REVIEW ARTICLE

Health literacy program among the elderly with hypertension: a systematic review

Suwattana Onprasonk[1], Kannika Trinnawoottipong[1], Sarach Buntrai[1]

[1]Department of Disease Control, The Office of Disease Prevention and Control, Khon Kaen, Thailand

Corresponding Author: Suwattana Onprasonk **Email:** suwattana.on@kkumail.com

Received: 16 April 2024 **Revised:** 7 July 2024 **Accepted:** 8 July 2024 **Available online:** September 2024
DOI: 10.55131/jphd/2024/220325

ABSTRACT

Health literacy programs (HLP) have been recognized as key factors in promoting health and in changing caregiving behaviors for older adults with hypertension (HT), which have resulted in improved quality of life and continued good health. The objective of this research was to conduct a systematic literature review of the impact of HLP among the elderly individuals with HT. From January 1, 2013, to December 31, 2022, the formulation of research questions was based on the PICO framework and utilized a combination of the Boolean operators (AND or OR). The PRISMA approach was used to choose the studies. We searched in the Cochrane Library, PubMed, Google Scholar, Science Direct, MEDLINE, SCOPUS, CINAHL, TCI, TDC, and unpublished data. The initial screening of titles and abstracts was conducted. Studies meeting inclusion criteria were fully reviewed, and assessed for quality using a risk of bias tool, and then the data were extracted and summarised. A total of 8 papers were found to meet the criteria for review. The study design consisted of Randomized Controlled Trials (RCTs) and the quasi-experimental study design. The sample sizes varied from 29 to 185 individuals per group. The duration of the interventions ranged from 6 weeks to 18 months. With regard to the HLP, the systematic literature review found that it had been effective in blood pressure (BP) control, increasing health literacy (HL), and enhancing health behavior (HB) for older adults with HT in the intervention group (IG). The intervention exhibited notable variations both in terms of the quantity and the duration of the sessions. Nevertheless, the content remained predominantly similar, with a primary emphasis on HL. The studies, that had employed group-based interventions or had used a face-to-face individual approach, had been implemented in clinical settings or within communities. All the articles used a combination of didactics and facilitation. The research noted that the use of HLP as an intervention is becoming increasingly important and can contribute to a more efficient control of HT levels.

Key words:
health literacy program; systematic review; hypertension, elderly

Citation:
Suwattana Onprasonk, Kannika Trinnawoottipong, Sarach Buntrai. Health literacy program among the elderly with hypertension: a systematic review. J Public Hlth Dev. 2024;22(3):321-336 (https://doi.org/10.55131/jphd/2024/220325)

INTRODUCTION

HT represents a globally significant non-communicable disease. In the year 2021, an estimated 1.28 billion individuals between the ages of 30 and 79 years experienced high BP, with 42% having undergone diagnosis and treatment. Furthermore, 21% of treated patients are unable to maintain control over their BP levels. Advanced age is associated with an increasing susceptibility to HT.[1] The US National Health and Nutrition Examination Survey (NHANES) revealed that 70% of individuals aged 65 and above are afflicted with HT.[2] The significance of HT stems from the fact that it is a risk factor for cardiovascular diseases, cerebrovascular diseases, and renal diseases, ultimately impacting the severity of the diseases and mortality.[3] It is estimated that individuals with HT in the United States incur annual healthcare expenses that are nearly 2000 dollars.[4] One approach to preventing and mitigating the severity of this issue is the promotion of HL among elderly individuals with HT.[5] Recognizing the importance of HL, the World Health Organization emphasized its global development during the 7th World Health Promotion Conference.[6] HL, which is viewed as an intellectual process that utilizes social skills, can stimulate motivation and enhance the abilities of individuals to gain access to health information, comprehend, utilize the information, communicate effectively, and make decisions regarding their own health that can foster the promotion and maintenance of their well-being.[7-10]

The idea of HL is a new paradigm in health promotion. The differences in skills in HL have been categorized as basic/functional, communication, and critical HL.[11] From the literature review, it was found that the enhancement of HL efforts among the elderly has predominantly focused on strengthening basic and functional HL. However, there remains a lack of focus on fostering perceptual skills and communication abilities, as well as on disseminating information within the healthcare service system and nursing.[12] In the future, the enhancement of HL will emphasize the improvement of the quality of health communication in diverse formats. This includes skills development in the areas of accessing, comprehending, analyzing, and applying health information. Furthermore, before making decisions related to their own well-being, individuals must be capable of verifying information in order to ensure accuracy.[13] If a population exhibits a low level of HL, it will influence the occurrence of risky behaviors, sub-optimal self-care practices, and the occurrence of an increased prevalence of health-related issues.[14,15] In addition, the risk of hospitalization was found to be higher for patients with low HL.[16] HL is positively correlated with knowledge related to the management of high BP and health care behaviors.[17-19] Elderly individuals with insufficient HL levels exhibit a significantly higher mortality rate at approximately 1.75 times more than those individuals with adequate HL levels.[20]

HL is a key concept of health promotion. When individuals possess an appropriate level of HL, they can effectively manage their own well-being, as well as the well-being of their families and communities, resulting in positive health outcomes. The enhancement of HL, especially among the elderly, is crucial and should be undertaken in order to ensure clear understanding and to promote HL in a systematic manner. Emphasizing the significance of enhancing health knowledge implies fostering the ability of the elderly to self-manage their health,[12] especially those individuals with congenital disease conditions, such as HT, dyslipidemia, and diabetes mellitus, etc.

