

# Health Belief Model and Hypertension Prevention

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## Abstract

**Background:** Hypertension is a cardiovascular disease that contributes to morbidity and mortality. Hypertension is the number one cause of death in the world every year. The prevalence of hypertension in the world in 2015 was 1.13 billion. The number of people with hypertension is increasing every year. By 2025 it is estimated that there will be 1.5 billion people affected by hypertension. **Aim :** This review summarizes the HBM used as an approach in the prevention of hypertension. **Materials and Method :** The article uses a questionnaire with a number of respondents between 18-403 with a total of 2,160. **Results :** Respondents are students, residents, nurses, police from Iran, London, USA, South Africa, and China. The HBM model is still relevant and feasible to be used in predicting hypertension prevention behavior. **Conclusion :** HBM is still relevant and feasible to use in predicting hypertension prevention behavior.

**Keywords:** health belief model, prevention, hypertension

## Introduction

Cardiovascular diseases (CVD) is a major health problem in developed and developing countries.<sup>1</sup>This disease is still a public health challenge and is called a silent killer because it often occurs without complaints, usually known after complications.<sup>2</sup>One of the most common cardiovascular diseases is hypertension, namely systolic blood pressure >140 mmHg and diastolic blood pressure  $\geq$ 90 mmHg.<sup>3</sup> Hypertension is the number one cause of death in the world every year.<sup>4</sup>The prevalence of hypertension in the world in 2015 is 1.13 billion.<sup>5</sup>This means that one in three people in the world diagnosed with hypertension. The number of hypertension sufferers increases every year.<sup>6</sup>By 2025 it is estimated that there will be 1.5 billion people affected by hypertension.<sup>7</sup>Based on the Basic Health Research (BHR) report 2013, the prevalence of hypertension based on measurements at >18 years of age is 25.8%, while in 2018 the prevalence of hypertension increased to 34.1%. Hypertension occurs in the age group 31-44 years (31.6%), 45-54 years (45.3%) and 55-64 years (55.2%).<sup>8</sup>

Hypertension can be caused by various factors, such as smoking, unhealthy diet, excessive consumption of sugar, salt, fat, obesity, lack of physical activity, alcohol consumption, and stress.<sup>9</sup>BHR 2018 for aged > 15 years found that the proportion of lacked physical activity was 35.5%, eating fewer vegetables and fruit was 95.5%, smoking 29.3%, central obesity 31% and general obesity 21.8%.<sup>10</sup>This data shows an increase from the BHR 2013.

Hypertension can also cause various complications.<sup>11</sup>All organs that have blood vessels will be damaged in hypertension.<sup>12</sup> The organs of the body that are targeted include the brain, eyes, heart, kidneys, and blood vessels. Damage of organs depends on the magnitude of the blood pressure and the length of the blood pressure condition that goes undiagnosed and untreated. Apart from the damage to organs, hypertension can lead to increased treatment costs. Data from the Health Social Security Administration states that service costs for hypertension have increased every year, in 2016 amounting to 2.8 trillion rupiahs, in 2017 and 2018 amounting to 3 trillion rupiahs.<sup>13</sup>Hypertension is also a risk factor for heart disease, kidney failure, stroke, and diabetes.

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Hypertension can be prevented by controlling risky behaviors such as not smoking, a healthy diet, reducing consumption of sugar, salt, fat, avoiding obesity, doing physical activity, not consuming alcohol, and good stress management.<sup>14</sup> Efforts that can be made to prevent and control hypertension are with health promotion through communication, information, and education.<sup>15</sup> Various models and theories can be used as approaches in the prevention of hypertension.<sup>16</sup> This review summarizes the HBM used as an approach in the prevention of hypertension.

## Materials and Methods

The literature search was carried out in January 2021 on the PubMed database using the keywords “health belief model”, “prevention” and “hypertension”. The articles used are the articles of the last 15 years (from 2005-2020). The search found 39 articles and 10 articles that were discussed.

## Results and Discussion

Table 1 describes 10 selected articles on the HBM for hypertension prevention. The article used a questionnaire with a number of respondents between 18-403 with a total of 2,160. Respondents are students, residents, nurses, police from Iran, London, USA, South Africa, and China.

