The development and validation of the health belief model questionnaire for measuring factors affecting adherence in the elderly with hypertension

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Abstract

Objectives: This study aimed to validate the questionnaire on the health belief model questionnaire to assess health beliefs that could influence adherence to hypertension in the elderly.

Methods: The questionnaire was based on a study of the literature and discussion with experts. The questionnaire was then circulated via social media. Participants who met the following criteria were asked to participate in the study: (1) aged 60–79 years of age, (2) had antihypertensive medications in the last three months, and (3) had a mobile phone with an active number. The questionnaire consists of six domains: perceived susceptibility, perceived severity, perceived threat, perceived benefits, perceived barriers, and perceived self efficacy. The findings were grouped by domain and tested for reliability and validity using SPSS ver.24.

Results: Thirty participants completed the questionnaire. Each domain was tested for its reliability and validity at a value of 0.05. The result shows that each domain had a Cronbach's alpha value greater than 0.7, with a total score of 0.89 indicating that all domains in the questionnaire were reliable. Furthermore, of the 49 items in the questionnaire, only two items were invalid while the rest of the items demonstrated their validity based on the Pearson Correlation (>r table 0.361; $p<0.05$).

Conclusions: This self administered health belief model questionnaire was a valid and reliable instrument to assess health beliefs in elderly with hypertension.

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

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Introduction

The World Health Organization (WHO) has confirmed that hypertension is a severe medical condition that may increase the risk of heart, brain, and kidney diseases. Also, one of the main risk factors for hypertension is age >65 years. Hypertension is one of the leading causes of early death worldwide, with more than one million people suffering from hypertension in 2015, largely due to an increase in risk factors in these populations in recent decades [1]. Profoundly prevalence of hypertension is at aged 65 years or more. However, medication nonadherence increases at the age of 80 years or more [2, 3].

The Basic Health Research Indonesia (Riskesdas 2018) stated that the hypertension prevalence in Indonesia reached 34.1%, dominated by the elderly. About 427,218 people died due to hypertension. About 13.3% of people did not take medication, and 32.3% did not take medication regularly. Evidence showed that hypertension patients in Indonesia had a low level of medication adherence, caused illness belief, medication belief, and forgetfulness [4].

Several studies have reported that elderly hypertension has had low blood pressure control due to poor medication adherence, resulting in significant morbidity and use of health services [5–8]. The study revealed that more than half of the participants (55.9%) acknowledged some degree of medication non-compliance. Older age, living alone, and perceptions associated with treatment control were independently related with the need for

adherence to treatment, with odds ratios ranging from 1.14 to 1.92 (p = 0.05) [2].

Adherence is affected by the patient's beliefs and wellbeing. The patient tends to follow the recommendation if they assume that hypertension is a controllable disease [9]. Greater awareness of the health beliefs of elderly people with hypertension can help pharmacist and researchers develop strategies to improve adherence to medications and manage blood pressure. This study aimed to validate the health belief model (HBM) questionnaire to measure health beliefs that could affect adherence in the elderly with hypertension.

Materials and methods

The Committee of Ethical Approval in the Faculty of Nursing, Universitas Airlangga approved this study, with reference number 2090-KEPK. All participants gave their consent and were assured of confidentiality. It was a cross-sectional study conducted in September 2020. The questionnaire was built based on the literature review and discussion with experts. The questionnaire was then circulated via social media. Participants who met the following criteria were asked to participate in the study: (1) aged 60–79 years of age, (2) had antihypertensive medications in the last three months, and (3) had a cell phone with an active number.

The questionnaire consists of six domains: perceived susceptibility (eight items), perceived severity (five items), perceived threat (five items), perceived benefits (11 items), perceived barriers (12 items), and perceived self efficacy (eight items). The questionnaire consisted of 49 items and used A four-point Likert scale: 1 = strongly agreed, 2 = agreed, 3 = disagree, and 4 = strongly disagreed.

The findings were grouped by domain and tested for reliability and validity using SPSS ver.24. The validity of the item scale correlation was carried out to determine the degree to which the item was correlated with its hypothesized domain. The Pearson correlation coefficient values equal to or greater than the critical value table (r = 0.361; p = 0.05) were considered to be valid items [10]. The coefficient of reliability is an absolute number that can range from 0.00 to 1.00. The value of 1.00 indicates perfect consistency. A value of 0.00 indicates a complete lack of consistency [11]. A reliability coefficient of 0.70 or higher was accepted as proof of internal consistency for the instrument [12].

Results

Thirty-two participants completed the questionnaire, and two of them were excluded due to inadequacy of age. The average age of participants was 66.47 ± 5.7 years. Most of the participants were female (63.3%), and the majority had tertiary education (36.7%). Most participants were retired (0.4%) and had hypertension of around 1–5 years (0.44%). Almost all participants had no comorbidity (0.44%). The characteristics of participants are shown in Table 1.