Several reviews of primary research found programs, which had been utilized to enhance HL among the elderly

by employing diverse methodologies. For example, action research had been carried out to design activities based on HL and HB (nutrition, physical exercise, emotional well-being, smoking cessation, and alcohol abstinence).[21,22] The HL promoting model had applied the theories of Nutbeam (knowledge and understanding, access to information, communication skills, self-management, media literacy, and decision-making skills);[23,24] the health education model for enhancing HL in new patients with diabetes and HT (self-efficacy, empowerment, and knowledge sharing);[25] and the HL program for implementing the health management framework by Ryan and Sawin.[26] Moreover, in the secondary research, a systematic study was conducted by Manafo and Wong.[27] This systematic review focused on investigating health knowledge programs for the elderly. The search for articles took place from January 2000 to March 2011 and resulted in the identification of nine articles. The research adopted a non-experimental design, assessing the knowledge levels before and after interventions within a single group setting. However, no previous systematic literature review that had focused on enhancing HL for the elderly with HT was found.

Thus, researchers were interested in studying the patterns, processes, and methodologies that could be employed to enhance HL, including the outcomes of enhancement programs, which had focused on the HL of elderly individuals with HT. Therefore, the purpose of this study was to conduct a systematic literature review of the effects of HLP among the elderly with HT.

METHODS

This research constituted a systematic review during which the study reports were systematically examined with regard to HL-enhancing programs among the elderly with HT. The study was conducted with reference to the principles established by the Cochrane Collaboration.[28]

Search strategy

The systematic search strategy comprised of four processes: identification, screening, assessment of eligibility, and inclusion. To identify relevant studies, we conducted a comprehensive search for research reports (both published and unpublished) from January 2013 to December 2022. We searched the Cochrane Library, PubMed, Google Scholar, Science Direct, MEDLINE, SCOPUS, CINAHL, TCI, TDC, and unpublished data sources. The study was guided by the research questions: What are the patterns of HL among the elderly with HT? How effective is HLP for the elderly with HT? The formulation of research questions was based on the PICO framework and utilized a combination of the Boolean operators (AND or OR).[29,30] Search terms included “hypertension”, “high blood pressure”, “elderly”, “senile”, “old age”, “elder”, “older adults”, “geriatric”, “senior”, “program”, “enhancement”, “program effectiveness”, “program assessment”, “health literacy”. The systematic review process followed the PRISMA flow diagram, which was the process used to select the studies.

Inclusion and Exclusion Criteria

The inclusion criteria for the systematic review of studies were the following: (1) interventions related to HLP, (2) conducted among elderly people with HT, (3) quasi-experimental studies or RCTs, and (4) studies that measured HL, HB, controlled BP, systolic BP, and diastolic BP outcomes. Studies were excluded if they were pilot RCTs, and the publication language was not English. Initial screening based on titles and

abstracts was performed by two independent reviewers (SW and SB). In the event of any disagreement, the final decision was made after consulting with a third reviewer (KT). Abstracts were retrieved and reviewed, and studies meeting inclusion criteria were then obtained for full-text review.

Assessment of methodological quality

All included articles were assessed for quality using the Cochrane 'Risk of Bias Assessment' guidelines, consisting of 7 items: 1) Random sequence generation, 2) Allocation concealment, 3) Blinding of participants and personnel, 4) Blinding of the outcome assessment, 5) Incomplete outcome data, 6) Selective reporting, and 7) Other biases. The evaluation results for each item were considered to determine the extent of bias, which was divided into three levels: low risk (green), high risk (red), and unclear risk (yellow). The assessment of article quality using the Cochrane approach involved evaluating the risk of bias in the following manner: 1) a low risk, indicating a low risk of bias across all items; 2) a high risk, indicating a high risk of bias for at least one item; and 3) an unclear risk, with at least one item being unclear and no items are rated as high risk.[31] For all included articles, the risk of bias tool was applied by two independent reviewers.

Data extraction

We extracted data and summarized the details of eligible studies using the information extracted from each reviewed study (e.g., authors, publication year, country, study design, sample, intervention, duration of the program, results) by two independent reviewers (SO and SR). A meta-analysis was not feasible; thus, the findings have been synthesized using a narrative synthesis.

