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Implementation of the Health Belief Model as a Predictor of Acupuncture Therapy Adherence in Post-Stroke Patients

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ABSTRACT

Background: Post-stroke symptoms include limb weakness, paralysis, loss of balance, pain and numbness, memory and cognitive disorders, and urinary and digestive problems. The recovery process in post-stroke patients takes a long time, therefore, the patient needs to adhere to acupuncture therapy for recovery. This study aims to analyze the influence of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and cues to action on acupuncture therapy adherence in post-stroke patients.
Subjects and Method: This study was a cross-sectional study conducted in Yogyakarta, from November to December 2024. A total of 205 patients were selected using random sampling. The dependent variable was adherence to acupuncture therapy in post-stroke patients. Independent variables were perceived vulnerability, perceived severity, perceived benefits, perceived benefits, self-efficacy, and cues to action. The data were analyzed using path analysis.
Results: Adherence to acupuncture therapy increased with increased perceived susceptibility (b= 1.19; 95% CI= -0.13 to 2.27; p=0.081), perceived severity (b= 2.16; 95% CI= 0.81 to 3.31; p= 0.001), perceived benefits (b= 1.71; 95% CI= 0.98 to 2.45; p<0.001), self-efficacy (b= 0.73; 95% CI= 0.11 to 1.36; p= 0.022) and cues to action (b= 1.77; 95% CI= 1.08 to 2.45; p<0.001).
Conclusion: There is a positive relationship between perceived susceptibility, perceived severity, perceived benefits, self-efficacy, and cues to action on adherence to acupuncture therapy in post-stroke patients. The perceived benefits and self-efficacy are a direct influence on adherence to acupuncture therapy in post-stroke patients, while the perceived susceptibility, perceived severity, and cues to action are indirect influences.

Keywords: Health Belief Model, Adherence, Acupuncture Therapy, Post Stroke

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BACKGROUND

Stroke is a worldwide health problem, as one of the leading causes of death and long-term disability. According to a World Health Organization (WHO) report, in 2018 as many as 7.75 million people die from stroke every year. Stroke is a serious, life-threatening disease where blood flow to the brain is insufficient and leads to cell death (Sutin et al., 2022).

A stroke occurs when blood vessels in the brain become blocked so they block blood flow to the brain and cause nerve damage. Clogged arteries cause reduced oxygen flow and damage to brain cells. The most common signs and symptoms in stroke patients include stiffness or weakness on one side of the body and numbness in the face, hands, or feet (Suwaryo et al., 2019).

Post-stroke, symptoms may include limb weakness, paralysis, loss of balance, pain and numbness, memory and cognitive impairment, and urinary and digestive problems. Patients in recovery but with disabilities need help from family, friends, and medical professionals (Ulandari and Soebyakto, 2019).

Recovery of stroke patients occurs through complementary and non-complementary therapies. One such complementary therapy is acupuncture therapy. Acupuncture therapy is an alternative treatment technique that is often used to treat post-stroke. Acupuncture therapy can activate the body's defense mechanisms that make it homeostatic and lead to a healing process. This therapy method is the insertion of needles into points on the surface of the body (Darmawan et al., 2019). The recovery process in post-stroke patients takes a long time, therefore, patients need to adhere to the medication or therapy recommended by a doctor or health care professional. Adherence is a person's level of implementing a suggested rule. A person's level of undergoing the care, treatment, and behavior recommended by a nurse, doctor or other health care worker.

Adherence describes the extent to which a person behaves to implement the rules in behaving suggested by health workers (Pratama, 2021). Medication adherence is essential to reduce complications to chronic diseases and healthcare costs (Christiandari et al., 2022). Therapy adherence is influenced by various factors, one of which is the patient's perceptual behavior of their health. This perceptual behavior can be seen using the Health Belief Model theory.

The Health Belief Model is a theory used to explain and understand health behaviors (Yuliani et al., 2022). The Health Belief Model is an individual behavior itself, regardless of whether the perception and belief are in accordance with reality or not (Barakat and Kasemy, 2022). The Health Belief Model is a theoretical framework used to explain and predict individual health-related behavior. This model emphasizes that a person's health behavior is influenced by an individual's beliefs and perceptions about certain diseases or health conditions (Rachmawati, 2019).

This study aims to analyze the effect of Health Belief Model on the adherence to acupuncture therapy in post-stroke patients.