Research in two health care centers in Iran on 92 women at risk of hypertension, found that after two months of health education on hypertension prevention based on HBM, there was an increase in scores before and after intervention in physical activity, as a form of hypertension prevention efforts. In the intervention group, the pre-test score was  $7.71 \pm 0.97$  and the pre-post score was  $7.98 \pm 0.98$ . Whereas in the control group the pre-test score was  $7.47 \pm 1.16$  and the post-test score was  $7.29 \pm 1.19$ .<sup>17</sup> In the US study, it was found that most participants believed that culture and genetics made them more susceptible to obesity. The perceived benefits of losing weight include reducing the risk of health problems and improving physical appearance. The perceived barriers included lack of motivation, dietary information, and social support. Self-efficacy is mainly influenced by a frustrating diet history.<sup>18</sup>

Research on 312 black population in London, found that the self-efficacy factor is associated with the risk of

hypertension. An increase in the self-efficacy score was followed by a decrease in the hypertension risk score. The score for susceptibility was  $3.41 \pm 0.73$ , the score for severity was  $2.22 \pm 0.55$ , the score for barriers was  $3.67 \pm 0.66$ , the score for benefits was  $4.18 \pm 0.84$  and the score for self-efficacy was  $4.01 \pm 0.72$ .<sup>19</sup>

A study in the USA in 399 African-American communities found that affective risk perception and self-efficacy are proven to change the behavior of reducing salt intake as an effort to hypertension prevention.<sup>20</sup> A study on 104 nurses in Iran found that HBM-based education programs were proven to increase perceived severity, perceived benefits, and perceived self-efficacy in the intervention group compared to the control group. Scores in the intervention group, pre-test and post-test scores were obtained in the dimensions of susceptibility  $41.12 \pm 5.89$ ;  $42.14 \pm 4.06$ , severity  $19.89 \pm 2.54$ ;  $22.64 \pm 2.22$ , benefits  $48.47 \pm 4.86$ ;  $50.83 \pm 5.22$ , barriers  $35.43 \pm 10.46$ ;  $32.20 \pm 7.16$ , cues to action  $20.04 \pm 4.55$ ;  $19.56 \pm 3.42$  and self-efficacy  $39.25 \pm 4.36$ ;  $42.37 \pm 5.93$ .<sup>21</sup>

A study on 188 female students in Iran found that nutrition education programs based on HBM had a positive impact on the knowledge, attitudes, and behavior of young girls. The pre-post test scores in the intervention group were susceptibility  $23.4 \pm 2.2$ ;  $44.8 \pm 2$ , severity  $24.1 \pm 2.1$ ;  $41.9 \pm 2.1$ , benefits  $25.9 \pm 2$ ;  $44.7 \pm 2.1$ , barriers  $27.3 \pm 2.1$ ;  $15.1 \pm 2.1$ .<sup>22</sup> A study in Iran on 336 adolescents, it was found that perceived susceptibility, cues to action and self-efficacy are the main constructs that improve the diet quality of respondents. The pre-post test scores in the intervention group on the dimensions of barriers / benefits  $57.14 \pm 9.36$ ;  $61.19 \pm 9.03$ , susceptibility  $3.43 \pm 1.41$ ;  $3.80 \pm 1.17$ , severity  $18.46 \pm 7.21$ ;  $21.11 \pm 6.60$ , cues to action  $16.98 \pm 3.79$ ;  $17.94 \pm 3.36$  and self-efficacy  $50.20 \pm 15.27$ ;  $52.50 \pm 13.88$ .<sup>23</sup>

Research on 403 residents in Iran, it was found that after 6 months of the intervention, the intervention group felt less inhibited, and got more cues to action than the control group. Salt intake restriction was higher in the intervention group. The pre-post test score in the intervention group obtained a susceptibility of  $13.96$ ;  $14.88 \pm 0.36$ , severity  $23.98$ ;  $21.71 \pm 0.40$ , benefits  $25.11 \pm 3.51$ ;  $25.45 \pm 3.57$ , barriers  $13.06$ ;  $12.71 \pm 0.33$ , cues to action  $2.80$ ;  $3.58 \pm 0.12$  and self efficacy  $37.63 \pm$