RESULTS

The preliminary search of the database yielded 960 articles, of which 28 duplicate articles were removed, leaving a remainder of 932 articles. The initial selection criteria for articles by titles or abstracts were as follows: 1) elderly individuals with hypertension (age ≥ 60 years); 2) experimental studies (including RCTs or quasi-experimental studies); and 3) interventions involving HLP for HT. Out of these, 909 articles did not meet the inclusion criteria, leaving only 23 articles that had satisfied the study criteria. To achieve eligibility, the selected full-text articles had to have an explicit focus on the study of HLP for the elderly with HT, of which 8 papers were finally chosen and fully reviewed. The assessment of the quality of complete research reports was independently reviewed by two evaluators according to the inclusion and exclusion criteria. The study selection flowchart is shown in Figure 1.

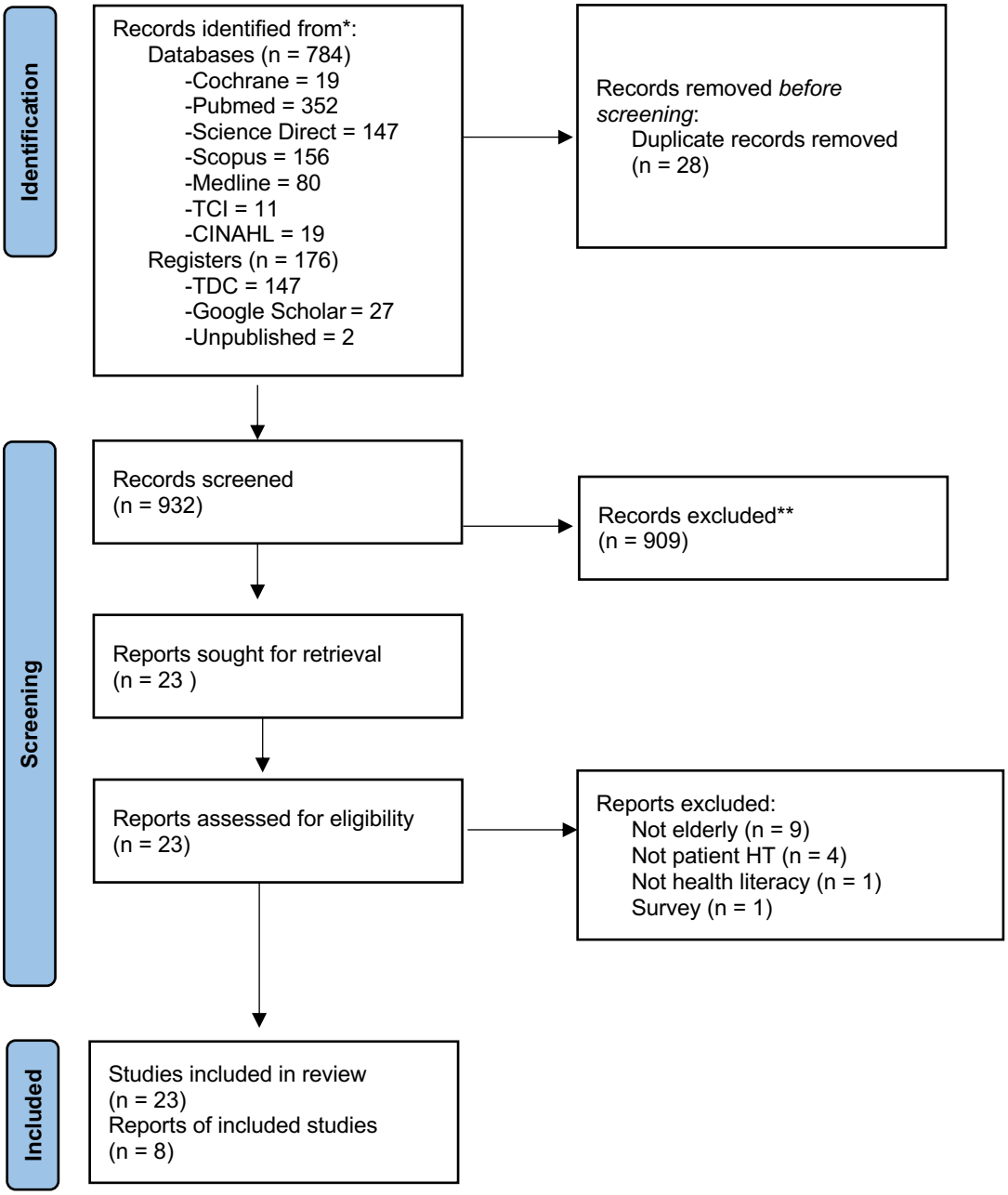

Figure 1. The PRISMA flow diagram

All full articles that had passed the quality assessment were subjected to data extraction, consisting of the title, year, author names, methods, participants, interventions, and outcomes, the results of which are summarized in Table 1. The intervention exhibited notable variations in terms of both the quantity and the duration of the sessions. Nevertheless, the content remained predominantly similar, with a primary emphasis on HL.