Table 1: Demographic characteristics of the participants (n = 30).

Demographic data	Category	Number	Percentage, %
Age	Age – Mean (SD)	66.47 (5.7)	–
Sex	**Women**	**19**	**63.3**
	Men	11	36.7
Education	Primary school	4	0.13
	Junior high school	5	0.17
	Senior high school	**11**	**36.7**
	Bachelor degree	7	0.23
	Master degree	2	0.07
	Doctoral	1	0.03
Occupation	Housewife	9	0.3
	Private employees	2	0.07
	Lecturer	2	0.07
	Retired	**12**	**0.4**
	Driver	1	0.03
	Farmer	1	0.03
	Teacher	1	0.03
	Odd jobs	1	0.03
	Unemployment	1	0.03
Duration of hypertension	One year	3	0.1
	1–5 years	**13**	**0.44**
	5–10 years	7	0.23
	More than 10 years	7	0.23
Comorbidity	**None**	**13**	**0.44**
	Diabetes Mellitus type 1 or 2	5	0.17
	Coronary heart disease	1	0.03
	Stroke	1	0.03
	Dyspepsia	1	0.03
	Maag	1	0.03
	Osteoarthritis	3	0.1
	Cataract	1	0.03
	Vertigo	1	0.03
	Gout	1	0.03
	Arrhythmia	1	0.03
	Hyperlipidaemia	1	0.03

Table 2: The questionnaire reliability.

Domain	Cronbach's alpha coefficient	Standard coefficient	Explanation
Perceived susceptibility	0.897	0.70	Reliable
Perceived severity	0.743	0.70	Reliable
Perceived threat	0.761	0.70	Reliable
Perceived benefit	0.866	0.70	Reliable
Perceived barrier	0.849	0.70	Reliable
Perceived self efficacy	0.710	0.70	Reliable
All domain	0.898	0.70	Reliable

Table 3: The questionnaire validity.

Item	Domain	Statements	Pearson correlation	r table	Explanation
1	Perceived susceptibility	Susceptibility of uncontrollable blood pressure caused by taking medication improperly and irregularly.	0.727	0.361	VALID
2		Susceptibility of heart disease caused by taking medication improperly and irregularly.	0.825	0.361	VALID
3		Susceptibility of stroke caused by taking medication improperly and irregularly.	0.760	0.361	VALID
4		Susceptibility of a peripheral blood vessel caused by taking medication improperly and irregularly.	0.743	0.361	VALID
5		Susceptibility of nerve disorder caused by taking medication improperly and irregularly.	0.780	0.361	VALID
6		Susceptibility of renal disorder caused by taking medication improperly and irregularly.	0.616	0.361	VALID
7		Susceptibility of retina disorder caused by taking medication improperly and irregularly.	0.758	0.361	VALID
8		Susceptibility of brain disorder caused by taking medication improperly and irregularly.	0.891	0.361	VALID
9	Perceived severity	Anxiousness of blood pressure caused by taking medication incorrectly and irregularly.	0.787	0.361	VALID
10		Concern of blood pressure condition.	0.577	0.361	VALID
11		Fine with not taking any medications.	0.629	0.361	VALID
12		Deterioration of health caused by improper use of medication.	0.766	0.361	VALID
13		Deterioration of health caused by not taking the medication regularly.	0.791	0.361	VALID
14	Perceived threat	High-risk of a complication caused by not taking medication.	0.673	0.361	VALID
15		High-risk of a complication caused by not taking medication correctly.	0.851	0.361	VALID
16		Have no risk of a complication caused by taking medication irregularly.	0.561	0.361	VALID
17		Have a health risk caused by increasing medication without a healthcare professional's approval.	0.723	0.361	VALID
18		Have a health risk caused by reducing medication without a healthcare professional's approval.	0.770	0.361	VALID
19	Perceived benefit	Improved health caused by taking medication correctly.	0.717	0.361	VALID
20		Improved health caused by taking the medication regularly.	0.739	0.361	VALID
21		Healthier by taking medication and exercising regularly.	0.793	0.361	VALID
22		Healthier by taking medicines, fruits, and vegetables.	0.818	0.361	VALID
23		Healthier by taking medication and white meat.	0.547	0.361	VALID
24		Healthier by taking medication and either boiled or grilled foods.	0.667	0.361	VALID
25		Red meat is harmless to my blood pressure.	0.406	0.361	VALID
26		Fatty or high cholesterol foods are safe for blood pressure.	0.626	0.361	VALID
27		Healthier by taking medication and reducing salt intake (less than 1 tsp/day).	0.439	0.361	VALID
28		Healthier by taking medication and not smoking.	0.766	0.361	VALID
29		Healthier by taking medication and not drinking alcohol.	0.851	0.361	VALID
30	Perceived barrier	Uncomfortable due to cough while taking medication.	0.518	0.361	VALID
31		Uncomfortable caused by polyuria while taking medication.	0.564	0.361	VALID
32		Uncomfortable due to insomnia while taking medication.	0.654	0.361	VALID
33		Uncomfortable due to dizziness or vertigo while taking medication.	0.701	0.361	VALID
34		Uncomfortable caused by stomach ache while taking medication.	0.772	0.361	VALID
35		Uncomfortable due to nausea or vomiting while taking medication.	0.782	0.361	VALID
36		Uncomfortable due to constipation while taking medication.	0.831	0.361	VALID
37		Uncomfortable caused by diarrhea while taking medication.	0.765	0.361	VALID
38		Difficult to remember when taking medication as scheduled.	0.457	0.361	VALID
39		Difficult to remember if the medication has been taken.	0.601	0.361	VALID
*40		Not knowing about how to use the medication.	0.305	0.361	INVALID
*41		Not knowing about the time to use the medication.	0.348	0.361	INVALID
42	Perceived self efficacy	Easy to controlled blood pressure due to regular checks.	0.607	0.361	VALID

