

Theory of Planned Behavior (TPB) and Hypertension Prevention

Asep Sukohar¹, Suharmanto¹

¹Faculty of Medicine, Universitas Lampung, Indonesia

Abstract

Background: Hypertension is still high in morbidity and mortality in the world and Indonesia. The number of people with hypertension is increasing every year. **Aim:** This review summarizes the Theory of Planned Behavior (TPB) in the prevention of hypertension. **Materials and Method:** The literature search was carried out in February 2021 on the PubMed database using the keywords “theory of planned behavior”, “prevention” and “hypertension”. The articles used are the articles of the last 10 years (from 2011-2020). The search found 30 articles and 8 articles that fit the criteria were discussed. The number of respondents in this study was between 25-306 with a total of 1,331 people. The questionnaire was used in the study for data collection. **Results:** Respondents are students, adolescents, residents, and communities from Iran, Thailand, and USA. TPB provides benefits in an educational program for people who are at risk of hypertension. Subjective norms, perceived behavioral control (PBC), intention increased hypertension prevention. **Conclusion:** TPB-based interventions are effective for hypertension prevention. All TPB constructs play an important role in hypertension prevention. The TPB model is still feasible and relevant for assessing hypertension prevention behavior.

Keywords: *theory of planned behavior, prevention, hypertension*

Introduction

Health problems in developed and developing countries include hypertension.¹ This disease often appears without complaint and has an impact on complications.² Hypertension is systolic blood pressure >140 mmHg and diastolic blood pressure \geq 90 mmHg. Hypertension is a non-communicable disease which is one of the main causes of premature death in the world. The World Health Organization (WHO) estimates that currently the prevalence of hypertension globally is 22% of the world's total population.³ Based on the 2018 Basic Health Research report, the prevalence of hypertension at age >18 years is 34.1%.⁴

The causes of hypertension include smoking, excessive salt, and fat consumption, obesity, alcohol consumption, stress, and sedentary behavior.⁵ The chemicals contained in cigarettes will affect the endothelium of blood vessels which will increase blood pressure.⁶ Excessive consumption of salt and fat will increase the amount of sodium in the blood which increases blood pressure. Obesity can also increase blood

pressure because of the presence of fat which interferes with blood flow in the body. Sedentary behavior or lack of physical activity causes blood flow that is not smooth and can increase blood pressure.⁷

Complications caused by hypertension include damage to body organs and increased treatment costs. Several heart diseases complicate hypertension, including coronary heart disease, left heart enlargement, heart attacks, and heart failure.⁸ Untreated hypertension can cause blood vessels to become damaged, harden, and tighten. This condition blocks blood flow to the heart, and results in chest pain and shortness of breath. This condition is known as coronary heart disease.⁹ The lack of blood flow can also trigger an irregular heartbeat, even a heart attack. Hypertension also forces the heart to work harder than normal to pump blood. This situation causes the left ventricle of the heart, which is in charge of pumping blood throughout the body to become thick and enlarged left heart. If left untreated, this condition increases risk of having a heart attack, sudden cardiac arrest, and heart failure. Besides high blood pressure also causes the heart muscle to become weak and work

less efficiently. Eventually, the heart gets overwhelmed, and wears out. This condition causes heart failure.¹⁰

Hypertension can be prevented by adopting a healthy life, avoiding smoking, a healthy diet, reducing salt and fat consumption, weight management, physical activity, and avoiding alcohol.¹¹ Education can be given as a measure to prevent hypertension.¹² The approach to preventing hypertension can use the theory of planned behavior (TPB).¹³

TPB has several dimensions, namely attitude, subjective norm, perceived behavioral control (PBC), intention, and behavior.¹⁴ Attitude is a person's subjective assessment of an object. Subjective norms are the influence of the social environment on behavior. PBC is a behavior control that is perceived by a person. The intention is a person's desire to take action. All these dimensions will manifest in an action. This review summarizes TPB as an approach to preventing hypertension.

Materials and Method

The literature search was carried out in February 2021 on the PubMed database using the keywords "theory of planned behavior", "prevention" and "hypertension". The articles used are the articles of the last 10 years (from 2010-2020). The search found 30 articles and 8 articles that fit the criteria were discussed. Twenty two articles were not used because they did not meet the criteria. This research chooses various methods in the article.

Results and Discussion

Table 1 describes 8 selected articles on TPB for hypertension prevention. The number of respondents in this study was between 25-306 with a total of 1,331 people. The questionnaire was used in the study for data collection. Respondents are students, adolescents, residents, and communities from Iran, Thailand, and USA.

