Original Article

Access this article online
Quick Response Code:

Website:
www.jfcmonline.com

DOI:
10.4103/jfcm.jfcm_174_23

Health coaching for hypertension control in primary care patients with uncontrolled hypertension in Egypt

Samar M. Abbas, Hend M. Salama, Hebatallah Nour-Eldein, Hazem A. Sayed Ahmed

Abstract:

BACKGROUND: Health coaching effectively improves hypertension self-care activities and the control of blood pressure (BP) in hypertensive patients. Studies on the effects of health coaching on patients in primary care with uncontrolled hypertension in developing countries are limited. In this study, the effectiveness of health coaching on hypertension self-care and BP control was assessed in patients who have uncontrolled hypertension compared to standard care in Egypt.

MATERIALS AND METHODS: Our quasi-experimental study included control and intervention groups. The intervention group included 70 participants who received health coaching sessions (face-to-face and by telephone) besides the standard care, whereas the control group included 71 participants who only received the standard care. The study was conducted between July 2020 and November 2021. The participants were recruited from three primary healthcare settings in the Port Said Governorate. Personal and medical history, BP measurements, and hypertension self-care activity level effects (H-SCALE) were obtained. Paired-*t*-test was used to assess the changes in BP measurement, and H-SCALE score before and after receiving the health coaching. McNemar's test was used to assess changes in controlled BP and optimal hypertension self-care activities between control and health coached groups. Multiple logistic regression analysis assessed the predictors of better BP control.

RESULTS: Health coaching resulted in more controlled BP (51.4%, $P < 0.001$) compared to the delivery of only usual care (11.3%, $P = 0.008$). The intervention showed a significant promotion in hypertension self-care activities, including medication usage ($P < 0.001$), low-salt diet ($P < 0.001$), and weight management ($P < 0.001$). The H-SCALE score mean change was the only predictor for BP control (odds ratio 1.057, $P = 0.048$) in the intervention group after 6 months.

CONCLUSION: Intervention including traditional health coaching and phone calls is a beneficial modality for the promotion of hypertension self-care and improvement of BP control in primary care patients with uncontrolled hypertension.

Keywords:

Blood pressure control, health coaching, hypertension, primary care, self-care activities

Introduction

Hypertension is a common noncommunicable disease worldwide that affects 1.28 billion people with a prevalence of 31.1% globally. Two-thirds of them reside in low- and middle-income countries (LMICs).[1] In Egypt, the hypertension prevalence was 29.5% of the population aged 18 years or more.[2] Previous studies revealed that uncontrolled hypertension was reported among 86% of hypertensive patients worldwide[3] and 90% in LMICs.[4] In Egypt, 88% and 75% of men and women had uncontrolled hypertension, respectively.[5] Uncontrolled hypertension is associated with atherosclerosis cardiovascular disease, chronic kidney disease, dementia, and death.[6]

Department of Family Medicine, Faculty of Medicine, Suez Canal University, Ismailia, Egypt

Address for correspondence:
Dr. Samar M. Abbas, Department of Family Medicine, Faculty of Medicine, Suez Canal University, Ismailia, Egypt.
E-mail: dr.samar_90@yahoo.com

Received: 06-07-2023
Revised: 30-09-2023
Accepted: 16-10-2023
Published: 08-01-2024

How to cite this article: Abbas SM, Salama HM, Nour-Eldein H, Sayed Ahmed HA. Health coaching for hypertension control in primary care patients with uncontrolled hypertension in Egypt. J Fam Community Med 2024;31:16-24.

Individuals with uncontrolled hypertension need to perform ongoing hypertension self-care to improve their blood pressure (BP) control, prevent hypertension-mediated organ damage, improve quality of life, and decrease the all-cause mortality rate. Hypertension self-care behaviors include taking medication, following a low salt or fat diet, performing regular physical activity, managing weight, quitting smoking, restricting alcohol consumption, reducing stress, self-monitoring of BP, and attending follow-up visits regularly.[7-10]

Health coaching or wellness coaching is a promising intervention to help individuals with hypertension improve their BP control and hypertension self-management.[11-14] Health coaching is grounded on the behavior change theory and has a patient-centered approach, in which the patient fully or partially determines his/her goal, integrates active learning, self-discovery, and subject education to help the patient reach their goals and self-monitor behaviors to increase patient's accountability for health supportive behaviors. Health coaching processes occur through an ongoing and consistent interpersonal interaction with a health coach.[15,16]