Table 3: (continued)

Item	Domain	Statements	Pearson correlation	rtable	Explanation
43		Able to neither smoke nor drink alcohol.	0.440	0.361	VALID
44		Able to exercise regularly.	0.678	0.361	VALID
45		Able to consume fruits and vegetables regularly.	0.479	0.361	VALID
46		Able to avoid either fatty or cholesterol food.	0.706	0.361	VALID
47		Able to avoid red meat.	0.695	0.361	VALID
48		Able to reduce salt intake (less than 1 tsp/day).	0.454	0.361	VALID
49		Able to take medication as prescribed.	0.516	0.361	VALID

*Item number 40 and 41 dropped because invalid.

All questionnaire scale data were entered into SPSS ver.24, and then analyzed for its reliability and validity at a significance level of 0.05. The result shows that each domain had a Cronbach's alpha value greater than 0.7, with the overall score was 0.89 indicating that all domains in the questionnaire were reliable [11, 12]. Furthermore, from 49 items in the questionnaire, two items were invalid and dropped from the questionnaire. All of the 47 items in the questionnaire were valid based on the Pearson Correlation ($r>0.361$; $p<0.05$) [10]. Items reliability and validity are shown in Tables 2 and 3.

Discussion

This study evaluated a newly developed instrument to determine the illness beliefs and treatment beliefs of elderly with hypertension. This instrument was developed with experts and tested for internal consistency reliability and validity using SPSS ver.24 software. However, this instrument suggested testing in a larger sample to represent all elderly with hypertension in Indonesia.

Limitations of Cronbach's alpha as a sole index of reliability, showing how it is not invariant with variations of the scale length, interitem correlation, and the characteristics of the sample [13]. This study proposed that it be presented alongside other complementary statistical measures (such as the outcomes of factor analyses) where appropriate [14]. This study cannot perform the exploratory factor analysis (EFA) as it did not meet the minimum sample size requirements.

The study found that the ratio of a sample size to the number of variables exhibited an inverse relationship. Using the coefficient of congruence criteria mentioned above, and a fixed number of factors, a small number of variables needs a greater minimum sample size than a large number of variables [15]. Both Cattell (1978) and Nunnally (1967), suggested various ratios of participants to variables ranging from 3 to 1, 10 to 1, and even higher for such an index [16, 17]. However, a study summarized that the sample size of 30 could assess reliability by using Cronbach's alpha, given that the scale items have strong correlations [18].

The value of "r table" $p = 0.05$ with 30 respondents is 0.361, with Pearson correlation coefficient values equal to or greater than the critical value table ($r = 0.361$; $p = 0.05$) considered to be a valid item [10]. In Table 3, item 40 (Pearson correlation 0.305) and number 41 (Pearson correlation 0.348) the Pearson correlation is less than 0.361 (r table), so item 40 and 41 are considered invalid and dropped from the questionnaire.

Conclusions

Finally, it was concluded that this study was sufficient to demonstrate that this questionnaire was accurate and valid so that calculating factors influencing adherence based on the health belief models in elderly with hypertension could be used. Also, more supportive data analysis is warranted to improve this questionnaire's application to the elderly with hypertension in Indonesia.

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Informed consent: All participants gave their consent and were assured about confidentiality.

Ethical approval: The Committee of Ethical Approval in the Faculty of Nursing Universitas Airlangga approved this study, with reference number 2090-KEPK.

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