Malaysian Journal of Social Sciences and Humanities (MJSSH) (e-ISSN : 2504-8562)
2025, Volume 10, Issue 2, e003174
DOI: https://doi.org/10.47405/mjssh.v10i2.3174

RESEARCH ARTICLE

The Effect of The Online Combined Offline Health Education Model on Hypertension Among Floating Elderly Self-Management Enhancement

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KEYWORDS:
TikTok
Hypertension
Floating elderly hypertensive
Self-management

CITATION:
Wang, Y., Danis, A., Wang R., & Wang, X. (2025). The Effect of The Online Combined Offline Health Education Model on Hypertension Among Floating Elderly Self-Management Enhancement. *Malaysian Journal of Social Sciences and Humanities (MJSSH), 10*(2), e003174. https://doi.org/10.47405/mjssh.v10i2.3174

ABSTRACT

Improving self-management in floating elderly hypertensive patients is especially critical for controlling BP to maintain stability. A multi-center, patient and outcome-assessed blinded, randomized trial was conducted in Ningxia, China, recruiting 200 patients with floating elderly primary hypertension and dividing the randomized blocks into three intervention groups of 50 each and a control group of 50 after controlling for gender using stratification. The main contents of the intervention were regular medication+salt-reduced diet+aerobic exercise; the intervention time was 2 months. The online intervention group used (TikTok+WeChat+Telephone) mode, and the offline intervention group used (Lectures+Brochures+1-on-1 consulting) mode. The online and offline combined intervention group used the mode (TikTok+WeChat+Telephone + Lectures+Brochures+1-on-1 consulting). The primary outcome measure was dominated by blood pressure change, and secondary outcomes were the Medication Adherence Scale scores, Therapeutic Attitudes and Beliefs scores, and Self-management scores. The results shows that the combined online and offline intervention was the most effective at improving self-management, attitudes, practices, and BP control compared to the offline and online interventions alone. The differences between the groups were statistically significant ($p < 0.05$). The combined approach resulted in the most significant increases in self-management (43.33 point increase), attitudes (39.49 point increase), medication adherence (2.34 point increase), and practices (39.89 point increase) scores. It also led to the most significant reductions in systolic (-11.46 mm Hg) and

diastolic (-7.15 mm Hg) BP. These findings suggest that integrating online and offline health education modalities may be the most effective approach for improving hypertension management in this population.

Contribution/Originality: This study contributes to the existing literature that strategically reinforced digital health education platforms can significantly enhance adherence to hypertension medication and overall disease management. This health education model proves particularly effective in vulnerable population, and offers valuable insights for developing culturally appropriate educational interventions.

1. Introduction

Hypertension has been recognized as a significant risk factor associated with health problems all over the world, which seriously affects the quality of life (Filippone, Naccarelli & Foy, 2024). Approximately 54% of cerebral and 47% of cardiac strokes occur due to hypertension (Mancia et al., 2021). Over the past 25 years, the number of hypertensive patients has increased, and subsequently, the morbidity and mortality rates have also increased significantly (Mendy et al., 2021). It has been predicted that by 2025, the global population of hypertensive individuals will reach 1.5 billion (Yan et al., 2024).

Long-term hypertension is an important risk factor as it causes a variety of cardiovascular diseases, affects the function of important organs such as the heart, brain, and kidneys, and may finally lead to functional failure of these organs (Zhou et al., 2021). Hypertension has emerged as one of the chronic diseases having the highest incidence rate, which is constantly increasing. Other studies have shown that the rate of awareness, treatment, and control of hypertension in Chinese adults is significantly lower than that in developed countries such as the United States. Nevertheless, there is still no effective cure for hypertension (Zhang et al., 2023). The treatment and control of hypertension mainly depend on anti-hypertensive drugs; the existing anti-hypertensive drugs are mainly taken in oral doses, and most patients need to undergo lifelong treatment (Di Palo & Barone, 2022).