SUBJECTS AND METHOD

1. Study Design

This was a cross-sectional study conducted in Yogyakarta, from November to December 2024.

2. Population and Sample

The study population was post-stroke patients undergoing acupuncture therapy in Yogyakarta. A sample 205 post-stroke

patients was selected using simple random sampling.

3. Study Variables

Dependent Variable is adherence to acupuncture therapy in post-stroke patients. Independent Variables were Perceived susceptibility, perceived severity, perceived benefits, self-efficacy, and cues to action.

4. Operational Definition of Variables

Perceived susceptibility is an individual's belief about his/her susceptibility to disease risk and encourages him/her to engage in healthier behaviors.

Perceived severity is an individual's belief in the severity of his or her illness.

Perceived barriers is a negative aspect in the individual that prevents the individual from engaging in healthy behavior, because making changes is not an easy thing.

Perceived benefits is a belief in the benefits to be experienced by individuals when they engage in healthy behaviors.

Self-efficacy is self-belief in the ability to do something.

Cues to act is constructs that explain the factors that stimulate individuals to willingly behave healthily.

Adherence to acupuncture therapy isessential for the successful recovery of post-stroke patients and to prevent complications of the disease.

5. Study Instruments

The instrument used in this study is a questionnaire. The questionnaire was prepared by the researcher based on existing theories to measure variables, namely perceived susceptibility, perceived severity, perceived barriers, perceived benefits, self-efficacy, and cues to act as well as adherence to acupuncture therapy of post-stroke patients. The questionnaire had been tested for validity and reliability.

6. Data analysis

Univariate analysis aims to explain and describe the characteristics of each study variable. The study used the chi-square test for bivariate analysis and path analysis for multivariate analysis.

7. Research Ethics

Study ethics including informed consent, anonymity, and confidentiality, are handled with care during the study process. This study has received an ethical clearance from DR. Moewardi Regional General Hospital, Surakarta, Indonesia, No.263-8/XI/HREC/2024, on November 14, 2024.

RESULTS

1. Sample Characteristics

Based on Table 1, it shows that of the 205 subjects studied, the majority was the male gender with a total of 105 people (51.22%). The majority of the study subjects were 51-60 years old with a total of 80 people (39.02%). Most of the education levels of the study subjects were Senior High School, with a total of 63 people (30.73%), then Bachelor's Degree as many as 61 people (29.76%). And the majority of the study subjects were unemployed with a total of 55 people (26.83%).

Table 1. Characteristics of the research sample (categorical data)

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	105	51.22
	Female	100	48.78
Age	40-50 years	49	23.90
	51-60 years	80	39.02
	61-70 years	62	30.24
	>70 years	14	6.83
Level of education	Elementary	24	11.71

Characteristic	Category	Frequency (n)	Percentage (%)
	Junior High School	28	13.66
	Senior High School	63	30.73
	Associate's Degree	18	8.78
	Bachelor's Degree	61	29.76
	Master's Degree	11	5.37
Employment	Retirement	23	11.22
	Civil Servant	17	8.29
	Labourer	41	20.00
	Private	41	20.00
	Self-employed	28	13.66
	Unemployed	55	26.83

2. Univariate Analysis

Table 2 shows that the perceived susceptibility had the lowest value of 4.08 and the highest value of 4.36, with an average of 4.22 (SD= 0.73). The variable perceived severity had the lowest value of 7.06 and the highest value of 7.36, with an average of 7.21 (SD= 0.07). The variable perceived benefits had the lowest value of 5.38 and the highest value of 5.67, with an average of 5.52 (SD= 0.07). The variable perceived barriers had the lowest value of 3.68 and the highest value of 4.40 with an average of 4.04 (SD= 0.18). The variable self-efficacy had the lowest value of 6.02 and the highest value of 6.59 with an average of 6.31 (SD= 0.14). The variable cues to action had the lowest value of 5.24 and the highest value of 5.56 with an average of 5.40 (SD= 0.08). The variable adherence had the lowest value of 1.29 and the highest value of 1.43 with an average of 1.36 (SD= 0.03).

