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Research Article

Self-Care Behaviours and Determinants Associated with Hypertension Control in Elderly Patients

Nizal Sarrafzadegan[1]*, Marjan Mansourian[2], Hassan Alikhassi[3], Alireza Sherafat[4], Alireza Khosravi[5], Maryam Eghbali[6], Noushin Mohammadifard[7], Sonia Zarfeshani[8], Feridoun Noohi[9], Mostafa Barghi[10]

[1]Isfahan Cardiovascular Research centre, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan; [2]Department of Epidemiology and Biostatistics, Health School, Isfahan University of Medical Sciences, Iran; [3]Heart Failure Research Centre, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iranl; [4]School of Medicine, University of Central Lancashire, Preston, England; [5]Hypertension Research Centre, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran; [6]Nursing and Midwifery Care Research Center, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan; [7]Interventional Cardiology Research centre, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran; [8]Isfahan Cardiovascular Research centre, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran; [9]Shahid Rajaei Cardiovascular Research and Treatment Center, Iran University of Medical Sciences, Tehran, Iran; [10]Isfahan Cardiovascular Research centre, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan

ABSTRACT

Objective: To determine the impact of self-care and its determinants on blood pressure control in elderly patients with hypertension in Isfahan, Iran.

Methods: This Cross-sectional study included2100 patients with hypertension aged more than 65 years. We calculated and compared self-care behaviours score between patients with controlled and uncontrolled hypertension.

Results: Uncontrolled blood pressure group has lower levels of self-care score than controlled group. Factors like Knowledge, attitude and practice about hypertension control, family support, socioeconomic status and underlying diseases have affected self-care behaviour score in controlling patients' blood pressure.

Discussion: Our findings led to future studies to examine the effect of education and training programs on hypertension control in this group of patients.

Keywords: Elderly patients; Hypertension control; Self-care behaviour

INTRODUCTION

Hypertension is the 3rd cause of death worldwide, hence has been recognized as a global healthcare challenge resulting in a significant burden of disease [1]. According to World Health Organization (WHO) report in 2015, 1 out of every 4 males has hypertension, while this ratio for females is 1 out of 5. It is estimated that 1 billion adults are living with hypertension globally and this figure is predicted to rise by 60% until 2025 (1.56 billion). The main reason for this increase is attributed to the growing number of patients living with hypertension in developing countries [2,3]. The analysis of data from 72 countries has shown that hypertension is the main cause for increased mortality, life years lost due to Disability Adjusted Life Years (DALYs) [4]. As stated by WHO[5], 29.2% of males and 24.8% of females have hypertension and the global figure of 600 million patients in 1980 significantly increased to 1 billion in 2008, which is mainly explained by the global trend of aging population [6]. The majority of hypertension patients are asymptomatic and the older adults have a tendency to recognise high blood pressure as a variant of normal ageing. Hence, both these factors act as barriers to an early diagnosis and management of hypertension [7]. Thus, controlling high blood pressure amongst the elderly is a particular challenge [8]. Poorly controlled Blood Pressure (BP) is defined as a systolic BP> 140 mmHg or diastolic BP> 90 mmHg with optimal treatment, but this definition is varied amongst the elderly population according to sex, age, race, activity and health status, severity of hypertension, poor engagement with

***Correspondence to:** Nizal Sarrafzadegan, Isfahan Cardiovascular Research centre, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran, Tel: 0098-31-36115313; Email: nsarrafzadegan@gmail.com

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treatment regimens, co-morbidities and physician's poor insight into the control of high blood pressure [9-12]. Amongst these aspects, self-care activities are regarded as essential contributing factors in long-term management of poorly controlled hypertension amongst the older adults [12,13]. WHO defines self-care activities as the capabilities at individual, family and society levels which all aim to promote health behaviours, maintain current health states, prevent deteriorations and eventually reduce the burden of diseases by enhancing individuals' coping mechanisms [14]. Furthermore, it is important to note the fact that adhering to local, regional and international guidelines is essential alongside self-care measures to achieve an optimal target in high blood pressure control [15,16]. Self-care activities are comprised of adherence to drug regimens, dietary restrictions and modifications, smoking cessation, alcohol abstinence, addiction rehabilitation, exercise and regular BP monitoring. However, interventions not only need to take these measures into consideration, but also should aim to identify and target the barriers in their implementation in clinical practice [17,18].