5.47;  $38.19 \pm 5.99$ .<sup>24</sup>

A study on 200 residents in China, found that HBM-based interventions were effective in improving CVD prevention behavior. HBM increases the mean value of the HBM construct and displays CVD prevention behavior. The scores obtained in the intervention group were susceptibility  $18.84 \pm 2.62$ , severity  $18.69 \pm 2.41$ , benefits  $17.56 \pm 2.52$ , barriers  $-16.27 \pm 2.67$ , self-

efficacy  $20.94 \pm 2.29$  and cues to action  $4.04 \pm 2.15$ .<sup>25</sup>

A study on 58 police officers in Iran, found that educational programs based on HBM were effective in increasing susceptibility, severity, benefits for CVD prevention behavior. The scores obtained in the pre-test and post-test are at susceptibility  $3.30 \pm 0.29$ , severity  $3.36 \pm 0.24$ , benefits  $3.60 \pm 0.27$ , barriers  $2.93 \pm 0.22$ , cues to action  $2.83 \pm 0.34$  and Self-efficacy:  $3.26 \pm 0.26$ .<sup>26</sup>

**Table 1. List of Articles**

No	Author	Study Design	Country	Participants	Number of Participants	Instrument
1	Hoseini17	Experiment	Iran	Female resident	n = 92	Questionnaire
2	Newell19	Cross sectional	London	Black race population	n = 312	Questionnaire
3	Zhang20	Survey	USA	African American Community	n = 399	Telephone survey
4	James18	Qualitative	USA	African American women	n = 50	Focus Group Discussion
5	Amraei21	Quasy experiment	Iran	Nurses	n = 104	Questionnaire
6	Naghashpour22	Intervention study	Iran	Girl students of junior high school	n = 188	Questionnaire
7	Keshani23	Field trial study	Iran	Adolescents	n = 336	Questionnaire
8	Chen24	Intervention study	China	Residents	n = 403	Questionnaire
9	Kheiri25	Quasy experiment	Iran	Residents	n = 200	Questionnaire
10	Saffari26	Experiment	Iran	Police officer	n = 58	Questionnaire

**Table 2. HBM Study on Hypertension Prevention**

No	Author	Score	Result
1	Hoseini17	In the intervention group the pre-test score was $7.71 \pm 0.97$ and the pre-post score was $7.98 \pm 0.98$ . Whereas in the control group the pre-test score was $7.47 \pm 1.16$ and the post-test score was $7.29 \pm 1.19$ .	After two months of health education on hypertension prevention based on HBM, there was an increase in scores before and after intervention in physical activity, as a form of hypertension prevention efforts.
2	Newell19	The score for susceptibility was $3.41 \pm 0.73$ , the score for severity was $2.22 \pm 0.55$ , the score for barriers was $3.67 \pm 0.66$ , the score for benefits was $4.18 \pm 0.84$ and the score for self-efficacy was $4.01 \pm 0.72$ .	The self-efficacy factor is associated with the risk of hypertension. An increase in the self-efficacy score was followed by a decrease in the hypertension risk score.
3	Zhang20	NA	Affective risk perception and self-efficacy are proven to change the behavior of reducing salt intake as an effort to hypertension prevention.
4	James18	NA	Most participants believed that culture and genetics made them more susceptible to obesity. The perceived benefits of losing weight include reducing the risk of health problems and improving physical appearance. The perceived barriers included lack of motivation, dietary information and social support. Self-efficacy is mainly influenced by a frustrating diet history.
5	Amraei21	Scores in the intervention group, pre-test and post-test scores were obtained in the dimensions of susceptibility $41.12 \pm 5.89$ ; $42.14 \pm 4.06$ , severity $19.89 \pm 2.54$ ; $22.64 \pm 2.22$ , benefits $48.47 \pm 4.86$ ; $50.83 \pm 5.22$ , barriers $35.43 \pm 10.46$ ; $32.20 \pm 7.16$ , cues to action $20.04 \pm 4.55$ ; $19.56 \pm 3.42$ and self-efficacy $39.25 \pm 4.36$ ; $42.37 \pm 5.93$ .	HBM-based education programs were proven to increase perceived severity, perceived benefits, and perceived self-efficacy in the intervention group compared to the control group.
6	Naghashpour22	The pre-post test scores in the intervention group were susceptibility $23.4 \pm 2.2$ ; $44.8 \pm 2$ , severity $24.1 \pm 2.1$ ; $41.9 \pm 2.1$ , benefits $25.9 \pm 2$ ; $44.7 \pm 2.1$ , barriers $27.3 \pm 2.1$ ; $15.1 \pm 2.1$ .	Nutrition education programs based on HBM had a positive impact on the knowledge, attitudes, and behavior of young girls.
7	Keshani23	The pre-post test scores in the intervention group on the dimensions of barriers / benefits $57.14 \pm 9.36$ ; $61.19 \pm 9.03$ , susceptibility $3.43 \pm 1.41$ ; $3.80 \pm 1.17$ , severity $18.46 \pm 7.21$ ; $21.11 \pm 6.60$ , cues to action $16.98 \pm 3.79$ ; $17.94 \pm 3.36$ and self efficacy $50.20 \pm 15.27$ ; $52.50 \pm 13.88$ .	Perceived susceptibility, cues to action and self-efficacy are the main constructs that improve the diet quality of respondents.
8	Chen24	The pre-post test score in the intervention group obtained a susceptibility of $13.96$ ; $14.88 \pm 0.36$ , severity $23.98$ ; $21.71 \pm 0.40$ , benefits $25.11 \pm 3.51$ ; $25.45 \pm 3.57$ , barriers $13.06$ ; $12.71 \pm 0.33$ , cues to action $2.80$ ; $3.58 \pm 0.12$ and self efficacy $37.63 \pm 5.47$ ; $38.19 \pm 5.99$ .	After 6 months of the intervention, the intervention group felt less inhibited, and got more cues to action than the control group. Salt intake restriction was higher in the intervention group.