Study characteristics

The study design consisted of four studies utilizing the RCT [32,36,39] and an additional four studies adopting the quasi-

experimental study design.[33,34,35,37] The study participants were elderly individuals with HT in five studies[35,36,37,38,39] and elderly individuals with HT and diabetes in three studies.[32,33,34] The sample sizes varied from 29 to 185 individuals per group. The duration of the interventions ranged from 6 weeks to 18 months. Five studies were conducted in Thailand,[32-35,37] while one each was conducted in the USA,[39] Hong Kong,[38] and Iran.[36]

Intervention characteristics

Seven studies were designated as group-based interventions,[32-35,37-39] while one study used a face-to-face individual approach.[36] All the articles used a combination of didactics, facilitation, and teaching. Two studies were implemented in a clinical setting,[32,36] while six studies were carried out within a community.[33-35,37-39] Within the articles, there is an intervention related to the HLP, focusing on the HL of the Nutbeam concept, the HL of Sorensen, self-efficacy, self-management education, decision-making, evaluation, management, lifestyle modification, medication adherence, and health management.

Impact of the HLP interventions on outcomes

Out of the eight studies, three articles reported changes in the mean HB scores,[33,37,39] three papers reported changes in the mean HL scores,[34,35,39] and seven revealed changes in the BP levels.[32-36,38,39] Only two of the studies found statistically significant reductions in the average systolic BP level, while the reductions in the average diastolic BP level were not statistically significant.[32,33] Three studies showed significant improvements in the IG in regard to both HL and BP control rates.[34,35,39]

Table 1. A summary of the articles included in this review

Studies/ years	Countries	Study Designs	Samples	Interventions	Program Durations	Results
Kakahthum, P., 2022 [32]	Thailand	RCT	Elderly with diabetes and HT comorbidities, consisting of IG 30 and CG 30.	An HL promotion program with three sessions over eight weeks: The first session focused on functional HL at Week 1, and the second session focused on interactive HL at Week 4, and the last session focused on critical HL by using a teaching strategy consisting of "Ask Me 3" at Week 8, with follow-up at Week 9. In Week 12, there was an outcome assessment.	3 months	After 3 months of intervention, there had been a significantly lower average A1C and the systematic BP in the IG of participants than in the CG ($p < 0.001$). However, the diastolic BP had not decreased significantly ($p = 0.170$).
Sinthuchai S, 2022[33]	Thailand	A quasi-experimental study of two groups with a pre-test and a post-test	Elderly with diabetes and HT comorbidities, consisting of IG 75 and CG 75.	HL model: The Sorensen et al, Dunn and Conard, Kim and Lee, Miller and Rollnick concepts were all applied.	3 months	After 3 months of intervention, there had been a significantly higher score of average self-management behaviors, a lower average A1C, and a lower average systolic BP level in the IG of participants than in the CG of participants ($p < 0.001$). The exception was that the average diastolic BP level was not significant ($p = 0.309$).

Studies/ years	Countries	Study Designs	Samples	Interventions	Program Durations	Results
Sriyasak A et al., 2021[34]	Thailand	A quasi-experimental study of two groups with a pre-test and a post-test	Elderly with diabetes and HT comorbidities, consisting of IG 69 and CG 69.	HL for Health Management: The individual and family self-management theory of Ryan and Sawin was applied, which consisted of education, planning, decision-making, evaluation, management, and follow-up by phone at 2, 4, 6, and 10 weeks.	3 months	After 3 months of intervention, there had been a significantly higher score of average self-management behaviors, higher score of average HL, and a lower average systolic BP level in the IG of participants than in the CG of participants ($p < 0.001$) The exception was that the average diastolic BP level was not significant ($p = 1.360$).
Eamsaard S, 2021[35]	Thailand	A quasi-experimental study two groups with a pre-test and a post-test	Elderly with HT, consisting of IG 33 and CG 33.	HL and self-management behaviors: consisting of education, demonstrations, and home visits.	3 months	After 3 months of intervention, there had been a significantly higher average HL, and scores of self-management behaviors, as well as a lower average BP level in the IG of participants than in the CG ($p < 0.001$).
Delavar et al., 2020[36]	Iran	RCT	Elderly with uncontrolled primary HT and inadequate HL , consisting of IG 56 and CG 58.	HL on medication adherence and BP control: Education focusing on the concepts of HT, its risk factors, consequences, treatments, drug side-effects, the management of medication side-effects, the importance of medication adherence, and the	4 weeks	After 3 months of intervention, there had been a significantly lower average systolic BP level ($p = 0.011$), and diastolic level ($p = 0.039$) in the IG of participants than in the CG of participants.