Health coaching is classified in the literature as human coaching (traditional), virtual coaching (digital), or mixed coaching.[12,14,17-24] Human coaching can be provided by nurses, health educators, medical assistants, social workers, community health workers, pharmacists, trained students, or trained patients.[18-21] Many virtual coaching interventions (e.g., smartphone applications and video consultation) had been developed to cope with patient's health problem and promote it in the long run.[12,22,23] A recent meta-analysis reported that the predominant method of delivering health coaching was by telephone calls to patients with cardiovascular risk factors. Text messages and face-to-face contact were also conducted as coaching interventions.[24] Another meta-analysis reported that phone-based interventions were an effective type of health coaching for reducing BP.[14]

Meng *et al.,* demonstrated that systolic BP (SBP) and diastolic BP (DBP) reduction can be achieved through health coaching, and it has a favorable effect on dietary behaviors.[14] Wu *et al.,* found that implementing monthly health-coaching phone calls was associated with significantly modest improvements in medication adherence and DBP in the rural primary healthcare (PHC) settings.[25] Margolius *et al.,* concluded that coaching patients with low income to monitor their BP at home had improved their BP control but without a statistically significant difference.[26] Mao *et al.,* revealed that health coaching through mobile phone can be an innovative solution for reducing body weight and improving BP measurements in overweight or obese patients.[12] Health coaching studies for patients who have uncontrolled hypertension in developing countries are scarce. In this research, the effectiveness of health coaching on self-care and control of BP was assessed in PHC patients with uncontrolled hypertension compared with standard care in the Port Said Governorate, Egypt.

Materials and Methods

The study design was a nonrandomized control group pretest–posttest design (quasi-experimental study). Data were taken from participants from July 2020 to November 2021. Ethical approval was obtained from the Institutional Review Board vide Letter No. 4109 dated 24/02/2020, and informed written consent was taken from all participants in the study.

The study had two groups: intervention and control groups. In the intervention group, the participants received face-to-face health coaching sessions, and phone calls besides the standard care, whereas the control group only received the standard care. The standard care or traditional care for hypertension at the PHC settings is a diagnostic and treatment process that PHC providers follow for hypertension, which includes counseling for lifestyle modification, prescribing or refilling the appropriate medications, follow-up of illness, and referral if indicated. The standard care session which is provided by the PHC providers lasts about 10–15 min. During these sessions, the PHC providers share information and make recommendations that align with the treatment plan for hypertension.

Participants were recruited by the first author through a consecutive sampling technique. The participants were assigned to either the control or the intervention group. The participants were recruited from three PHC settings in the Port Said Governorate affiliated with Egypt's General Authority of Healthcare. The assessment was done simultaneously for both groups at baseline and 6 months later.

We included individuals with uncontrolled hypertension (SBP ≥140 mmHg, DBP ≥90 mmHg, or both)[27] had been diagnosed with hypertension for at least 1 year, had received antihypertensive medication without change for 3 months, aged 18 years or more, and had agreed to participate in this study. We excluded pregnant women, extremely ill patients (e.g., decompensated renal disease), with severe mental illness, for example, severe dementia or depression that could interfere with communication or comprehension questions, and those who had visual and hearing impairments that interfere with communication. In addition, those patients who

had not completed the interview were excluded from this study.

The sample size calculated[28] was equal to 62 per group. After the addition of a drop-out proportion of 15%, the total sample size was 142 subjects. One participant was dropped from the intervention group after the pretest since they passed away. Hence, the actual sample size was 141 participants.

A relevant authority was contacted for permission to carry out the study in PHC settings in the Port Said Governorate affiliated with the general authority of healthcare. Informed written consent was designed by the researcher. Patients with uncontrolled hypertension who participated were required to sign an informed consent to participate in this study. The questionnaire included socioeconomic characteristics, disease profile and BP control, and the Arabic version of the hypertension self-care activity level effects (H-SCALE).[29]

Sociodemographic data were age (years), gender, marital status, occupation, employment status, and income. The disease profile included the duration of hypertension (years), comorbidities, hypertension-related complications, current antihypertensive medications, and a family history of hypertension. The examination included BP, height, weight, and body mass index. The first author took the BP measurements for all participants to minimize observer bias.

The H-SCALE instrument was developed by Warren-Findlow and Seymour.[29] This scale was translated into Arabic by the first author. This Arabic version was back-translated into English by a bilingual consultant, and then the two translators discussed necessary modifications, restatement, and rewording. The Arabic version of the H-SCALE faced validity by three expert opinions with no major modifications. The self-care activities, for example, medication adherence (3 items), low-salt diet (12 items), physical activity (2 items), smoking (1 item), weight management (10 items), and a pilot study was carried out on 20 patients before the study to assess the feasibility and reliability of this scale and it found an acceptable Cronbach's α of 0.6.