Table 2. The results of the univariate analysis of perceived susceptibility, perceived severity, perceived benefits, self-efficacy, and cues to action

Variable	Mean	SD	Minimum	Maximum
Perceived Susceptibility	4.22	0.73	4.08	4.36
Perceived Severity	7.21	0.07	7.06	7.36
Perceived Benefits	5.52	0.07	5.38	5.67
Perceived Barriers	4.04	0.18	3.68	4.40
Self-Efficacy	6.31	0.14	6.02	6.59
Cues to Action	5.40	0.08	5.24	5.56
Adherence	1.36	0.03	1.29	1.43

3. Bivariate Analysis

Table 3 showed that perceived susceptibility (OR= 1.32; 95% CI= 0.67 to 2.63; p= 0.420), perceived severity (OR= 1.79; 95% CI= 0.55 to 5.78; p= 0.326), perceived benefit (OR= 6.51; 95% CI= 0.55 to 5.78; p<0.001), perceived barrier (OR= 2.08; 95% CI= 1.16 to 3.71; p=0.014), self-efficacy (OR= 2.71; 95% CI= 1.51 to 4.88; p=0.001), and cues to action (OR= 3.52; 95% CI= 1.89 to 6.54; p<0.001) increased the likelihood of adherence to acupuncture therapy

Table 3. Results of bivariate analysis of perceived susceptibility, perceived severity, perceived benefits, self-efficacy, and cues to action on the adherence to acupuncture therapy in post-stroke patients

Variables	Acupuncture Therapy Adherence				OR	95% CI		p
	No		Yes			Lower Limit	Upper Limit	
	N	%	N	%				
Perceived of Susceptibility					1.32	0.67	2.63	0.420
Low	18	41.86	25	58.14				
High	57	35.19	105	64.81				
Perceived Severity								
Low	6	50	6	50	1.79	0.55	5.78	0.326
High	69	35.75	124	64.25				
Perceived Benefit								
Low	33	70.21	14	29.79	6.51	3.17	13.34	<0.001
High	42	26.58	116	73.42				
Perceived Barrier								
Low	38	46.91	43	53.09	2.08	1.16	3.71	0.014
High	37	29.84	87	70.16				
Self-Efficacy								
Low	43	50	43	50	2.71	1.51	4.88	0.001
High	32	26.89	87	73.11				
Cues to Action								
Low	36	57.14	27	42.86	3.52	1.89	6.54	0.001
High	39	27.46	103	75.54				

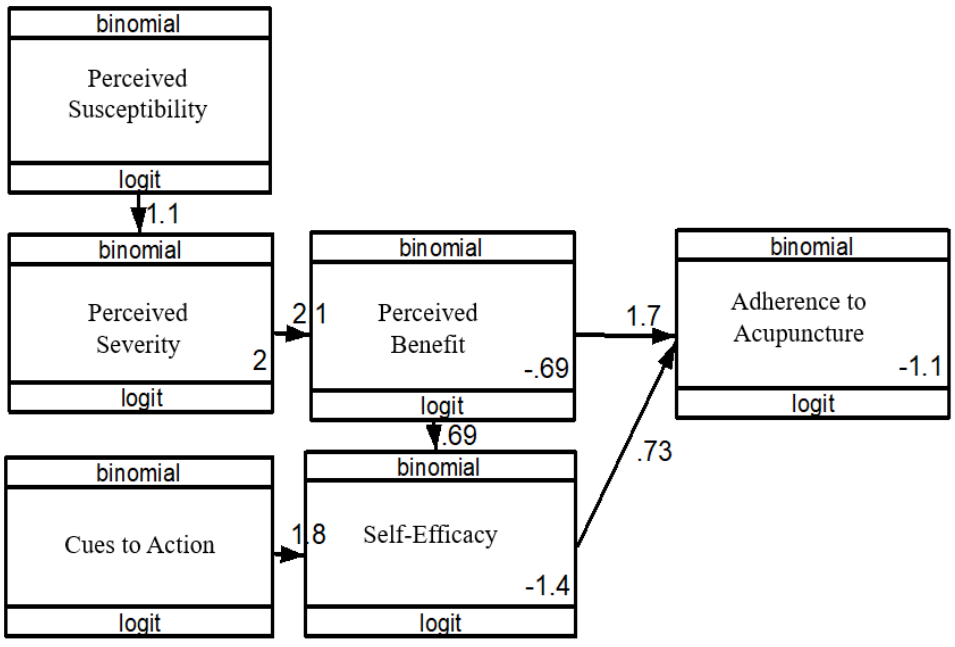

Figure 1. Structural equation model of Health Belief Model constructs on the adherence of acupuncture therapy in post-stroke patients

4. Path analysis

Figure 1 shows that adherence to acupuncture therapy in post-stroke patients was directly by perceived benefits and self-efficacy. Post-stroke patients who had positive perceived benefits were more likely to adhere to acupuncture therapy. Likewise, post-stroke patients who had strong self-efficacy were more likely to adhere to acupuncture therapy. Perceived benefit was directly affected by perceived severity, and perceived severity was directly affected by perceived susceptibility.

