariate manner in this research, namely age, gender, income, and perceived severity, which can be seen in Table 2. Based on previous research, the factors of age (Fitriananci et al., 2022), gender (Tambuwun et al., 2021), income (Valassi et al., 2019), and perceived severity (Arindari & Suswitha, 2020; Joho, 2021; Suhat et al., 2022) were found to be correlated with medication adherence; however, in this study, these factors were not proven to influence adherence to medication in the elderly with hypertension so these factors became confounding factors in this study. The HBM theory explains that age can influence beliefs about health which can ultimately shape health behavior. However, the age of individuals said to influence the increase in health beliefs are older adults compared to younger adults (National Institutes of Health, 2012; Rosenstock et al., 1994). As age increases, an individual's life experience increases, influencing their mindset to take positive action regarding their health. This may have also resulted in no relationship between age and medication adherence in this study because all respondents in this study were elderly and the majority (53.9%) had high cues to act or high drive to trigger the process of taking recommended health actions.

In this study, gender as shown in Table 2 was not proven to be a predictor variable that had a direct influence on medication adherence in elderly people with hypertension. This is different from the previous HBM theory which states that gender can be a modifying factor that influences HBM so that ultimately individuals can carry out healthy behavior (National Institutes of Health, 2012; Rosenstock et al., 1994). Previous research results also showed a significant relationship between the two and it was found that female respondents were more compliant with taking hypertension medication (Poormuhamad & Jalili, 2017; Yue et al., 2015). In contrast, this study reported that the difference in adherence to taking hypertension medication was not too great between men (44.6%) and women (55.4%). This could be concluded there is no relationship between gender and compliance with taking medication in elderly people with hypertension. Gender influences hypertension control behavior, more so because men tend to be disobedient. Men tend to be aggressive, adventurous, free-spirited, rude, and more willing to take risks, including the risk of not complying with taking medication, compared to women (Amin, 2018).

Based on the HBM theory, the respondent's income is one of the factors that can influence the main forming beliefs of the HBM theory so that individuals can carry out healthy behavior (Rosenstock et al., 1994). In contrast, this study found no significant relationship between income and compliance with taking medication for elderly people with hypertension. This is because most patients currently take advantage of the health insurance program as seen from BPS (Central Statistics Agency) data for 2021 which found that 69.62% of the population in Indonesia had health insurance. This presentation increased by 1.26% compared to the previous year (BPS, 2021). Previous research also reported that medical costs were not considered an obstacle to medication adherence. Most respondents could obtain medication easily at community health centers or referral hospitals by utilizing the government's BPJS program (Arindari & Suswitha, 2020).

Perceived benefits were also found to have no direct effect on elderly medication adherence in this study. This could be because, apart from feeling a high perceived benefit, the individual also needs to have a high perceived susceptibility to change their health behavior. Previous research supports this research which states that beliefs about susceptibility to complications and the perceived seriousness of the disease describe the magnitude of the threat to one's health (Conner & Norman, 2005). The magnitude of the threat a person feels can change health behavior for the better, including medication adherence (Notoatmodjo, 2010; Raingruber, 2014; Rosenstock et al., 1994).

This research has limitations, namely that it uses a cross-sectional approach which lasts for a limited time and only serves to prove the conditions that occurred at the time of the research, allowing for changes in research results in the future. Therefore, it is hoped that this research can become the basis for subsequent research by considering the time period so that it can truly prove that the perceived benefit factor of elderly people influences compliance with taking hypertension medication.

Conclusion

The perceived benefit factor is the determinant factor most related to adherence to medication adherence in elderly people with hypertension. Nurses in hospitals are expected to be able to increase the perceived benefits of the elderly by developing a hypertension management counseling program with the families of the elderly, especially for the elderly with low medication compliance using the health belief model approach to help find the problems faced by the elderly in meeting their medication compliance. Family involvement here is important considering the limitations that elderly people may face in their long-term care. Educational institutions should also add teaching materials related to factors in medication compliance for elderly people with hypertension through the HBM approach. Future researchers can conduct further research using qualitative descriptive methods through in-depth interviews to determine the influence of beliefs about perceived benefits on medication adherence in elderly people with hypertension to obtain coherent research results.

Declaration of Interest

The authors state that there is no conflict of interest.

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Data Availability

The corresponding author will provide the interested parties with access to the datasets created or analyzed upon the reasonable request.

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