Theoretically, the existing anti-hypertensive drugs can control the blood pressure of more than 90% of patients with hypertension. However, the rate of control of blood pressure is not high in hypertensive patients (Hisamatsu & Miura, 2024). The reason is that the incidence, progress, and prognosis of hypertension, and whether patients can follow the doctors' instructions directly affect the results of hypertension treatment. This is closely related to patients' daily eating habits, knowledge level, behavior, and compliance with treatment (Xie et al., 2020). Health education can strengthen patients' understanding of their diseases. Guiding patients to develop good living habits, improve self-management ability, and retard the progression of the disease significantly helps in controlling and reducing complications associated with hypertension, which in turn improves patients' quality of life (Ataro, Mulatu & Mengistu, 2023).

When the elderly floating migrants come to live in a city, they face adaptability problems that pertain to their lifestyle, communication, psychological needs, institutional guarantees, and medical and health care in unfamiliar cities and environments (Han, Guan & Guan, 2022). This study was a randomized controlled trial, stratified by age, of 100 floating elderly hypertensive patients of both sexes in Ningxia, China, for 2 months

with the interventions of increasing medication adherence, low-salt diet, and aerobic exercise. A combination of online (TikTok + WeChat + Telephone), offline (Lectures + Brochures + 1-on-1 consulting), and online-offline interventions were utilized, and the final results were assessed by the primary outcome blood pressure change and secondary outcome self-management ability scores, treatment attitude and belief scores, and medication adherence scores. The results were categorized into evaluation outcomes. Data were analyzed using SPSS 20.0.

1.1. Research Questions

What are the changes in blood pressure, self-management scores, treatment attitudes and beliefs scores of patients in the intervention group after health education through online health education model (TikTok+WeChat+Telephone) and offline health education model (Lecture+Brochures+One-on-One Counseling)?

1.2. Objectives

To determine the effectiveness of integrated health education prevention among floating elderly hypertension patients in Ningxia, China. To determine changes in BP, self-management scores, attitudes toward treatment, and belief scores before and after receiving health education in each intervention group of patients.

2. Methods

2.1. Research Design

This study is a randomised-control trial using a block design. The primary health education components of the program were regular medication, a low-salt diet, and aerobic exercise. The online intervention group was required to open TikTok to watch the videos selected by our research team every day during the 60 days of health education, with a total of 60 videos, including 36 videos on hypertension knowledge and 16 videos on low-salt diet-8 videos on aerobic exercise. Patients were asked to open TikTok and watch 1 video pushed by us every day, which was 30 seconds to 1 minute in length, and they were also asked to like, favorite, and follow it. This is the use of TikTok's significant data function. The system will automatically push more types of hypertension health education videos through the patient's attention, allowing the patient to engage in active knowledge acquisition. In order to assess the day's knowledge acquisition, we utilize WeChat interaction daily to answer questions and explain and communicate with patients.

Several questions are set according to the day's video content, and patients who answer correctly are considered to have mastered the knowledge points of the day. Those with poor results will be pushed again through the WeChat video until all patients pass the test. Telephone follow-up consistent telephone calls were mainly used for daily follow-up of patients, including those who did not complete daily tasks and answered WeChat questions incorrectly several times. Adherence to the intervention was monitored by distributing small gifts to increase patient adherence. Patients in the offline health education group were given lectures twice a week, on Wednesdays and Saturdays, at 9:00 a.m. We would give scientific lectures on health knowledge at community health service stations, which lasted for about one hour, and the contents of the weekly lectures were the same for the online and offline groups. In order to assess patients' knowledge,

each participant answered questions on the spot at the end of the lecture, which included the content of the day's lecture until everyone answered correctly, and provided 1-to-1 counseling and a physical assessment of the participants. For those unable to attend the lecture, we provided door-to-door counseling. The online and offline joint health education group must use a combination of the two health education tools mentioned above.

The main topics of the lectures IIe medication adherence, such as the importance of adherence to medication, self-monitoring of blood pressure, the dangers of hypertension, the relationship between cerebral infarction and blood pressure, and many other topics related to hypertensive disorders. The lecturers are cardiologists and chronic disease managers from our team. Dietary habits: Eat more coarse grains, reduce meat, eat more soy products, nuts, vegetables, fruits, and vegetable oils, do not drink beverages dairy products, salt control, quit smoking, quit drinking, sleep, happy mood. Exercise: Avoid strenuous exercise. I recommend aerobic exercise step by step and a program for slow walking + fast walking, 10,000 steps per day, time every day, evening, 30 minutes each time. Whether or not to complete WeChat's exercise software will prevail, and WeChat will push the amount of exercise and walking steps of the day.