This program was prepared and implemented by the first author, and it was revised for content validity by a group of three experts. The program was delivered through face-to-face and mobile health coaching sessions organized and implemented in accordance with the requirements of each participant for 6 months. Four sessions of 20–30 min per session of health coaching were conducted for participants once every 2 months at the study settings during their monthly treatment refill. Mobile health biweekly coaching sessions of 15–30 min were conducted between the sessions, for 9 sessions.

The coach trained patients for self-management support providing information, promoting healthy behaviors, acquiring problem-solving skills, providing regular follow-up, assisting with the emotional impact of chronic illness, and encouraging people to be active participants in their care. The health coaching program had given basic knowledge related to hypertension, for example, definition, symptoms and signs, complications, management, follow-up, and hypertension self-care activities (e.g., medication adherence, a low-salt diet, weight loss or maintenance of ideal body weight, quitting smoking, regular physical activity for 30 min most days of the week, as well as self-monitoring of BP).

For the scoring of the H-SCALE, medication adherence practice comprised three items (score: 0–21). Low-salt diet practice consisted of 12 items; 9 items were reversely coded as these items were negatively phrased. A mean score was calculated. Adherence to a low-salt diet is considered when the score is 6 or better. Physical activity practice had two items (score: 0–14). Smoking practice had one item (smoker or nonsmoker). Weight management practice comprised ten items. Response categories ranged from strongly disagree (1) to strongly agree (5). Responses were summed up creating a range of scores from 10 to 50. Good weight management practices had a score of $\geq$40. Alcohol practice had 3 items (abstinence or not).[29]

The obtained data were entered and analyzed using the Statistical Package for the Social Sciences software version 26.0 (SPSS, IBM Corporation, NY, USA). A paired-sample *t*-test was used to assess the changes in BP measurement, and H-SCALE score before and after receiving the health coaching in both arms of this intervention. However, an independent-samples *t*-test was used to evaluate the statistical differences between the means of intervention and control groups' change scores regards these issues. McNemar's test was used to assess changes in controlled BP and optimal hypertension self-care activities between control and health coached groups. Risk ratio (RR) was used to assess the effectiveness of health coaching in improving BP control and the appropriate self-care practices for hypertension. Multiple logistic regression analysis was used to assess the predictors of better BP control (BP <140/90 mmHg)[27] after receiving health coaching in the intervention group aiming to control the confounders. $P < 0.05$ was considered statistically significant.

Results

The study included 141 participants, 51.8% were males, and 65.2% were 60 years old or older with a mean age of 61.90 ± 8.41 years. Most patients (77.3%) were married, 46.8% had secondary school only or intermediate education, 31.2% were in semi-professional occupations, and 57.4% had a sufficient income for essential needs. The participants in the study had an average baseline SBP of 148.79 ± 14.0 mmHg, and an average baseline DBP of 88.1 ± 7.1 mmHg. Table 1 shows no significant differences between health coaching and control groups in any of the demographic and clinical characteristics assessed except education ($P = 0.015$) and chronic kidney disease ($P = 0.034$).

Providing health coaching had resulted in a significant reduction of SBP (the average mean change was 11.57 ± 11.18 mmHg, $P < 0.001$) and DBP (the average mean change was 6.29 ± 7.96 mmHg, $P < 0.001$). While in the control group, SBP decreased insignificantly by 1.41 ± 18.98 mmHg ($P = 0.53$) and DBP increased

Table 1: Demographic characteristics of the participants in the health coaching and control groups

Variables	Health coaching group (*n*=70) *N* (%)	Control group (*n*=71) *N* (%)	*P-value*
Gender			
Male	39 (55.7)	34 (47.9)	0.631[a]
Female	31 (44.3)	37 (52.1)	
Age (years), mean±SD	61.11±8.67	62.68±8.15	<0.001*
<60	31 (44.3)	18 (25.4)	0.264[a]
≥60	39 (55.7)	53 (74.6)	
Marital status			
Married	49 (70.0)	60 (84.5)	0.286[b]
Widowed	21 (30.0)	11 (15.5)	
Education			
Less than secondary	17 (24.3)	22 (31.0)	0.015*,[b]
Secondary school/intermediate	31 (44.3)	35 (49.3)	
University or above	22 (31.4)	14 (19.7)	
Occupation			
Nonworking/housewife	19 (27.1)	17 (23.9)	0.733[b]
Manual worker	4 (5.7)	14 (19.7)	
Trades/semi-professional/professional	47 (67.1)	40 (56.3)	
Income			
Insufficient	6 (8.6)	0	0.246[b]
Hardly sufficient	15 (21.4)	23 (32.4)	
Sufficient for essential needs	39 (55.7)	42 (59.2)	
Enough and save	10 (14.3)	6 (8.5)	
Family history of hypertension	45 (64.3)	53 (74.6)	0.744[a]
Hypertension duration (years)			
≤5	29 (41.4)	26 (36.6)	0.236[b]
>5–10	17 (24.3)	9 (12.7)	
>10	24 (34.3)	36 (50.7)	
Hypertension complications			
Coronary artery disease	28 (40)	20 (28.2)	0.08[a]
Chronic kidney disease	6 (8.6)	4 (5.6)	0.034*,[b]
Associated diseases			
Diabetes mellitus	34 (48.6)	32 (45.1)	0.978[a]
Dyslipidemia	46 (65.7)	53 (74.6)	0.575[b]
BMI			
Normal	0	2 (2.8)	0.005*,[a]
Overweight	20 (28.6)	12 (16.9)	
Obese	50 (71.4)	57 (80.3)	
Antihypertensive medication			
Monotherapy	12 (16.9)	20 (28.2)	0.192[b]
Dual therapy	38 (53.5)	23 (32.4)	
Triple therapy	12 (16.9)	22 (31.0)	
Quadrable therapy or more	8 (11.3)	6 (8.5)	