Studies/ years	Countries	Study Designs	Samples	Interventions	Program Durations	Results
				necessity for routine doctor visits for BP monitoring and follow-up at 6 weeks.		
Kongsa A, 2020 [37]	Thailand	A quasi-experimental study with two groups with a pre-test and a post-test and a 2-week follow up	Elderly with HT, consisting of IG 30 and CG 29.	HL promotion program: the Nutbeam conceptual framework was implemented over a span of four weeks, with a subsequent two-week follow-up period post-intervention.	6 weeks	The results indicated a significant increase in the mean scores of BP control behaviors among participants in the IC compared to those in the CG. This difference was observed following the program at the 4th week, and during the subsequent follow-up period in the 6th week ($p < 0.001$).
Fu et al., 2020 [38]	Hong Kong	Cluster RCT	Elderly with uncontrolled HT, consisting of IG 152 and CG 137.	Education focusing on knowledge of HT, lifestyle modifications, and a hands-on home BP monitoring training conducted over a span of six weeks with follow-up assessments at 6, 8, and 12 months to evaluate BP levels and clinical parameters.	18 months	After 18 months of intervention, there had been a significantly higher BP control rate in the IG than in the CG ($P < 0.001$).
Kim et al., 2014 [39]	USA	A clinically controlled trial	Elderly with HT, consisting of an IG 184 and a control group (CG) 185.	The IG received a multimodal self-help intervention program that consisted of HL, high BP management, BP home	18 months	The results showed that after 18 weeks of intervention, there had been a significant increase over time in self-efficacy for

Studies/ years	Countries	Study Designs	Samples	Interventions	Program Durations	Results
				monitoring, and monthly follow-up counseling by phone for 12 months, with evaluate BP, medication adherence behaviors, self-efficacy, and HL at 0, 6, 12, and 18 months.		BP control, medication adherence behaviors, HL, and depression ($p < 0.001$). There had been a significantly higher BP control rate in the IG at 6, 12, 18 months, than in the CG ($P < 0.001$).

IG: intervention group; CG: case control

The review authors assessed the quality of the eight studies using the risk of bias assessment. One study was judged to have a "low risk of bias".[36] Six studies were assessed as having a "high risk of bias",[32-35,37,38] and one study was found to have an "unclear risk of bias".[39] In Figure 2, the assessment of the risk of bias for each article is shown.