2.2. Research Location

This study were conducted in Yinchuan, Ningxia, China. After reviewing, four community health service stations with the most significant number of elderly floating hypertensive patients will be selected in Yinchuan. Reading Sea Vanguard Community Health Service Station, JinFeng District, Yinchuan, Ningxia, China. Shang Qian Cheng Jia Yuan Community health service station, XingQing District, Yinchuan, Ningxia. Mangrove Community Health Service Station, Xixia District, Yinchuan, Ningxia. Sun City Community Health Service Station, HeLan District, Yinchuan, Ningxia.

2.3. Research Population

The study included 200 patients and randomly assigned into four groups, each consisting of 50 subjects. By the principle of stratification by randomized compartments and controlling for multiple confounders such as gender. The quota sampling method was randomly assigned into four groups: control group (n = 50), online group (n = 50), offline group (n = 50), and combined online and offline group (n = 50) in a 1:1:1:1 ratio. Different intervention plans have been carried out for four groups of hypertensive patients. Control group: No intervention, usual care only. Offline health education: Weekly focused lectures on hypertension topics (diet, exercise, medication), plus 1-on-1 monitoring and physical exams. Online health education: Weekly hypertension health knowledge pushed via TikTok, WeChat Q&A to enhance learning. Combined online and offline: Weekly hypertension health knowledge via TikTok WeChat Q & A, weekly focused lectures, and 1-on-1 advice.

2.4. Research Sample

Two hundred floating elderly hypertensive patients aged 60-70 were recruited from Yinchuan, Ningxia, China, between 01/08/2023 and 30/9/2023. The baseline data on blood pressure, BMI, medication adherence, and self-management skills were not statistically significant in the four groups. Inclusion criteria included patients with primary hypertension who had been floating for over three years and could care for

themselves, walk independently, have a smartphone, use TikTok and WeChat, and receive phone calls. Exclusion criteria included patients with hypertension who have experienced complications such as heart, brain, kidney, and eyes; patients with a history of mental illness and cognitive impairment; patients who refuse to undergo regular follow-up; patients who are participating in other hypertension health management programs; no consent was obtained from the family, or the family did not support participation in the program; patient currently has comorbid with other chronic conditions (diabetes, kidney disease, COPD, and other chronic conditions); those who plan to move or need to go out in the next six months, and those with high blood pressure that is more serious and needs to be hospitalized; those who resisted the study and could not trust the research team after repeated explanations from the research team.

2.5. Research Instrument

This study used SBP and DBP as outcome measures. BP was measured by a Digital Blood Pressure Measuring Device (OmronSem-1 Model). All the participants were allowed to rest for five minutes before measuring their BP. BP was measured with each participant sitting comfortably in a chair with the left arm supported on a table at heart level. Three BP measurements were taken with a gap of five minutes between each recording, and if a difference of more than 10mmHg was noticed in the SBP or DBP, the fourth measurement was taken until the three lowest BP readings that did not differ by more than 10mmHg were obtained. The average of these three readings was recorded as the final measurement. Adherence to anti-hypertensive medication was assessed using the Medication Adherence Scale (Morisky); the answer is set as 'yes' or 'no,' 'yes' is given 0 points, 'no' is given 1 point, and the rating is 0~4 points; the higher the score, the better the adherence, as long as there is one or more 'yes' answer, it means poor adherence. The higher the score, the better the adherence; if there are one or more 'yes' answers, the adherence could be better. The Cronbach's alpha coefficient for this scale is 0.61 (Huang et al., 2021). Tang (2011) developed the Belief Evaluation Scale to evaluate hypertension patients' treatment attitudes and beliefs. It consists of 21 items and is scored on a 5-point scale, with 'completely agree' scoring 1, 'agree' scoring 2, 'can't say' scoring 3, 'disagree' scoring 4, and 'completely disagree' scoring 5. The total score is 20-100, with higher scores indicating higher attitudes and beliefs about treatment. The Hypertension self-management behavior evaluation scale assessed hypertensive patients' self-management behavior. Cronbach's α coefficient = 0.914, and the scale includes six dimensions: condition monitoring, diet management, exercise management, rest and work management, emotion management, and tobacco and alcohol addiction management. The higher the score, the higher the level of self-management ability (Zhao & Liu, 2012).