*Statistically significant at $P<0.05$, [a]Chi-square test was used, [b]Fisher's exact test was used. BMI=Body mass index, SD=Standard deviation

significantly by 2.53 ± 8.53 ($P = 0.015$). Mean differences of SBP (10.16, 95% confidence interval CI: 5–15.31, $P < 0.001$) and DBP measurements (8.82, 95% CI: 6.65–11.08, $P < 0.001$) were significantly reduced after 6 months. The H-SCALE score was significantly increased (the average mean change was 18.81 ± 11.9, $P < 0.001$) in participants in the intervention group; however, this score was significantly decreased in the control group participants [the average mean change was 2.08 ± 6.18, $P = 0.001$, Table 2].

Table 3 shows that medication usage (RR = 1.72, 95% CI: 1.38–2.14, $P < 0.001$), low-salt diet (RR = 3.55, 95% CI: 1.91–6.60, $P < 0.001$), and weight management (RR = 4.06, 95% CI: 1.77–9.3, $P < 0.001$) were significantly improved in the health coached participants. BP control was significantly associated with the level of education ($P = 0.041$), occupation ($P = 0.014$), duration of hypertension ($P = 0.025$), presence of coronary artery disease ($P = 0.029$), changes in total self-care activities ($P = 0.039$), medication usage ($P = 0.032$), and weight management ($P = 0.007$) scores in the intervention participants [Table 4]. In the intervention group, the higher changes in total H-SCALE, medication usage, and weight management scores were found in participants with controlled BP (means were 21.97 ± 14.82, 3.5 ± 6.09, and 10.61 ± 5.36, respectively) compared with those participants with uncontrolled BP (means were 15.47 ± 6.44, 1.12 ± 2.99, and 7.24 ± 3.82, respectively). In Table 5, multiple logistic regression demonstrated that a unit increase in the 6-month change of H-SCALE total score in the intervention group is significantly associated with a 5.7% greater odds of better BP control (odds ratio: 1.057, 95% CI: 1.001–1.116).

Discussion

This study found that providing face-to-face health coaching and phone calls significantly improved BP control and hypertension self-care activities, for example, medication usage, low-salt diet, and weight management. In our study, health coaching helped the participants in the intervention group improves their BP control through self-care activities.

Our study found that BP control was significantly improved after receiving health coaching, and our result is consistent with that of a recent

Table 2: Differences in blood pressure measurements and hypertension self-care among the participants in the pre- and posttest control study

Variables	Health coaching group (*n*=70)			Control group (*n*=71)			Mean difference	95% CI for mean difference	*P-value*[b]
	Mean±SD	Change, Mean±SD	*P-value*[a]	Mean±SD	Change, Mean±SD	*P-value*			
SBP									
Pretest	148.43±11.31	11.57±11.18	<0.001*	149.15±16.34	1.41±18.98	0.53	10.16	5.0–15.31	<0.001*
Posttest	136.86±13.19			147.75±16.05					
DBP									
Pretest	88.14±8.31	6.29±7.96	<0.001*	88.03±5.70	−2.53±8.53	0.015*	8.82	6.56–11.08	<0.001*
Posttest	81.86±5.66			90.56±7.15					
H-SCALE score									
Pretest	116.73±17.02	−18.81±11.9	<0.001*	112.77±14.83	2.08±6.18	0.001*	−13.89	-17.02– -10.76	<0.001*
Posttest	135.54±8.78			110.69±14.67					

*Statistically significant at $P<0.05$, [a]Paired-samples *t*-test was used, [b]Independent-samples *t*-test was used. H-SCALE=Hypertension self-care activity level effects, SD=Standard deviation, CI=Confidence interval, SBP=Systolic blood pressure, DBP=Diastolic blood pressure