Table 1. List of Articles

No	Author	Study	Country	Participants	Number	Instrument
1	Kalampakorn ¹⁵	Quasi-experimental study	Thailand	Community	n = 68	Questionnaires
2	Mahmoodabad ¹⁶	Intervention study	Iran	Adolescent	n = 172	Questionnaires
3	Morowatisharifabad ¹⁷	Exploratory research	Iran	Married individual	n = 25	Questions of interview
4	Matlabi ¹⁸	Cross-sectional study	Iran	Junior high school students	n = 160	Questionnaires
5	Pooreh ¹⁹	Quasi-experimental study	Iran	Girl adolescent	n = 160	Questionnaires
6	Peters ²⁰	Cross-sectional study	USA	African Americans community	n = 306	Questionnaires
7	Chenary ²¹	A mixed-method study	Iran	Women	n = 300	Questionnaires
8	Rahimdel ²²	Randomized Controlled Trial (RCT)	Iran	Community	n = 140	Questionnaires

Table 2. Study of TPB on Hypertension Prevention

No	Author	Score	Results
1	Kalampakorn	Experimental Group ; Comparison Group Attitude 43.21 ± 3.5 ; 42.21 ± 3.9 PBC 27.50 ± 4.0 ; 27.21 ± 2.3 Subjective norm friends 1.71 ± 0.9 ; 1.29 ± 0.6 Subjective norm family 2.47 ± 1.2 ; 2.44 ± 0.9 Walking exercise intention 8.38 ± 1.6 ; 7.94 ± 1.8 Walk (minute) 85.15 ± 42.25 ; 53.53 ± 43.91	TPB provides benefits in a walking exercise program for people who are at risk of hypertension. Subjective norms, PBC, intention, and walking exercise increased over time, while attitudes toward walking exercise increased within weeks.
2	Mahmoodabad	Score of Pre ; Score of Post Knowledge 21.43 ± 7.09 ; 34.50 ± 2.12 Attitude 84.18 ± 5.96 ; 90.47 ± 4.34 Subjective norms 47.48 ± 5.55 ; 51.27 ± 4.87 PBC 31.44 ± 7.35 ; 42.16 ± 4.45 Intention 28.66 ± 3.89 ; 30.75 ± 3.83 Behavior 20.88 ± 6.73 ; 29.54 ± 4.98	TPB-based interventions are effective for weight loss in adolescents to prevent hypertension. All TPB constructs play an important role in weight loss in adolescents. TPB describes the ability of attitudes and PBC to increase weight loss intentions.
3	Morowatisharifabad	Qualitative	The prevention of hypertension using the TPB approach can be done by reducing salt intake or consuming low-salt foods.
4	Matlabi	Attitude 28.27 ± 6.13 Subjective norms 12.58 ± 2.98 PBC 12.81 ± 2.97 Intention 16.02 ± 4.61 Behavior 8.00 ± 3.22	TPB can predict hypertension prevention behavior in adolescents through nutrition programs. Attitude, subjective norm, PBC, and intention affect hypertension prevention behavior in adolescents.
5	Pooreh	Case Group & Control Group Attitude 36.42 ± 2.88 ; 35.49 ± 4.09 Subjective norms 19.63 ± 3.51 ; 20.84 ± 3.60 PBC 16.70 ± 1.70 ; 15.79 ± 2.11 Intention 17.15 ± 1.37 ; 16.48 ± 2.69	Education-based on TPB is effective in preventing hypertension and enhancing attitudes, PBC, and intention in nutrition and physical activity. TPB can be used to increase hypertension prevention in adolescents.
6	Peters	No Answer	TPB can predict hypertension prevention behavior by controlling blood pressure. Attitude, subjective norm, PBC, and intention influence blood pressure control behavior.
7	Chenary	No Answer	This study provided a validated and reliable instrument developed based on the TPB dimension to assess women's behavior towards reducing salt intake to prevent hypertension.
8	Rahimdel	Intervention Group ; Control Group Attitude 194 ± 76.4 ; 121.22 ± 3.1 PBC 123 ± 52.2 ; 78.29 ± 56.7 Subjective norm 71.67 ± 30.7 ; 47.43 ± 35.2 Intention 42.78 ± 3.1 ; 36.9 ± 5.1	TPB-based educational interventions are effective for reducing salt intake in individuals at risk of hypertension. Attitude, subjective norm, PBC, and intention influence the behavior of reducing salt intake to prevent hypertension.