2.6. Data Analysis

Measurements conforming to the normal distribution were expressed as mean ± standard deviation, and measurements of skewed distribution were statistically described by median and interquartile spacing. Measurements that conformed to the normal distribution were compared between two groups using one-way ANOVA. Paired t-tests were used for comparisons before and two months after the intervention, and nonparametric tests were used for skewed distribution measures and count data comparisons. Repeated-measures ANOVA was used to compare the systolic and diastolic blood pressure at each time point before and after the intervention in the four groups. α

= 0.05 was set as the significance level of the test. The measured data were normally distributed, and the variance was homogeneously analyzed using the one-way analysis of variance (ANOVA) method. α = 0.05 was used as the significance level of the test. All analyses were conducted using SPSS (version 20.0).

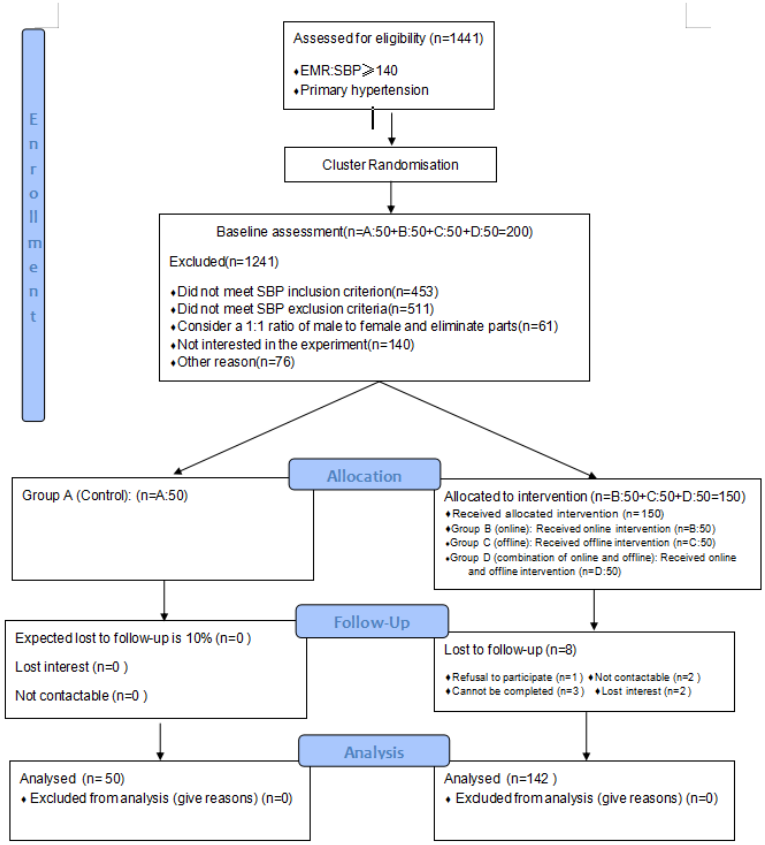
2.7. Ethical Approval and Consent to Participate

Written informed consent was obtained from all participants after obtaining ethical approval from Ningxia Medical University (license number: 2022-Z055) and Universiti Teknologi MARA(PG/FB/19) Ethical Review Committee (SERC). Written informed consent was obtained from all the participants before intervention.

3. Results

Searching the files of elderly patients with essential hypertension in the four communities identified 1,441 floating elderly primary hypertensive patients, and 200 study participants were finally determined after the inclusion and exclusion criteria and the principle of patient resource participation according to the principle of age stratification and the principle of matching the four groups 1:1:1:1. After 200 floating elderly hypertensive patients aged 60-70 were recruited, the intervention was done between 01/08/2023 and 30/9/2023. The final number of 192 patients who completed this experiment was 50 in the control group, 47 in the online intervention group, 47 in the offline intervention group, and 48 in the combined online and offline intervention group (refer to Figure 1).