Table 3: Comparison of achieving controlled blood pressure and optimal self-care activities in the health coaching and control groups

Variables	Health coaching group (*n*=70)			Control group (*n*=71)			Effect estimates		
	Pretest *N* (%)	Posttest *N* (%)	*P-value*	Pretest *N* (%)	Posttest *N* (%)	*P-value*	RR	95% CI for RR	*P-value*
BP									
Controlled BP	0	36 (51.4)	<0.001*	0	8 (11.3)	0.008*	4.56	2.29–9.11	<0.001*
Appropriate self-care									
Medication usage	49 (70.0)	67 (95.7)	<0.001*	51 (71.8)	39 (54.9)	<0.001*	1.72	1.38–2.14	<0.001*
Low-salt diet	19 (27.1)	35 (50.0)	<0.001*	12 (16.9)	10 (14.1)	0.5	3.55	1.91–6.60	<0.001*
Physical activity	11 (15.7)	11 (15.7)	NA	2 (2.8)	2 (2.8)	NA	NA	NA	NA
Nonsmokers	57 (81.4)	58 (82.8)	0.99	67 (94.4)	67 (94.4)	NA			
Weight management	0	24 (34.3)	<0.001*	6 (8.5)	6 (8.5)	NA	4.06	1.77–9.3	<0.001*

*Statistically significant at $P<0.05$. McNemar's test was used for assessing changes in controlled BP and optimal hypertension self-care activities. BP=Blood pressure, NA=Not applicable, RR=Risk ratio or relative risk, CI=Confidence interval

Table 4: Association of blood pressure control with sociodemographic and clinical characteristics data after health coaching in the intervention group

Variables	Uncontrolled BP (*n*=34) *N* (%)	Controlled BP (*n*=36) *N* (%)	*P-value*
Age (years)			
<60	12 (35.3)	19 (52.8)	0.141
≥60	22 (64.7)	17 (47.2)	
Gender			
Male	18 (52.9)	21 (58.3)	0.650
Female	16 (47.1)	15 (41.7)	
Marital status			
Married	22 (64.7)	27 (75.0)	0.437
Widowed	12 (35.3)	9 (25.0)	
Educational level			
Less than secondary	4 (11.8)	13 (36.1)	0.041*
Secondary	16 (47.1)	15 (41.7)	
University or above	14 (41.2)	8 (22.2)	
Occupation			
Nonworker or housewife	6 (17.6)	13 (36.1)	0.014*
Manual worker	0	4 (11.1)	
Trades/semi-professional/professional	28 (82.4)	19 (52.8)	
Income (patient's perceptions)			
Insufficient	4 (11.8)	2 (5.6)	0.055
Hardly sufficient	4 (11.8)	11 (30.6)	
Sufficient for essential needs	18 (52.9)	21 (58.3)	
Enough and save	8 (23.5)	2 (5.6)	
Duration of hypertension (years)			
<5	14 (41.2)	15 (41.7)	0.025*
5–9	4 (11.8)	13 (36.1)	
≥10	16 (47.1)	8 (22.2)	
Hypertension complications			
Coronary artery disease	16 (47.1)	8 (22.2)	0.029*
Chronic kidney disease	2 (5.9)	4 (11.1)	0.674
Associated comorbidities			
Diabetes	14 (41.2)	20 (55.6)	0.229
Dyslipidemia	22 (64.7)	24 (66.7)	0.863
Family history of hypertension	24 (70.6)	21 (58.3)	0.285
Change in BMI, median (IQR)	−0.69 (−0.78–−0.35)	−0.63 (−1.17–0)	0.990
Antihypertensive medication			
Monotherapy	6 (17.6)	6 (16.7)	0.467
Dual therapy	18 (52.9)	20 (55.6)	
Triple therapy	4 (11.8)	8 (22.2)	
Quadrable therapy or more	6 (17.6)	2 (5.6)	

*Statistically significant at $P<0.05$, [a]Chi-square test was used, [b]Fisher's exact test was used, [c]Mann–Whitney *U* was used. BP=Blood pressure, BMI=Body mass index, IQR=Interquartile range

meta-analysis.[14] In previous studies, SBP was the only significantly reduced BP measurement;[11,12,30] however, an American study found that DBP was significantly improved after receiving monthly health-coaching phone calls, whereas SBP was not significantly reduced in patients treated in the rural primary care settings.[25] In another American study, health coaching on monitoring BP at home and home titration of BP medications resulted in SBP and DBP reduction, but there was no significant difference in low-income primary care individuals.[26]