Self-efficacy was directly affected by the perceived benefits and cues to action. Post-stroke patients who had positive perceived benefits were more likely to have strong self-efficacy. Likewise, post-stroke patients who obtained cues to action were more likely to have a strong self-efficacy to adhere to acupuncture therapy. The results of the analysis are as follows. The results of the path analysis of the study in detail can be seen in the Table 4.

Table 4 showed that adherence to therapy directly affected by perceived benefit and self-efficacy. Strong self-efficacy (b= 0.73; 95% CI= 0.11 to 1.36; p=0.022) and strong perceived benefit (b = 1.71; CI 95% 0.98 to 2.45; p<0.001) increased adherence to acupuncture therapy.

Table 4. Estimation results of structural equation model of health belief model constructs on the adherence to therapy in post-stroke patients

Dependent Variable	Independent Variable	Path Coefficient (b)	CI 95%		p
			Lower Limit	Upper Limit	
Direct effect					
Adherence to therapy	← Self-efficacy (strong)	0.73	0.11	1.36	0.022
	←Perceived Benefits (strong)	1.71	0.98	2.45	<0.001
Indirect effect					
Self-efficacy (strong)	←Perceived benefits (strong)	0.69	-0.05	1.44	0.071
	←Cues to Action	1.77	1.08	2.45	<0.001
Perceived benefits (strong)	← Perceived Severity (high)	2.16	0.81	3.31	0.001
Perceived severity (high)	←Perceived Susceptibility (high)	1.19	-0.13	2.27	0.081

Table 4 showed that strong self-efficacy increased with perceived benefit (b= 0.69; 95% CI= to 0.05 to 1.44; p= 0.071) and strog cues to action (b= 1.77; 95% CI= 1.08 to 2.45; p<0.001).

Perceived benefit increased with perceived severity (b= 2.16; 95% CI= 0.81 to 3.31; p= 0.001). Perceived severity increased with perceived susceptibility (b= 1.19; 95% CI= to 0.13 to 2.27; p= 0.081).

DISCUSSION

1. Self-Efficacy and Acupuncture Therapy Adherence

The results showed that there was a significant association between adherence to acupuncture therapy and self-efficacy in post-stroke patients. Post-stroke patients who had strong self-efficacy were more likely to adhere to acupuncture therapy.

A study conducted by Wahyuni *et al.*, (2024) discovers a significant association

between knowledge and self-efficacy on post-stroke patients' self-management behavior. Good knowledge and high self-efficacy in post-stroke patients are essential because they can have a positive impact on self-management, so that it is expected to prevent recurrent strokes and improve the quality of life of patients in the future. Self-management and therapy adherence are closely related to managing the health of post-stroke patients.

2. Perceived Benefits and Acupuncture Therapy Adherence

The results showed that there was a significant association between adherence to acupuncture therapy and perceived benefits in post-stroke patients. Post-stroke patients who had a positive perceived benefits are more likely to adhere to acupuncture therapy

A study conducted by Dyfani *et al*., (2023) identifies that there is a significant effect of perceived benefits on the activity of daily living in non-haemorrhagic post-stroke patients, and there is no effect of perceived barriers and the activity of daily living in non-haemorrhagic post-stroke patients.

A study by Rosaline and Rahmah, (2023) states that individuals need confidence in the great benefits obtained if they implement healthy behaviors, one of which is adherence to treatment. However, if the individual feels that this behavior does not bring benefits, it has the potential to be a barrier in implementing healthy behaviors.

3. Self-Efficacy and Perceived Benefit

The results of the study showed that there was a significant association between self-efficacy and perceived benefits on acupuncture therapy adherence in post-stroke patients. Post-stroke patients who had positive perceived benefits would increase a strong self-efficacy to adhere to acupuncture therapy.