Research in Thailand on 68 people about the effect of walking exercise on people at risk of hypertension obtained scores in the experimental group and comparison group on attitude towards walking exercise 43.21 ± 3.5 ; 42.21 ± 3.9 , PBC 27.50 ± 4.0 ; 27.21 ± 2.3 ; subjective norm friends 1.71 ± 0.9 ; 1.29 ± 0.6 ; subjective norm family 2.47 ± 1.2 ; 2.44 ± 0.9 ; walking exercise intention 8.38 ± 1.6 ; 7.94 ± 1.8 ; walk (minute) 85.15 ± 42.25 ; 53.53 ± 43.91 . TPB provides benefits in a walking exercise program for people who are at risk of hypertension. Subjective norms, PBC, intention, and walking exercise increased over time, while attitudes toward walking exercise increased within weeks.¹⁵

Research on weight reduction obtained pre and post scores on knowledge 21.43 ± 7.09 ; 34.50 ± 2.12 , attitude 84.18 ± 5.96 ; 90.47 ± 4.34 , subjective norms 47.48 ± 5.55 ; 51.27 ± 4.87 , PBC 31.44 ± 7.35 ; 42.16 ± 4.45 , intention 28.66 ± 3.89 ; 30.75 ± 3.83 , behavior 20.88 ± 6.73 ; 29.54 ± 4.98 . TPB-based interventions are effective for weight loss in adolescents to prevent hypertension. All TPB constructs play an important role in weight loss in adolescents. TPB describes the ability of attitudes and PBC to increase weight loss intentions.¹⁶ Research in Iran on 25 married people found that prevention of hypertension using the TPB approach can be done by reducing salt intake or consuming low-salt foods.¹⁷

Research on hypertension prevention through nutrition program found that the score of attitude 28.27 ± 6.13 , subjective norms 12.58 ± 2.98 , PBC 12.81 ± 2.97 , intention 16.02 ± 4.61 and behavior 8.00 ± 3.22 . TPB can predict hypertension prevention behavior in adolescents through nutrition programs. Attitude, subjective norm, PBC, and intention affect hypertension prevention behavior in adolescents.¹⁸

Research about the prevention of hypertension obtained scores in the case and control groups on attitude 36.42 ± 2.88 ; 35.49 ± 4.09 , subjective norms 19.63 ± 3.51 ; 20.84 ± 3.60 , PBC 16.70 ± 1.70 ; 15.79 ± 2.11 and intention 17.15 ± 1.37 ; 16.48 ± 2.69 . Education-based on TPB is effective in preventing hypertension and enhancing attitudes, PBC, and intention in nutrition and physical activity. TPB can be used to increase hypertension prevention in adolescents.¹⁹

Research in the USA on 306 African American

communities found that TPB can predict hypertension prevention behavior by controlling blood pressure. Attitude, subjective norm, PBC, and intention influence blood pressure control behavior.²⁰ Another study provided a validated and reliable instrument developed based on the TPB dimension to assess women's behavior towards reducing salt intake to prevent hypertension.²¹

Research in Iran on 140 people about hypertension prevention obtained an intervention group and a control group score on attitude 194 ± 76.4 ; 121.22 ± 3.1 , PBC 123 ± 52.2 ; 78.29 ± 56.7 , subjective norm 71.67 ± 30.7 ; 47.43 ± 35.2 ; intention 42.78 ± 3.1 ; 36.9 ± 5.1 . TPB-based educational interventions are effective for reducing salt intake in individuals at risk of hypertension. Attitude, subjective norm, PBC, and intention influence the behavior of reducing salt intake to prevent hypertension.²²

Conclusion

Various studies that have been conducted that aim to determine the determinants of hypertension prevention behavior using the TPB approach found that attitudes, subjective norms, and PBC are directly related to the intention and behavior of hypertension prevention. TPB is still feasible and relevant to be used in predicting hypertension prevention behavior.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: This research has received ethical approval from the Faculty of Medicine, Universitas Lampung, Indonesia with Number 3886/UN26.18/PP.05.02.00/2019.