The elderly patients with hypertension are susceptible to a different variety of risk factors compared to younger adults. Therefore, appropriate adjustments should be made in a multidisciplinary team (MDT) prior to implementing health promotion measures such as self-care [19]. Nevertheless, the majority of previous studies with a focus on drug regimen adherence, dietary restrictions and exercise did not account specifically about the impact of these measures on patients with a poorly controlled hypertension compared to those with a well-controlled hypertension

Recent studies have mainly focused on the associations between self-efficacy and self-care activities in long-term management of hypertension; while, there is a need to focus on recognizing the causes of the poor practice of self-care . Moreover, the majority of the prior studies on poorly controlled hypertension were mainly focusing on epidemiological features of poor adherence to self-care measures rather than recognition of risk factors and possible preventive interventions [20,21].

There have been no studies to evaluate factors associated with self-care amongst the elderly population living with hypertension and how effective it is on hypertension control. The focus of this study is on assessing the level of self-care and evaluating the association of different factors with the adherence to self-care recommendations and ultimately improving hypertension control amongst the elderly patients with hypertension in Isfahan, Iran. The expected outcome of the present research is to facilitate an improved standard of care when designing interventions in long-term management of elderly patients to improve their poorly controlled HTN.

METHODS AND MATERIALS

Study type

This is a sub-study of an interventional large-scale study named IMPROVE-CARE done on three target groups including patients, patient's family and the health-care providers. The study main outcome is to improve hypertension control in a multidisciplinary approach.

This study population included 2100 patients with a diagnosis of hypertension from urban and rural areas. Patients were selected through in proportion to the population covered by the relevant health centres from 18 clinics associated with Isfahan University of Medical Sciences (IUMS).

Inclusion and exclusion criteria

Patients with a diagnosis of hypertension were selected from all those who were registered at hypertension clinics, primary healthcare centres and hospitals associated with IUMS.

Inclusion criteria

We defined the age of 65 as our cut point for elderly to be recruited in the study, roughly equivalent to retirement ages in most developed countries, is said to be the beginning of old age. In many parts of the developing world, chronological time has little or no importance in the meaning of old age. Other socially constructed meanings of age are more significant such as the roles assigned to older people; in some cases, it is the loss of roles accompanying physical decline which is significant in defining old age.

Having had a diagnosis of hypertension for over 6 months (systolic BP>140 mmHg or diastolic BP >90 mmHg) as an average of both home and clinic measurements. Having SBP equal or less than 139 and DBP equal or less than 89 mm HG and under treatment with anti-hypertensive medications. Mental and physical capability to engage actively with researchers (absence of any indicative evidences of cognitive disorders) Agreeing to terms and conditions of the study and obtaining an informed consent.

Exclusion criteria

Patients previously diagnosed with complications of poorly controlled hypertension such as renal failure, heart failure, cerebrovascular accidents (CVA) and myocardial infarction (MI), who required specialist care under other expert-led services, were excluded.

Basic measurements

After obtaining patients' informed consent forms, researchers screened their medical records followed by an initial consultation to include physical examination in order to ensure the standards of inclusion and exclusion are satisfactorily maintained. Patients were provided with detailed description of the objectives and parameters measured in this study both in oral and written format to ensure a valid informed consent is obtained. The sample size was analysed using version 3.9.1.4 of G*Power software. The following statistical features were selected: medium effect size d=0.50, confidence interval= 0.95 and α =0.05 [22]. 877 out of 2100 recruited patients in this study were elderly, while 1223 patients were from younger age groups.

Questionnaires

The questionnaire included demographic information, the current state of health and health behaviours amongst patients and their families as the main evaluation criteria. As a first step, a steering committee was set up in 2011 to set priorities and develop a practical plan to set a pattern for high blood pressure care. KAP study on participants, before and after, on the concepts and importance of self-care and the level of health care system, evaluation of clients who have referred to specific medical centers, evaluation of clients who have referred to counseling centers, evaluation Customers who have come to themselves. Assistance groups, evaluation of different costs of care among clients, evaluation of the number of clients,

evaluation of medical results in clients, evaluation of customer satisfaction, evaluation of satisfaction with health care providers. Valid and highly reputable questionnaires were used to assess KAP of self-care amongst patients with hypertension, their families and healthcare providers [23]. The contents of the questionnaires were developed according to STEPS approach of WHO [24]. Isfahan Healthy Heart Program (IHHP) [25] and Isfahan Cohort Study (ICS) [26]. The questionnaire designed for patients had 20 questions on patients education about blood pressure-related topics, 18 questions on their attitudes toward blood pressure measurement, 17 questions on functional importance of blood pressure, 11 questions on adherence to medication regimen and 109 questions focused on personal and demographics information, diet, exercise and physical activity, smoking, drug and alcohol abuse, past medical history, anxiety and depression, quality of life, cost of hypertension-related treatment, socioeconomic status and finally their understanding of the importance of blood pressure control.