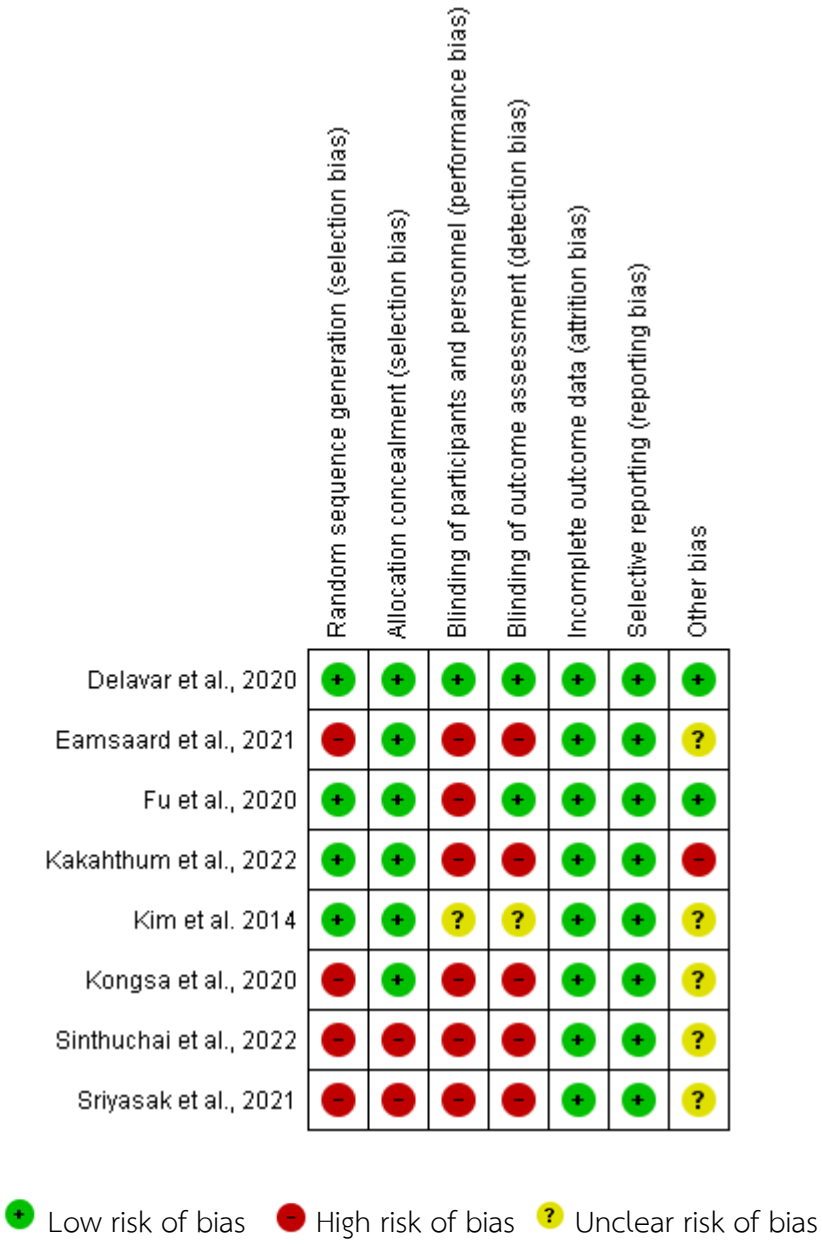

Figure 2. The risk of bias graph

DISCUSSION

This study aimed to provide a comprehensive evaluation of the literature regarding the effects of HLPs on older adults with HT. All the included studies were quasi-experimental studies and RCTs. Eight studies were found as effective based on HB, HL, and HB. It is important that older adults with HT undertake adequate HL to reduce BP levels and delay any complications.[40] HLPs had a wide range of follow-up periods; in this review, they were categorized according to follow-up period as short (4-6 weeks), intermediate (3 months), and long (18 months). Some studies had more than one follow-up assessment; however, in this review, the effect of the HLP will not be based on the follow-up period.

Therefore, increasing HL is necessary in order to support older adults with HT in order to develop effective HT self-management skills.[41] With regard to the HLP, the systematic literature review found that it had been effective in BP control for older adults with HT. A total of eight studies were identified that had utilized interventions with various modes of HT to yield the conceptual framework of program activities.

It was observed that the majority of interventions had demonstrated positive effects on BP control, irrespective of whether an intervention had been implemented at the individual level or at the group level and regardless of the varying durations of the conducted programs. Consequently, regarding interventions, a comprehensive understanding has been gained that has the potential to enhance clinical outcomes. Despite the relatively limited number of studies, favorable impacts on BP control have been consistently reported. Nevertheless, in some studies, the lack of significant results could be partly due to: i) the inconsistency of measurement BP instruments, study outcomes may include ambulatory BP readings or home BP readings;[38] ii) short intervention and follow-up periods;[36] and iii) a small sample size.[32]

The findings in the review showed the following: 1) individual and group education; 2) lectures, telephone-based education sessions, video media, demonstrations, the teaching techniques, such as the Ask Me 3 and Teach-back methods, group discussions, and sharing experiences; 3) follow-up by home visits or telephone calls; 4) counseling or telephone counseling; 5) monitoring by home BP readings; 6) the settings of clinics, community centers, and homes; 7) the lengths of programs (six weeks to eighteen months); and 8) program contents that focus on HL by employing the Nutbeam concept, HL of Sorensen, self-efficacy, self-management education, decision-making, evaluation, management, lifestyle modification, medication adherence, and health management.

LIMITATIONS

This literature review exclusively selected research published in English, which may result in incomplete information for countries with publications in other languages. Despite the inclusion criteria specifying individuals with hypertension, this review did not exclude studies involving individuals with other comorbidities in addition to hypertension. Moreover, the study found that programs, that had been applied to the elderly with HT, had exhibited a diversity in the following areas: approaches, assessments of outcomes over different time intervals, and dependent variables with differing measurements. Therefore, the findings could not conclusively determine which of the programs had yielded the best results for patients or which of the programs had been the most suitable.

CONCLUSIONS

This systematic review aimed at synthesizing the knowledge gained from research, which focused on the patterns of enhancing HL among the elderly with HT. From the eight studies reviewed, it is noted that the use of HLP as an intervention is becoming increasingly important and can contribute to a more efficient control of HT levels. The research findings can be utilized in order to serve as a guideline for designing a HLP for elderly individuals with HT by taking into consideration compatibility with lifestyle and cultural contexts. Therefore, multi-disciplinary healthcare teams should apply these programs as a guideline for promoting HL for the elderly with HT in order to improve HB or expand interventions in other areas.

CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest.

ACKNOWLEDGMENTS

The authors would like to thank Samarn Futrakul, MD and Sutin Chanabun, who served as an advisor, for supporting this research.