References

1. Korsager Larsen M, Matchkov V V. Hypertension and physical exercise: The role of oxidative stress. *Med* [Internet]. 2016;52(1):19–27. Available from: <http://dx.doi.org/10.1016/j.medic.2016.01.005>
2. Cipolla MJ, Liebeskind DS, Chan SL. The importance of comorbidities in ischemic stroke: Impact of hypertension on the cerebral circulation. *J Cereb Blood Flow Metab*. 2018;38(12):2129–49.
3. Shen Y, Chang C, Zhang J, Jiang Y, Ni B, Wang Y. Prevalence and risk factors associated with hypertension and prehypertension in a working

- population at high altitude in China: A cross-sectional study. *Environ Health Prev Med.* 2017;22(1).
4. Kemenkes RI. Riset Kesehatan Dasar. Jakarta: Kementerian Kesehatan Republik Indonesia; 2018.
 5. Gupta-Malhotra M, Banker A, Shete S, Hashmi SS, Tyson JE, Barratt MS, et al. Essential hypertension vs. secondary hypertension among children. *Am J Hypertens.* 2015;28(1):73–80.
 6. Ondimu DO, Kikuvu GM, Otieno WN. Risk factors for hypertension among young adults (18-35) years attending in tenwek mission hospital, Bomet county, Kenya in 2018. *Pan Afr Med J.* 2019;33:1–8.
 7. Rantanen AT, Korkeila JJA, Löyttyniemi ES, Saxén UKM, Korhonen PE. Awareness of hypertension and depressive symptoms: a cross-sectional study in a primary care population. *Scand J Prim Health Care.* 2018;36(3):323–8.
 8. Messerli FH, Rimoldi SF, Bangalore S. The Transition From Hypertension to Heart Failure: Contemporary Update. *JACC Hear Fail.* 2017;5(8):543–51.
 9. Judd E, Calhoun DA. Apparent and true resistant hypertension: Definition, prevalence and outcomes. *J Hum Hypertens.* 2014;28(8):463–8.
 10. O'Collins VE, Donnan GA, MacLeod MR, Howells DW. Hypertension and experimental stroke therapies. *J Cereb Blood Flow Metab.* 2013;33(8):1141–7.
 11. Lee JH, Kim K Il, Cho MC. Current status and therapeutic considerations of hypertension in the elderly. *Korean J Intern Med.* 2019;34(4):687–95.
 12. Anchala R, Kannuri NK, Pant H, Khan H, Franco OH, Di Angelantonio E, et al. Hypertension in India: A systematic review and meta-analysis of prevalence, awareness, and control of hypertension. *J Hypertens.* 2014;32(6):1170–7.
 13. Fishbein M, Ajzen I. The Influence of Attitudes on Behavior. *Handb Attitudes.* 2005;(July):173–222.
 14. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process.* 1991;50(2):179–211.
 15. Duangpunmat U, Kalampakorn S, Pichayapinyo P. An effect of walking exercise applying the theory of planned behavior in people at risk of hypertension. *J Med Assoc Thai.* 2013;96 Suppl 5.
 16. Mazloomi-Mahmoodabad SS, Navabi ZS, Ahmadi A, Askarishahi M. The effect of educational intervention on weight loss in adolescents with overweight and obesity: Application of the theory of planned behavior. *ARYA Atheroscler.* 2017;13(4):176–83.
 17. Morowatisharifabad MA, Salehi-Abargouei A, Mirzaei M, Rahimdel T. Behavioral beliefs of reducing salt intake from the perspective of people at risk of hypertension: An exploratory study. *ARYA Atheroscler.* 2019;15(2):59–66.
 18. Matlabi M, Esmaeili R, Moshki M, Ranaei A, Haji A, Mehrabi R. The status and predictors of hypertension preventive nutritional behaviors in adolescents based on the constructs of the Theory of Planned Behavior. *Electron Physician.* 2018;10(1):6223–30.
 19. Pooreh S, Hosseini Nodeh Z. Impact of education based on theory of planned behavior: An investigation into hypertension-preventive self-care behaviors in Iranian girl adolescent. *Iran J Public Health.* 2015;44(6):839–47.
 20. Peters RM. Theory of Planned Behavior, Self-Care Motivation, and Blood Pressure Self-Care. *Res Theory Nurs Pr.* 2010;24(3):172–86.
 21. Chenary R, Karimi-Shahanjarini A, Bashirian S, Roshanaei G, Fazaeli AA, Mohammadimanesh A, et al. Developing and testing an instrument to measure the factors affecting the salt restriction behaviors among women. *J Res Health Sci.* 2020;20(3):1–8.
 22. Rahimdel T, Morowatisharifabad MA, Salehi-Abargouei A, Mirzaei M, Fallahzadeh H. Evaluation of an education program based on the theory of planned behavior for salt intake in individuals at risk of hypertension. *Health Educ Res.* 2019;34(3):268–78.