Cont... Table 2. HBM Study on Hypertension Prevention

9	Kheiri25	The scores obtained in the intervention group were susceptibility $18.84 \pm 2.62$ , severity $18.69 \pm 2.41$ , benefits $17.56 \pm 2.52$ , barriers $-16.27 \pm 2.67$ , self efficacy $20.94 \pm 2.29$ and cues to action $4.04 \pm 2.15$ .	HBM-based interventions were effective in improving CVD prevention behavior. HBM increases the mean value of the HBM construct and displays CVD prevention behavior.
10	Saffari26	The scores obtained in the pre-test and post-test are at susceptibility $3.30 \pm 0.29$ , severity $3.36 \pm 0.24$ , benefits $3.60 \pm 0.27$ , barriers $2.93 \pm 0.22$ , cues to action $2.83 \pm 0.34$ and Self-efficacy: $3.26 \pm 0.26$ .	Educational programs based on HBM were effective in increasing susceptibility, severity, benefits for CVD prevention behavior.

### Conclusion

Various studies that aim to determine the factors of hypertension prevention behavior using the HBM approach found that perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy are directly related to hypertension prevention behavior. The same study on the use of HBM to analyze the factors that influence hypertension prevention behavior, found that there is a positive relationship between various dimensions of the HBM and hypertension prevention behavior. So it can be concluded that the HBM is still relevant and feasible to use in predicting hypertension prevention behavior.

**Conflict of Interest:** None

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**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

- Sr G, Cs K, Rk M, Bs H, Gm A. Blood pressure targets for hypertension in older adults ( Review ). 2017;(8).
- Boucly A, Weatherald J, Savale L, Jaïs X, Cottin V, Prevot G, et al. Risk assessment , prognosis and guideline implementation in pulmonary arterial hypertension. 2017;1–10. Available from: <http://dx.doi.org/10.1183/13993003.00889-2017>
- Oliveros E, Patel H, Kyung S, Fugar S, Goldberg A, Madan N, et al. Hypertension in older adults: Assessment, management, and challenges. Clin Cardiol. 2020;43(2):99–107.
- Edwards E, DiPette DJ. “Real-world data analysis” in disease management such as hypertension: Has the time come? J Clin Hypertens. 2019;21(5):635–7.
- Das C Hansen KC and Tyler JK LMS. Global Disparities. Physiol Behav. 2017;176(3):139–48.
- Quispe-Tintaya W. 乳鼠心肌提取 HHS Public Access. Physiol Behav. 2017;176(3):139–48.
- Tadic M, Cuspidi C, Mancina G, Dell R, Grassi G. Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ’ s public news and information . 2020;(January).
- Kemenkes RI. Riset Kesehatan Dasar. Jakarta: Kementerian Kesehatan Republik Indonesia; 2013.
- Ondimu DO, Kikui 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.
- Kemenkes RI. Riset Kesehatan Dasar. Jakarta: Kementerian Kesehatan Republik Indonesia; 2018.
- Vachiéry JL, Tedford RJ, Rosenkranz S, Palazzini M, Lang I, Guazzi M, et al. Pulmonary hypertension due to left heart disease. Eur Respir J [Internet]. 2019;53(1). Available from: <http://dx.doi.org/10.1183/13993003.01897-2018>
- Rodriguez-Iturbe B, Pons H, Johnson RJ. Role of the immune system in hypertension. Physiol Rev.