The awareness of Iranian patients about diagnostics, therapeutics and preventive measures of high blood pressure and their adherence to appropriate guidelines were evaluated and scored using the suitable questionnaires.

The total score of the questionnaire was reported as its range between 0 and 100 (0 indicates minimum standard was met in each parameter, while 100 means maximum standard was achieved) [27].

Body mass index (BMI) and Blood Pressure (BP) measurements

Blood pressure, height, weight, waist and hip circumferences were measured in all recruited patients using the universally standard techniques. Blood pressure measurements were particularly conducted according to the standard technique proposed by WHO [28].

Blood pressure was measured 3 subsequent times with an interval of 1 minute between each of 2 successive measurements from the patient's right arm while in sitting position. The mean of 2nd and 3rd measurements were used to calculate the blood pressure for each individual patient. According to the hypertension management guidelines developed by James et al. (2014), controlled hypertension is defined by consistent maintenance of systolic BP<140 mmHg and diastolic BP< 90 mmHg, while uncontrolled hypertension patients have systolic BP equal or higher than BP<140 mmHg and diastolic BP<90 mmHg. In this study, guidelines on management of poorly controlled hypertension were used to define a case of poorly managed hypertension as a mean systolic BP reading≥ 140 mmHg or a mean diastolic BP reading> 90 mmHg [29]. BP monitoring at home is a cost-effective measure to collect invaluable data regarding the BP control level in each individual patient and it will subsequently guide clinicians in terms of cardiovascular risk assessment and planning preventive measures [30]. Hence, BP monitoring at home was included in this study and researchers taught the correct technique to use home BP measurement devices to patients and their families.

Recruited patients were requested individually to check their BP using their BP monitor device at home every morning within 1 hour of waking and after urinating but before having breakfast and anti-hypertension medicine. Height was measured in meters (m) and weight was measured in kilogram (kg) using digital scales. Height and weight were measured 3 or more times in order to have 3-4 subsequent readings with a difference of 0.5 cm and 0.1 kg in height and weight, respectively. These readings were used to calculate a mean height and weight for each patient. Waist circumference was recorded to the nearest 1 mm and was measured in the mid-point of the lowest rib and superior margin of iliac crest using a tape measure. The hip circumference was measured as the maximum posterior width of buttocks [31].

Intervention phase

2 main strategies were used to conduct the intervention phase. The first strategy comprised of educating patients with hypertension and their family members about the importance of self-care activities and regular and accurate BP monitoring at home in reducing the mortality and morbidity associated with hypertension. Before initiating the intervention phase, several meetings were arranged with the local, regional and national institutions, authorities and societies including Islamic Republic of Iran Broadcasting (IRIB), city council, local education office, provincial educational office, non-governmental organisations (NGOs) with an interest in public health topics, the provincial public health office, continued medical education (CME) office, public relations office of IUMS and student society of IUMS.

Educational interventions were classified into 2 main groups:

1) Public health education campaign by means of using the capacity of local and regional press, social media and Short Messaging Service (SMS) texts

2) Provision of individualised and specialist medical education by urban and rural healthcare practitioners with an extensive experience in hypertension management to patients and their families

The intervention plan was designed based on Enhanced Chronic Care Model (ECCM) [32] 4 sessions of 2 hours duration were offered to educate the patients in the intervention group and their families. Then, they were followed up for 6 months by telephone.

An educational booklet was prepared and published for the patients and their families. The booklet included educational information on definition of high blood pressure, importance of controlling blood pressure, complications of poorly controlled hypertension and non-pharmacological managements of hypertension such as physical activity, stress and anxiety management, alcohol abstinence and smoking cessation as well as dietary restrictions and modifications, in particular having a low-salt diet to halt progression of HTN (DASH) (2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults) amongst the recruited patients.