REFFENCES

1. World Health Organization. Hypertension [Internet]. [Cited 2023 February 12]. Available from: https://www.who.int/news-room/fact-sheets/detail/hypertension
2. Leszczak J, Czenczek-Lewandowska E, Asif M, Baran J, Mazur A, Wyszyńska J. Risk factors and prevalence of hypertension in older adults from south-eastern Poland: an observational study. Sci Rep. 2024; 14(1):1450. doi: 10.1038/s41598-024-52009-3
3. Oparil S, Acelajado MC, Bakris GL, Berlowitz DR, Cífková R, Dominiczak AF, et al. Hypertension. Nat Rev Dis Primer. 2018;4:18014. doi: 10.1038/nrdp.2018.14
4. Kirkland EB, Heincelman M, Bishu KG, Schumann SO, Schreiner A, Axon RN, Mauldin PD, Moran WP. Trends in Healthcare Expenditures Among US Adults With Hypertension: National Estimates, 2003-2014. J Am Heart Assoc. 2018;7(11):e008731. doi: 10.1161/JAHA.118.008731
5. Babazadeh T, Ranjbaran S, Pourrazavi S, Latifi A, Maleki Chollou K. Impact of health literacy and illness perception on medication adherence among older adults with hypertension in Iran: a cross-sectional study. Front Public Health. 2024;12:1347180. doi: 10.3389/fpubh.2024.1347180
6. World Health Organization. Seventh Global Conference on Health Promotion, Nairobi, 21-26 October 2009 [Internet]. [Cited 2024 May 30]. Available from: https://www.who.int/teams/health-promotion/enhanced-wellbeing/seventh-global-conference
7. World Health Organization. Health promotion glossary. Geneva: WHO. 1998.
8. Nutbeam, D. Health Literacy and adolescents: a framework and agenda for future research. Health Education Research. 23(5). Oxford University Press. 2008.
9. Sørensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, et al. Health literacy and public health: A systematic review and integration of definitions and models. BMC Public Health. 2012;12:80. doi: 10.1186/1471-2458-12-80
10. Office of Risk Communication and Health Behavior Development.

Manual for the process of creating health literacy in the prevention and control of disease and health hazards. Nonthaburi province: Department of Disease Control, Ministry of Public Health. 2021.
11. Nutbeam D. Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. Health Promot Int. 2000; 15(3):259–267. doi: 10.1093/heapro/15.3.259
12. Kaeodumkoeng K, Thummakul D. Health literacy promoting in aging population. J Health Sci Res. 2015;9(2):1-8.
13. Nutbeam D, Lloyd JE. Understanding and Responding to Health Literacy as a Social Determinant of Health. Annu Rev Public Health. 2021;42(1):159–73. doi:10.1146/annurev-publhealth-090419-102529
14. Nilnate W, Hengpraprom S, Hanvoravongchai P. Level of Health Literacy in Thai Elders, Bangkok, Thailand. J Health Res. 2016;30(5): 315–321.
15. Department of Health. Health literacy. National Health Literacy survey project for Thai People aged 15 years and above (phase 1). Health Systems Research Institute (HSRI). 2017.
16. Baker DW, Parker RM, Williams MV, Clark WS. Health literacy and the risk of hospital admission. J Gen Intern Med. 1998;13(12):791-798. doi: 10.1046/j.1525-1497.1998.00242.x
17. Kareesun K, Malathum P, Sutti N. Relationships among Health Literacy, Knowledge about Hypertension Control, and Health Behavior in Older Persons with Hypertension. Rama Nurs J. 2020;25(3):280-95.
18. Du, S., Zhou, Y., Fu, C., Wang, Y., Du, X., & Xie, R. Health literacy and health outcomes in hypertension: An integrative review. Int J Nurs Sci. 2018; 5(3):301–9. doi: 10.1016/j.ijnss.2018.06.001
19. Ghaffari-Fam, S., Sarbazi, E., Ardabili, F., Babazadeh, T., Darghahi, G., & Jafaralilou, H. The role of Health Literacy in Hypertension Control: a cross-sectional study in Iran. Ann Ig. 2020; 32(3):263–273. doi: 10.7416/ai.2020.2349
20. Sudore RL, Yaffe K, Satterfield S, Harris TB, Mehta KM, Simonsick EM, et al. Limited Literacy and Mortality in the Elderly: The Health, Aging, and Body Composition Study. J Gen Intern Med. 2006;21(8):806–812. doi: 10.1111/j.1525-1497.2006.00539.x
21. Singhasem P, Krinara P, Tiparat W, Sukkum W. The Action Research for Enhancing Health Literacy among Elderly in Nongtrud Sub-district, Muang District, Trang Province. J Health Sci Thai. 2020;29(5):790-802.
22. Chaiyanukool T. Development of Health Literacy of the Elderly at Khamkrang Sub-district, Detudom District, Ubon Ratchathani Province. Health Sci J Thai. 2020;2(3):73-9.
23. Anowannaphan M. The development of health literacy promoting model of the elderly in Uthai Thani province. J Dep of health Serv Supp. 2021;17(1): 15-22.
24. Puttha N, Chalardlon P. The development of health literacy activities of self-care for elderly in the new normal Ban Lueak subdistrict, Photharam district, Ratchaburi province. JMND. 2022;9(3):46-64.
25. Division of Health Education. Health education program for Promoting health literacy in the group of diabetic patients New high blood pressure. Bangkok: Department of Health Service Support Ministry of Public Health, Ministry of Public Health. 2020.
26. Sriyasak A, Sarakshetrin A, Tongphet J, Ket-in V, Utaitum N, Mookui S, Meesub T. The development of Health