Figure 1: Trial flow diagram. The procedure of the study evaluating the model of the blood pressure management health education



3.1. Pre-intervention baseline data for the four groups of floating elderly hypertension patients

As Table 1 showed used the Kruskal Wallis test, a nonparametric test, was used to compare the four groups in terms of age, gender, education, marriage, average monthly income, family history, smoking history, alcohol consumption, diet, BP, BMI, physical activity, treatment attitudes and beliefs, and medication adherence. The differences were not statistically significant (P > 0.05), indicating that the baseline information of the four groups was the same and could be compared (refer to Table 1).

Table 1: Baseline characteristics of four groups of floating elderly hypertension patients

Patients' baseline Characteristics	Control group	Online group	Offline group	Online and offline group	χ2/F	p-value
	N = 50	N = 50	N = 50	N = 50		
Mean age (years) (SD)	64.6±7.6	63.9±8.4	66.7±10.9	65.1±6.9	7.03	0.43
Number (%) education level						
Low	34(68)	30(62)	32(65)	23(46)	11.73	0.92
Middle	15(30)	17(34)	18(35)	22(43)		
High	1(2)	3(4)	0(0)	5(11)		
Alcohol (g/wk)	61.2±121	26.1±50.5	35.8±73.3	44.6±90.6	3.27	0.75
Number (%) Current smoker	10(20)	12(24)	9(18)	16(32)	15.33	0.19
SBP (mm Hg)						
Mean ± SD	151.21±7.5	147.83±6.7	149.22±9.3	153.09±2.8	1.37	0.54
Number (%) 140–159.9	29(58)	32(65)	30(60)	32(64)		
Number (%) 160–179.9	19(38)	17(34)	19(39)	15(30)		
Number (%) ≧180	2(4)	1(1)	1(1)	3(6)		
DBP (mm Hg)						
Mean±SD	90.16±2.8	89.71±5.3	90.84±0.8	91.88±3.9	1.89	0.24
Number(%)＜90	26(52)	31(62)	29(58)	30(60)		
Number (%)90–99	20(40)	17(34)	21(42)	15(29)		
Number (%) 100–109	2(4)	2(4)	0(0)	3(6)		
Number (%) ≧110	2(4)	0(0)	0(0)	2(5)		

Body Mass Index (kg/m2)						
Mean ±SD	31.2±5.8	32.3±4.5	31.4±1.7	30.6±2.9	0.93	0.37
Number (%) normal weight (<25)	3(6)	3(8)	0(0)	1(2)		
Number (%) overweight (25–30)	7(14)	7(12)	15(30)	9(18)		
Number (%) obese: (≧30)	40(80)	40(80)	35(70)	40(80)		
Physical activity score (mean ± SD)	39.28 ±14.65	40.17 ±13.47	42.69 ±9.78	38.57±13.18	1.65	0.72
Therapeutic attitudes and beliefs score (mean ± SD)	39.14±21.54	47.28 ±24.85	52.70 ±17.47	32.79±24.38	31.89	0.72
Self-management score (mean ± SD)	68.27±19.35	73.19±12.36	67.25 ±31.26	61.26±15.76	7.09	0.85
Adherence to medication score (mean ± SD)	2.35±0.26	2.97±0.54	2.36±0.18	2.47±1.98	1.78	0.13

3.2. Outcomes in the control group and the three intervention groups after 2-month of intervention

As shown in Table 2, the ANOVA test was selected for the data of the four groups, and the results showed that there was no significant change in BMI after the intervention in the four groups (P > 0.05). The differences between the four groups were statistically significant for SBP, DBP, treatment attitude and belief scores, physical exercise scores, self-management scores, and medication adherence scores (P < 0.05) (refer Table 2).

Table 2: Comparison of BMI, physical activity, treatment attitude and belief, self-management behavior, medication compliance, and BP among the four groups in the intervention of two months