Patients and their families were invited to their local health centres on planned days in order to attend health promotion and hypertension control education programmes in form of public seminars, small group discussions and interactive sessions using Microsoft PowerPoint, educational images as well as online and paper-based polls. In addition, there was an expert-led question and answer session at the end of each educational day to give all attendees a chance to discuss any potential concerns. Hence, the researchers and healthcare practitioners running the sessions had an invaluable opportunity to assess the patients' and their families' adherence to the proposed protocols of the study. Patients and their families were followed up by telephone on a monthly basis for 6 months to assess their adherence level to guidelines on self-care

and ensure the set standards of the project were met. In addition, patients were reminded about educational points taught during sessions and any queries raised by patients or their families were addressed.

Among patients, failure to attend more than 2 educational sessions was defined as an exclusion criterion in this project. Interviewers were highly trained to collect data from patients and their families after obtaining an informed consent. The information on prevalence, awareness and treatment alongside risk factors for hypertension such as smoking and alcohol abuse, lack of physical activity, unhealthy diet, proportion of obese and overweight patients and adherence to management protocols were all gathered in the basic initial analysis of data.As mentioned earlier, the following definition of well-managed hypertension will be used in this study: SBP< 140 and DBP<90.

Statistical analysis

Biographic variables including sex, age, educational status, marital status, occupation, health status, past medical history, presence of any hypertension-related complications, the duration since initial diagnosis of hypertension (years), antihypertensive medications and adherence to medical management were all analysed by descriptive statistical techniques. Chi-square test, χ^2 test, was used to analyse the qualitative variables in relation to response variable (hypertension being controlled or not). Independent t-test was used to analyse quantitative variables in relation to the response variable. Logistic regression model was used to account for the potential effects of auxiliary and confounding variables. Statistically significant variables (95 % CI) which influence the control of hypertension were identified ($p<0.05$). Four statistical models were used to calculate and analyse the association between self-care activities and control of hypertension. State software (version 16) was used to analyse and evaluate the results of this study.

RESULTS

The study sample comprised of a total of 2100 adults with hypertension, including 877 elderly aged>60 patients and 1223 younger patients. 24.85% of a total of 533 elderly patients with well-controlled hypertension were females and 35.91% were males. 38.65% of patients in this group were from a low socioeconomic background, 21.66% were from a middle socioeconomic status and 0.45% were from a high socioeconomic background. Amongst 533 elderly patients with a well-controlled hypertension, 50.51% had sustainable family support, while 29.98% of them did not benefit from family support.

344 elderly patients with hypertension had a poorly controlled disease. 20.18% of them were females and 19.04% were males. With regards to socioeconomic status of these patients, 26.33% of patients in this group were from a low socioeconomic background, 12.42% were from a middle socioeconomic status and 0.45% was from a high socioeconomic background. In this group, 10.26% had the privilege to benefit from strong family support, while 9.23% did not have family support Table 1.

Patients' adherence levels to self-care standards were higher in all 3 low, middle and high levels (16.64%, 29.53% and 14.59%) in those elderly patients with a well-controlled hypertension when compared to their counterparts in the group with poorly controlled hypertension in low, middle and high levels (12.31%, 17.67%, 9.23%).

Comparison of self-care behaviours and associated variables amongst elderly patients with well-controlled or poorly controlled hypertension

As shown in table 2, there were significant differences between the patients with well-controlled hypertension and patients with poorly controlled hypertension in terms of level of adherence to self-care standards. Amongst patients who implemented self-care measures, those who adhered to a higher standard had a 46% greater chance of having a well-controlled hypertension compared to those adhering to a lower standard of self-care. Patients with other co-morbidities had a 21% higher chance of having a well-controlled hypertension compared to their counterparts without co-morbid conditions. In addition, patients who were from a middle socioeconomic class had a 24% higher chance of achieving

Table 1: Basic Characteristics in all participants' older patients.

Factors	Elderly(N=877) NO/Per cent. Mean(SD)	P-value Blood Pressure Control NO(1) YES (2)
Sex		0.001
Male	177 (20.18%) 218(24.85%)	
Female	167 (19.04%) 315 (35.91%)	
SES		0.456
Low	231 (26.33%) 339 (38.65%)	
Medium	109 (12.42%) 190 (21.66%)	
High	4 (0.45%) 4 (0.45%)	
Comorbidity disease		0.304
NO	42 (5.43%) 86 (11.12%)	
Collaborate fully	43 (5.56%) 84 (10.68%)	
Incomplete collaboration	202 (26.13) 316 (40.87%)	
Blood pressure knowledge	344 (87.31/0.57) 533 (88.19/0.45)	0.024
Attitude about blood pressure	344 (80.77/0.43) 533 (81.25/0.36)	0.416
Practise about blood pressure	343 (73.75/0.51) 533 (74.81/0.40)	0.056

a well-controlled hypertension status compared to those classified as being of a low socioeconomic status. Detailed information is reported in Table 2.