In our study, there was a mean decrease in SBP (11.57 mmHg) and DBP (6.28 mmHg) in the participants who received health coaching. These changes are greater than the reported SBP and DBP reductions in the previous studies, in which SBP reductions ranged from 0.26 to 8.21 mmHg[12,14,25,30] and DBP reductions ranged from 0.13 to 1.116 mmHg.[14,30] Margolius *et al*., found a greater SBP reduction (21.8 mmHg) than our study.[26] Wu *et al*., demonstrated higher DBP reductions over time (7.67–10.47 mmHg) than our finding in those primary care patients with low medication adherence,

Table 5: Predictors of better blood pressure control among the participants after health coaching in the intervention group

Variables	β	SE	*P-value*	OR	95% CI for OR
Education					
Secondary education	−1.275	0.782	0.103	0.279	0.060–1.294
University or above	−1.504	0.803	0.061	0.222	0.046–1.072
Duration of hypertension (years)					
5–10	1.140	0.764	0.136	3.127	0.699–13.992
≥10	−0.466	0.668	0.485	0.627	0.169–2.324
Coronary artery disease	−0.744	0.604	0.218	0.475	0.145–1.553
Change of H-SCALE total score	0.055	0.028	0.048*	1.057	1.001–1.116

*Statistically significant *P* (<0.05). Reference categories were less than secondary education, duration of hypertension is <5 years, absent coronary artery disease, and change of the total H-DCALE score. Multiple logistic regression: Omnibus tests χ^2 (df)=19.339 (6), *P*=0.004, Cox and Snell R^2=0.241, Negelkerke R^2=0.322, overall correct classification=67.1%. CI=Confidence interval, H-SCALE=Hypertension self-care activity level effects, OR=Odds ratio, SE=Standard error, Df=Degree of freedom

who received health coaching on medication adherence and BP control.[25]

The variations in these results might be due to differences in culture, demographic and clinical characteristics of the study population, study design, duration of these interventions, focus of coaching (e.g., self-management, BP monitoring, or home titration of BP medications), and methods of delivering health coaching, for example, phone-based interventions, face-to-face, or mixed coaching.[11,12,14,25,26,30]

We found that health coaching significantly influenced medication adherence. This finding is like previous studies regardless of the differences in the participants' characteristics and the used methods.[11,25,31] Crittenden *et al*., demonstrated that health coaching improved adherence to antihypertensive medications.[11] Wu *et al*., concluded that implementing a multicomponent intervention that includes health coaching had a significantly greater improvement in medication adherence over time.[25] Thom *et al*., found that health coaching by a medical assistant had a significant effect on medication adherence.[31]

In our study, health coaching had a significant effect on hypertension self-care activities, for example, low-salt diet and weight management. The percentage of nonsmokers had slightly increased without a statistically significant difference. However, there was no change in physical activity. Unfortunately, similar studies are limited to sound comparison. A prior study revealed that health coaching improved adherence to lifestyle modification,[11] whereas a meta-analysis found that health coaching had a positive effect on dietary behaviors.[14] In "Health Coaches for Hypertension Control "programs, there were statistically significant changes in healthy diet (e.g., increased consumption of fruits and vegetables and low-fat foods), physical activity, weight loss, and the ability to cope with life's stress.[30] Moreover, the "Expanded Health Coaches for Hypertension Control" program showed that there was a motivational readiness to engage in physical activity, eat healthy food, manage stress, adhere to an overall healthy lifestyle, and make small changes in weight and waist circumference.[32]

Our results showed that health coaching significantly improved BP control after 6 months through changes in overall hypertension self-care activities, medication usage, and weight management. These are logical findings. Improvement of adherence to the prescribed antihypertensive medication and lifestyle changes such as weight management are key components of better BP control.[27,33]

Intervention includes face-to-face health coaching and telephone calls is a clinically applicable strategy that provides promising opportunities to primary care individuals with uncontrolled hypertension in developing countries to improve hypertension self-care and BP control. Family physicians could provide health coaching for hypertensive patients, for example, knowledge, tools, skills, and confidence to become active participants in their self-care. The family physician could train primary care nurses or other medical assistants to provide coaching for the improvement of BP control.

Based on our best knowledge, this is the first study to assess the effectiveness of face-to-face and phone calls for health coaching in improving BP control and hypertension self-care in primary care patients in developing countries with uncontrolled hypertension compared with standard care. Prior intervention studies included another modality, for example, health education or health promotion to promote healthy lifestyle and reduce BP in patients in developing countries.[34-37] One intervention in developing countries concluded that mobile health interventions can be used as an effective method for hypertension self-management in patients treated at public hospitals.[38] Further study on a larger sample is needed to assess the psychometric properties of

the Arabic version of the H-SCALE including evaluation of construct, convergent, and discriminant validity in addition to test–retest reliability.