- 2017;97(3):1127–64.
13. BPJS. Biaya Pelayanan Hipertensi. Jakarta: Badan Penyelenggara Jaminan Sosial Kesehatan; 2020.
  14. Akl C, Akik C, Ghattas H, Obermeyer CM. The cascade of care in managing hypertension in the Arab world : a systematic assessment of the evidence on awareness , treatment and control. 2020;1–13.
  15. Lou M, Zong X, Wang L. Curative treatment of hypertension by physical exercise. 2017;3320–6.
  16. Song T, Qian S, Cui T, Yu P. The Use of Theory in Mobile Health Interventions for Patient Self-Management of Chronic Diseases. 2019;1982–3.
  17. Hoseini H, Maleki F, Moeini M, Sharifirad GR. Investigating the effect of an education plan based on the health belief model on the physical activity of women who are at risk for hypertension. *Iran J Nurs Midwifery Res* [Internet]. 2014;19(6):647–52. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/25558264><http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC4280731>
  18. James DCS, Pobe JW, Oxidine D, Brown L, Joshi G. Using the Health Belief Model to Develop Culturally Appropriate Weight-Management Materials for African-American Women. *J Acad Nutr Diet* [Internet]. 2012;112(5):664–70. Available from: <http://dx.doi.org/10.1016/j.jand.2012.02.003>
  19. Newell M, Modeste N, Marshak HH, Wilson C. Health beliefs and the prevention of hypertension in a black population living in London. *Ethn Dis*. 2009;19(1):35–41.
  20. Zhang N, Leary E, Teti M, Stemmler J, Hampton N. Examining the factors that influence african americans in the midwest to reduce salt intake. *Heal Equity*. 2020;4(1):183–9.
  21. Shahram Ghasemi Amraei FM, Goudarzi F, Ebrahimzadeh F. Using an educational program based on health belief model to improve the preventive behaviors of nurses against cardiovascular diseases. *J Educ Health Promot*. 2020;9(100):1–8.
  22. Naghashpour M, Shakerinejad G, Lourizadeh MR, Hajinajaf S, Jarvandi F. Nutrition education based on health belief model improves dietary calcium intake among female students of junior high schools. *J Heal Popul Nutr*. 2014;32(3):420–9.
  23. Keshani P, Kaveh MH, Faghieh S, Salehi M. Improving diet quality among adolescents, using health belief model in a collaborative learning context: A randomized field trial study. *Health Educ Res*. 2019;34(3):279–88.
  24. Chen J, Tian Y, Liao Y, Yang S, Li Z, He C, et al. Salt-restriction-spoon improved the salt intake among residents in China. *PLoS One*. 2013;8(11):1–9.
  25. Kheiri M, Jeihooni AK, Alkamel A, Harsini PA. The effect of educational intervention based on the health belief model on the promotion of cardiovascular disease (CVD) preventive behaviors among subjects referred to health centers in fasa city (fars province, iran). *Kontakt*. 2019;21(2):206–13.
  26. Saffari M, Sanaeinasab H, Jafarzadeh H, Sepandi M, O'Garro KGN, Koenig HG, et al. Educational intervention based on the health belief model to modify risk factors of cardiovascular disease in police officers in Iran: A quasi-experimental study. *J Prev Med Public Heal*. 2020;53(4):275–84.