Domain assessed	Control group	Online group	Offline group	Online and offline group	F	p-value
Body Mass Index (kg/m2)	30.14±2.7	31.99±7.8	30.26±1.9	30.1±3.8	1.04	0.62
SBP (mm Hg)	150.03±5.8	142.14±4.5	146.81±7.1	141.63±4.9	11.21	0.03
DBP (mm Hg)	89.28±4.7	86.19±7.5	84.73±1.2	84.73±8.6	65.12	0.01
Physical activity	42.14 ±16.43	51.39±17.24	67.45±10.56	78.46±14.09	18.2	0.01

score (mean ± SD)					3	
Therapeutic attitudes and beliefs score (mean ± SD)	41.36±10.76	58.17±13.41	64.34±26.25	72.28±13.26	48.02	0.02
Self-management score (mean ± SD)	69.50±11.13	93.23±26.47	93.14±20.81	104.59±27.65	10.44	0.00
Adherence to medication score (mean ± SD)	2.65±1.92	3.02±1.43	3.59±0.61	4.81±1.76	6.9	0.04

3.3. Comparison of health education effects among the three intervention groups

The Table 3 showed that the combined online and offline intervention was the most effective at improving self-management, attitudes, practices, and BP control compared to the offline and online interventions alone. The differences between the groups were statistically significant ($p < 0.05$). The combined approach resulted in the largest increases in self-management (43.33 point increase), attitudes (39.49 point increase), medication adherence (2.34 point increase), and practices (39.89 point increase) scores. It also led to the greatest reductions in systolic (-11.46 mm Hg) and diastolic (-7.15 mm Hg) BP. These findings suggest that integrating online and offline health education modalities may be the most effective approach for improving hypertension management in this population. (refer to Table 3).

Table 3: Comparing the outcomes of the offline, online, and combined interventions

Domain assessed	Offline intervention group	Online intervention group	Combined intervention group	p-value
Change in SBP (mm Hg, mean ± SD)	-2.41±2.2	-5.69±1.98	-11.46±2.1	0.001
Change in DBP (mm Hg, mean ± SD)	-6.11±0.4	-3.52±2.09	-7.15±4.7	0.001
Change in Practice Score (mean ± SD)	24.76±0.78	11.22±3.14	39.89±0.91	0.001
Change in Attitude Score (mean ± SD)	11.7±8.51	10.89±10.25	39.49±11.12	0.001
Change in Self-management Score (mean ± SD)	25.89±10.45	20.04±9.72	43.33±9.89	0.001
Change in Medication Adherence score (mean ± SD)	1.23±0.43	0.05±0.89	2.34±0.26	0.001

4. Discussion

Hypertension is the leading cause of cerebral hemorrhage and high infarction (Shen et al., 2021). However, it can be better controlled with regular medication, a low-salt diet, and aerobic exercise. However, in developing areas with less developed economies and poor medical facilities, especially floating elderly hypertensive patients face low control of hypertension, low treatment, and high mortality rates, mainly due to lower hypertension awareness among the population of the area (Stewart, 2023). Pharmacologic and non-pharmacologic treatments play an equal role in controlling blood pressure. Drugs alone cannot control blood pressure; non-pharmacologic treatments can also control it. However, the importance of non-pharmacological treatment is often overlooked by floating elderly hypertensive patients, which is mainly attributed to the high mobility of floating elderly hypertensive patients in their place of residence, difficulty in integrating with the current population, language barriers, and financial stress. As the frequency of smartphone use among floating elderly hypertensive patients increases yearly, utilizing smartphones to provide patients with adequate and necessary information can improve knowledge, attitudes, and self-efficacy and promote treatment adherence (Indraratna et al., 2022). Studies have shown that insufficient knowledge of the causes and symptoms of hypertension, fear of medication side effects, and dependence on medications are the main factors that lead to discontinuation of treatment and lack of treatment adherence (Schutte et al., 2021). Increasing public awareness of hypertension and taking the necessary self-management measures can help improve individual adherence to pharmacologic and nonpharmacologic treatments. Therefore, it is feasible to utilize the Internet for health education of hypertensive patients (Saeed et al., 2024).

This study showed that online (TikTok + WeChat + Telephone) combined with offline (lectures + Brochures + 1-on-1 consulting) interventions effectively controlled blood pressure and significantly improved patients' self-management skills. Compared with the baseline data, a two-month follow-up visit showed a significant reduction in blood pressure levels in the group receiving the intervention. In contrast, the control group showed little change in blood pressure levels after the same period. The three intervention groups showed a significant reduction in blood pressure levels after two months compared to the control group. Therefore, it can be inferred that hypertensive patients need continuous monitoring to control their blood pressure. The online combined offline health education group had the highest reduction in blood pressure. This may be because patients in this group were continuously managed by offline community health service station staff and online volunteers through WeChat, TikTok, and other cell phones to assist with telephone contacts. Patients in this group had more frequent contact with researchers than the other groups.