This study has many limitations. First, the lack of randomization may have resulted in the potential for selection bias and the inability to generalize the results. Second is the lack of blindness. Third, the educational levels of the intervention and control groups were not comparable. This may have had an influence in the intervention group. However, we did a multiple regression analysis to predict BP control in the participants in the health coached group after adjusting variables to control confounders, for example, education, duration of hypertension, presence of coronary artery disease, and change of H-SCALE total score.

Conclusion

Health coaching was an effective method for improving hypertension self-care and BP control in primary care patients with uncontrolled hypertension. Hypertension self-care activities, for example, medication usage, low-salt diet, and weight management were improved after health coaching. Changes in hypertension self-care activities were associated with better BP control in the intervention participants.

Acknowledgment
We appreciate the primary care patients with uncontrolled hypertension who participated in this study.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References

1. World Health Organization. Hypertension, Fact Sheet; 2021. Available from: https://www.who.int/news-room/factsheets/detail/hypertension. [Last accessed on 2022 Aug 12].
2. World Health Organization. WHO STEPS Chronic Disease Risk Factor Surveillance: Egypt STEPS Survey; 2017. Available from: https://www.who.int/ncds/surveillance/steps/Egypt_STEPS_Survey_2017_Fact_Sheet.pdf?ua=1. [Last accessed on 2020 Dec 19].
3. Mills KT, Bundy JD, Kelly TN, Reed JE, Kearney PM, Reynolds K, *et al.* Global disparities of hypertension prevalence and control: A systematic analysis of population-based studies from 90 countries. Circulation 2016;134:441-50.
4. Geldsetzer P, Manne-Goehler J, Marcus ME, Ebert C, Zhumadilov Z, Wesseh CS, *et al.* The state of hypertension care in 44 low-income and middle-income countries: A cross-sectional study of nationally representative individual-level data from 1·1 million adults. Lancet 2019;394:652-62.
5. Ministry of Health and Population [Egypt], El-Zanaty and Associates [Egypt], and ICF International. Egypt Health Issues Survey 2015. Cairo, Egypt and Rockville, Maryland, USA: Ministry of Health and Population and ICF International; 2015. Available from: https://dhsprogram.com/pubs/pdf/FR313/FR313.pdf. [Last accessed on 2020 May 10].
6. Ahuja R, Ayala C, Tong X, Wall HK, Fang J. Public awareness of health-related risks from uncontrolled hypertension. Prev Chronic Dis 2018;15:E40.
7. Dickinson HO, Mason JM, Nicolson DJ, Campbell F, Beyer FR, Cook JV, *et al.* Lifestyle interventions to reduce raised blood pressure: A systematic review of randomized controlled trials. J Hypertens 2006;24:215-33.
8. Han HR, Song HJ, Nguyen T, Kim MT. Measuring self-care in patients with hypertension: A systematic review of literature. J Cardiovasc Nurs 2014;29:55-67.
9. Ea EE, Colbert A, Turk M, Dickson VV. Self-care among Filipinos in the United States who have hypertension. Appl Nurs Res 2018;39:71-6.
10. Tan FC, Oka P, Dambha-Miller H, Tan NC. The association between self-efficacy and self-care in essential hypertension: A systematic review. BMC Fam Pract 2021;22:44.
11. Crittenden D, Seibenhener S, Hamilton B. Health coaching and the management of hypertension. J Nurse Pract 2017;13:e237-9.
12. Mao AY, Chen C, Magana C, Caballero Barajas K, Olayiwola JN. A mobile phone-based health coaching intervention for weight loss and blood pressure reduction in a national payer population: A retrospective study. JMIR Mhealth Uhealth 2017;5:e80.
13. Cao W, Milks MW, Liu X, Gregory ME, Addison D, Zhang P, *et al.* mHealth interventions for self-management of hypertension: Framework and systematic review on engagement, interactivity, and tailoring. JMIR Mhealth Uhealth 2022;10:e29415.
14. Meng F, Jiang Y, Yu P, Song Y, Zhou L, Xu Y, *et al.* Effect of health coaching on blood pressure control and behavioral modification among patients with hypertension: A systematic review and meta-analysis of randomized controlled trials. Int J Nurs Stud 2023;138:104406.
15. Wolever RQ, Eisenberg DM. What is health coaching anyway? standards needed to enable rigorous research. Arch Intern Med 2011;171:2017-8.
16. Wolever RQ, Simmons LA, Sforzo GA, Dill D, Kaye M, Bechard EM, *et al*. A systematic review of the literature on health and wellness coaching: Defining a key behavioral intervention in healthcare. Glob Adv Health Med 2013;2:38-57.
17. Lentferink AJ, Oldenhuis HK, de Groot M, Polstra L, Velthuijsen H, van Gemert-Pijnen JE. Key components in eHealth interventions combining self-tracking and persuasive eCoaching to promote a healthier lifestyle: A scoping review. J Med Internet Res 2017;19:e277.
18. Bennett HD, Coleman EA, Parry C, Bodenheimer T, Chen EH. Health coaching for patients with chronic illness. Fam Pract Manag 2010;17:24-9.
19. Singh HK, Kennedy G, Stupans I. A pilot Australian pharmacist health coaching trial of participants with poorly controlled hypertension: A qualitative study of participants' and coaches' experiences. Patient Prefer Adherence 2021;15:127-40.
20. Cooper J, Zimmerman W. The effect of a faith community nurse network and public health collaboration on hypertension prevention and control. Public Health Nurs 2017;34:444-53.
21. Vasti E, Pletcher MJ. Recruiting student health coaches to improve digital blood pressure management: Randomized controlled pilot study. JMIR Form Res 2020;4:e13637.
22. Alessa T, Hawley MS, Hock ES, de Witte L. Smartphone apps to support self-management of hypertension: Review and content analysis. JMIR Mhealth Uhealth 2019;7:e13645.
23. Weerahandi H, Paul S, Quintiliani LM, Chokshi S, Mann DM. A mobile health coaching intervention for controlling hypertension: Single-arm pilot pre-post study. JMIR Form Res