A study conducted by Marhenta *et al*., (2024) shows significant results that variable benefits affect the behaviors of hypertensive patients. The perceived benefit may be leading to better behavior, which suggest that respondents believe that the benefits of the drug are felt to be immense and that they would be better off if they took the drug regularly.

The results of this study are in line with the HBM theory, which states that people benefit when they believe that recommended actions to reduce the risk of the disease are effective (Amry *et al*., 2021).

4. Self-Efficacy and Cues to Action

The results showed that there was a significant association between self-efficacy and cues to act on adherence to acupuncture therapy in post-stroke patients. Post-stroke patients who had cues to action would increase a strong self-efficacy to adhere to acupuncture therapy.

A study conducted by Marhenta *et al*., (2024) shows significant results that there is an effect of variable cues to action on the behaviors of hypertensive patients. It can be assumed that perceived cues to action leads to high behaviors. This indicates that the respondents consider that the perceived cues to action is high and will improve if they continue to take medication regularly (Wahyuni *et al*., 2023).

5. Indirect Effect of Perceived Severity on Perceived Benefit

The results showed that there was a significant association between post-stroke patients' perception regarding perceived benefits and severity on adherence to acupuncture therapy. Post-stroke patients who had a high perceived severity would increase the positive perceived benefits to adhere to acupuncture therapy.

A study conducted by Vazini and Barati (2019), show that a person with a high perceived severity may affect the

behaviors of diabetes mellitus treatment. This is because perceived severity affects self-care behaviors, which means that with increased perceived severity, self-care also increases. The threat or risk of severity such as high mortality, can lead to changes in care behaviors

The results of this study are in accordance with the health belief model theory which shows that when a person perceives how severe a disease is, they are more eager to take preventive measures (Wahyuni et al., 2023).

6. Perceived Susceptibility and Perceived Severity

The results showed that there was a significant association between post-stroke patients' perception regarding perceived of severity and susceptibility to adherence to acupuncture therapy. Post-stroke patients with a high perceived susceptibility would increase the high perceived of severity to adhere to acupuncture therapy.

A study conducted by Tharek *et al.*, (2018), shows that perceived susceptibility and severity are the highest perceptions that can affect changes in a person's health behaviors. This study is in line with a study conducted by Shabibi et al., (2017), the results of the study show that there is an effect of the health belief model on diabetes mellitus treatment behaviors. This study analysed health promotion programs based on the health belief model, after the intervention there is a significant increase in DM patients. Perceived susceptibility and perceived severity are perceptions that can increase changes in patient behaviors.

Based on the theory of health belief model, the better the perceived vulnerability to the risk of a disease, the better the risk prevention behaviors. A person who has a high perceived of vulnerability will be more motivated to do something compared to a person who has a low perceived susceptibility (Prabawati et al., 2022).

7. Perceived Barrier and Acupuncture Therapy Adherence

Perceived barriers had a positive association with adherence to acupuncture therapy, and it was statistically significant in bivariate analysis. However, there was no correlation between the variables of perceived barriers and adherence to acupuncture therapy in multivariate analysis.

The results of this study show that high perceived barriers had a high probability of adherence to acupuncture therapy. So it is not in accordance with the theory in a study (Asfy and Primanita, 2024) that all stroke patients who underwent traditional treatment at ustad X did not feel any obstacles when undergoing treatment at ustad X. All respondents did not mind the distance they traveled to get the traditional treatment. In addition, family support was also very significant, with them escorting and accompanying the patient during the treatment process. It can be concluded that other constructs such as self-efficacy and perceived benefits can strengthen patient adherence to acupuncture therapy. The perceived barrier is high, however the other constructs in this health belief model are also high, it does not influence the study subjects to adhere to acupuncture therapy.

Furthermore, based on the findings in this study, the majority of study subjects were unemployed which may influence the high barriers variable related to economic conditions of financing for acupuncture therapy, however this does not influence therapy adherence because the study subjects who do not work have more flexible time to keep to the acupuncture therapy schedule, have high concern for health conditions, and receive financial support from the family.

AUTHOR CONTRIBUTION

Efa Yusfi Asrifa was the main researcher in this study who determined the topic, conducted study and data collection. Bhisma Murti and Haryani Saptaningtyas were the principal research assistants in this study.

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CONFLICT OF INTEREST

There was no conflict of interest in this study.

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