In contrast, the effect of regular online and offline education on blood pressure was less pronounced than the combination of online and offline education. A previous study showed that more intensive treatment, including frequent personal contact and additional behavioral components, significantly reduced blood pressure. Regular exercise, a low-calorie diet, and reduced sodium intake should be initial strategies for treating mild-to-moderate hypertension in overweight patients (Khemka et al., 2023). These factors may stimulate and motivate patients to be more active in controlling their blood pressure, often following the advice of their healthcare team.

Patients may adopt health-promoting behaviors at the beginning of their routine education. However, over time, they will likely need to remember what has been taught or lose freshness in the manner and content of the tasks. Failure of chronic disease managers to regularly track and evaluate the knowledge gained by patients results in the weakening of positive behaviors previously adopted by patients (Khattak et al., 2024). Therefore, as the main battleground for hypertension health education, the community should ensure continuous dynamic and multiple forms of knowledge dissemination and monitoring (Hines & Plante, 2022). Home blood pressure monitoring is increasingly accepted and used by patients and has had a desirable and beneficial impact on clinical interventions. In the present study, regular reminders to monitor blood pressure and increasing knowledge about the disease helped patients to monitor their blood pressure regularly at home. About 95% of the patients in the intervention group measured and recorded their blood pressure more than 50 times in two months. Measuring blood pressure at home allows individuals to be aware of their blood pressure status and promotes treatment adherence, facilitating optimal blood pressure control. Regular physical activity is key to controlling high blood pressure and improving health (Lopes et al., 2021). In addition to understanding the importance of regular physical activity for blood pressure control, patients in the intervention group were required to send daily spot messages and provide feedback to the researchers and those with a combination of online and offline exercise for the most extended period. This finding is consistent with studies conducted in the UK and the US (Dassanayake et al., 2022).

In this study, we used WeChat and TikTok to disseminate information about hypertension medications, physical activity, and dietary care online, and the evidence suggests that online services are as effective as face-to-face hypertension instruction and treatment. This opens the possibility of health education for floating elderly hypertensive patients, with online health education playing a significant role as mobility increases initially and offline modalities coming into play as familiarity and local integration are achieved at the floating site. The main advantage of this study is that it is not limited by time and place or spatial and geographical constraints. Patients can contact the researchers at any time. Although the attractiveness, popularity, and outreach of online and offline health education transcends spatial and temporal constraints, the best way to do this is through a combined online and offline model.

5. Conclusion

Compared with the online-only intervention group and the offline-only intervention group, the combined online and offline intervention model had the most significant effect on patients and was able to significantly change patients' knowledge, beliefs, and behaviors, improve patients' medication adherence, enhance exercise modalities, and rationalize diet, thus reducing SBP/DBP levels, enhancing patients' self-efficacy, improving patients' behavioral adherence, and improving patients' health-related quality of life. It can be inferred that combining online and offline health education is a better management model for floating elderly hypertensive patients and can be promoted for use. A combination of online and offline approaches was the most effective of the three for changing medication adherence, dietary habits, and exercise among mobile elderly hypertensive patients. Innovative policies are recommended to enhance support for these patients. Also, this study failed to include middle-aged patients, and more participants need to be included at a later stage to enrich the purpose of the study.

Ethics Approval and Consent to Participate

The researchers used the research ethics provided by the the Ethics Committee of Ningxia Medical University (license number: 2022-Z055) and Universiti Teknologi MARA(PG/FB/19) Ethical Review Committee (SERC). Written informed consent was obtained from all the participants before intervention.

Acknowledgement

Ten student volunteers from the School of Nursing of Ningxia Medical University and chronic disease managers from four communities in Yinchuan City greatly assisted in the conduct of this study.

Funding

This research was funded by Natural Science Foundation of Ningxia Province of China (2024AAC03287) and 2024 First-class discipline incubation project, School of Nursing, Ningxia Medical University, Ningxia, China (NYHLZD01).

Conflict of Interest

The authors declare there are no conflicts of interest.

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