Literacy for Health Management of Older Persons with Diabetes and Hypertension in Primary Care Cluster Context: Case Study in Phetchaburi Province. J Health Systems res. 2021;15(2):155-73.
27. Manafo E, Wong S. Health literacy programs for older adults: a systematic literature review. Health Educ Res. 2012;27(6):947–960. doi: 10.1093/her/cys067
28. Cochrane Effective Practice and Organisation of Care Group. Data Collection Checklist. EPOC Cochrane Effective Practice and Organisation of Care Group [Internet]. [Cited 2023 February 22]. Available from: http://www.epoc.cochrane.org/en/handsearchers.html
29. Muka T, Glisic M, Milic J, Verhoog S, Bohlius J, Bramer W, et al. A 24-step guide on how to design, conduct, and successfully publish a systematic review and meta-analysis in medical research. Eur J Epidemiol. 2020;35(1): 49-60. doi: 10.1007/s10654-019-00576-5
30. Haidich AB. Meta-analysis in medical research. Hippokratia. 2010;14(Suppl 1):29-37.
31. The Cochrane Collaboration. Review Manager (RevMan) [Computer program] version 5.3. Copenhagen: The Nordic Cochrane Centre. 2014.
32. Kim KB, Han HR, Huh B, Nguyen T, Lee H, Kim MT. The effect of a community-based self-help multimodal behavioral intervention in Korean American seniors with high blood pressure. Am J Hypertens. 2014; 27(9):1199-08. doi: 10.1093/ajh/hpu041
33. Kongsa A, Boonyamalik P, Kerdmongkol P. Effects of health literacy promoting program on blood pressure control behaviors among elderly with hypertension. KJN. 2020;27(2):90-102.
34. Fu SN, Dao MC, Luk W, Lam MCH, Ho ISF, Cheung SK, et al. A cluster-randomized study on the Risk Assessment and Management Program for home blood pressure monitoring in an older population with inadequate health literacy. J Clin Hypertens (Greenwich). 2020;22(9):1565-1576. doi: 10.1111/jch.13987
35. Delavar F, Pashaeypoor S, Negarandeh R. The effects of self-management education tailored to health literacy on medication adherence and blood pressure control among elderly people with primary hypertension: A randomized controlled trial. Patient Educ Couns. 2020;103(2):336–342. doi: 10.1016/j.pec.2019.08.028
36. Sinthuchai S, Namdej N, Kittiboonthawat P, Dejpitaksirikul S, Chuencham J, Ubolwan K, et al. Health Literacy Development Model to Promote Self-Management Behaviours and Its Health Impact on Older Adults with Both Type 2 Diabetes and Hypertension, in Primary Care Clusters in Saraburi Province. J Thai Nurse midwife Counc. 2022;37(1):58-74.
37. Sriyasak A, Sarakshetrin A, Tongphet J, Ket-in V, Utaitum N, Mookui S, Meesub T. The Development of Health Literacy for Health Management of Older Persons with Diabetes and Hypertension in Primary Care Cluster Context: Case Study in Phetchaburi Province. J Health Systems res. 2021; 15(2):155-173.
38. Eamsaard S. The effects of health literacy and self-management behaviors development program among elderly with hypertension, Phra Nakhon Sri Ayutthaya province. Community Health Development

Quarterly Khon Kaen University. 2021;9(2):155-166.
39. Kakahthum P, Lagampan S, Amnartsatsue K. Effects of health literacy improvement program on self-care behaviors and health outcomes in older adults with type 2 diabetes and hypertension comorbidities. J Public Health Dev. 2022;20(2):32–42. doi: 10.55131/jphd/2022/200203
40. Wannasirikul P, Termsirikulchai L, Sujirarat D, Benjakul S, Tanasugarn C. Health literacy, medication adherence, and blood pressure level among hypertensive older adults treated at primary health care centers. Southeast Asian J Trop Med Public Health. 2016;47:109-120.
41. Sangkhiaw W, Chintanawat R, Juntasopeepun P. Health literacy and self-management among older persons with uncontrolled hypertension. JPNC. 2023;34(1):17-29.