2020;4:e13989.

24. An S, Song R. Effects of health coaching on behavioral modification among adults with cardiovascular risk factors: Systematic review and meta-analysis. Patient Educ Couns 2020;103:2029-38.
25. Wu JR, Cummings DM, Li Q, Hinderliter A, Bosworth HB, Tillman J, *et al.* The effect of a practice-based multicomponent intervention that includes health coaching on medication adherence and blood pressure control in rural primary care. J Clin Hypertens (Greenwich) 2018;20:757-64.
26. Margolius D, Bodenheimer T, Bennett H, Wong J, Ngo V, Padilla G, *et al.* Health coaching to improve hypertension treatment in a low-income, minority population. Ann Fam Med 2012;10:199-205.
27. Williams B, Mancia G, Spiering W, Agabiti Rosei E, Azizi M, Burnier M, *et al.* 2018 ESC/ESH guidelines for the management of arterial hypertension. Eur Heart J 2018;39:3021-104.
28. Dawson B, Trapp RG. Basic and Clinical Biostatistics. 4th ed. USA: McGraw-Hill; 2004.
29. Warren-Findlow J, Seymour RB. Prevalence rates of hypertension self-care activities among African Americans. J Natl Med Assoc 2011;103:503-12.
30. Dye CJ, Williams JE, Evatt JH. Improving hypertension self-management with community health coaches. Health Promot Pract 2015;16:271-81.
31. Thom DH, Willard-Grace R, Hessler D, DeVore D, Prado C, Bodenheimer T, *et al.* The impact of health coaching on medication adherence in patients with poorly controlled diabetes, hypertension, and/or hyperlipidemia: A randomized controlled trial. J Am Board Fam Med 2015;28:38-45.
32. Dye CJ, Williams JE, Evatt JH. Activating patients for sustained chronic disease self-management: Thinking beyond clinical outcomes. J Prim Care Community Health 2016;7:107-12.
33. Fu J, Liu Y, Zhang L, Zhou L, Li D, Quan H, *et al.* Nonpharmacologic interventions for reducing blood pressure in adults with prehypertension to established hypertension. J Am Heart Assoc 2020;9:e016804.
34. Jafar TH, Islam M, Hatcher J, Hashmi S, Bux R, Khan A, *et al.* Community based lifestyle intervention for blood pressure reduction in children and young adults in developing country: Cluster randomised controlled trial. BMJ 2010;340:c2641.
35. Anyanwu GE, Ekezie J, Danborno B, Ugochukwu AI. Impact of education on obesity and blood pressure in developing countries: A study on the Ibos of Nigeria. N Am J Med Sci 2010;2:320-4.
36. Calano BJ, Cacal MJ, Cal CB, Calletor KP, Guce FI, Bongar MV, *et al.* Effectiveness of a community-based health programme on the blood pressure control, adherence and knowledge of adults with hypertension: A PRECEDE-PROCEED model approach. J Clin Nurs 2019;28:1879-88.
37. Shin J, Konlan KD, Mensah E. Health promotion interventions for the control of hypertension in Africa, a systematic scoping review from 2011 to 2021. PLoS One 2021;16:e0260411.
38. Bozorgi A, Hosseini H, Eftekhar H, Majdzadeh R, Yoonessi A, Ramezankhani A, *et al.* The effect of the mobile "blood pressure management application" on hypertension self-management enhancement: A randomized controlled trial. Trials 2021;22:413.