DISCUSSION

The present study was conducted to assess the role of adherence to self-care activities in long-term management of hypertension amongst elderly patients with well-controlled hypertension compared to poorly controlled hypertension

The study showed that education of self-care activities is directly related to the socioeconomic status of elderly patients. Previous studies on non-communicable diseases (NCDs), including hypertension, have also shown the positive correlation of implementing protocols of self-care activities with a higher educational attainment and socioeconomic status among patients [33-36]. A higher socio-economic status alongside a higher awareness level are associated with an improved self-efficacy and judgment ability in relation to adopting a healthy lifestyle and adhering to protocols on self-care activities.

In the present study, the level of adherence to protocols on self-care activities, family support and engagement as well as the scores related to education and awareness level were lower amongst the patients with a poorly controlled hypertension compared to their counterparts with a well-controlled hypertension. Therefore, there is a need to propose practical measures in order to improve the long-term engagement of patients with healthcare professionals to achieve the relevant targets of self-care management amongst patients with a poorly controlled hypertension [37,38]. In addition, findings of previous studies have concluded that a higher level of implementation of self-care activities is in positive correlation with adherence to pharmacological managements, socioeconomic status, family engagement and support, low-salt diet, physical activity and co-morbid conditions in the long-term management of hypertension [39].

The conclusion of the current study is in agreement with the conclusion of previous publications in this filed highlighting the positive correlation between adherence to higher levels of self-care activities and family support in long-term management of hypertension in elderly patients. The supportive role of family

Table 2: Factors associated with hypertension control in older patients presented as Crude odds ratio (COR) and adjusted odds ratio (AOR).

Factor	Blood Pressure Control NO (1) YES (2)	COR(95%CI)	AOR(95%CI)	p-value
Sex				
Male		1	1	
Female		1.531(1.166-2.012)	0.577(0.418-0.796)	0.001
SES				
Low		1	1	
Medium		1.188(0.890-1.586)	1.246(0.898-1.729)	0.188
High		0.681(0.169-2.752)	0.702(0.132-3.723)	0.678
Comorbidity disease				
No		1	1	
Yes		1.516(1.083-2.123)	1.215(0.834-1.770)	0.310
Collaborate of family members				
NO				
Collaborate fully		0.954(0.567-1.606)	0.974(0.572-1.659)	0.923
Incomplete collaboration		0.764(0.508-1.150)	0.800(0.522-1.227)	0.307
Blood pressure knowledge		1.008(0.995-1.021)	1.004(0.989-1.018)	0.616
Attitude about blood pressure		1.007(0.990-1.024)	0.997(0.997-1.016)	0.742
Practise about blood pressure		1.014(1.00-1.029)	1.018(1.000-1.037)	0.052
Self-care score				
Low		1	1	
Medium		1.236(0.899-1.700)	1.182(0.817-1.710)	0.375
High		1.169(0.805-1.698	1.463(0.904-2.370)	0.122

Table 3: Models presenting the association between self-care score as tertiles and hypertension control in older patients after adjusting different variables.

Subject	elderly OR(95%CI)			
Tertiles of Self-care	Model 1	Model 2	Model 3	Model 4
Tertile 1	Ref.	Ref.	Ref.	Ref.
Tertile 2	1.236(0.899-1.700)	1.302(0.9431-1.797)	1.294(0.937-1.787)	1.182(0.817-1.710)
Tertile 3	1.169(0.805-1.698)	1.290(0.882-1.888)	1.271(0.868-1.861)	1.463(0.904-2.370)

Model 1: Unadjusted model
Model 2: Adjusted by, sex.
Model 3: Adjusted by sex, SES.
Model 4: Adjusted by sex, SES, Comorbidity disease, Blood pressure knowledge
Attitude about blood pressure, practise about blood pressure and cooperation of family members

in reminding and encouraging the elderly adults to follow the instructions of clinicians regarding self-care measures is essential to ensure an acceptable outcome is reached.

Adherence to health behaviours such as self-care activities stem from the shared personal and cultural values [40-42]. Various studies have shown a positive correlation between living with other chronic NCDs such as Diabetes and Chronic Heart Disease (CHD) with attainment of a higher level of adherence to self-care measures, which is also consistent with our findings. Being afraid of potentially more severe complications can provide an explanatory justification in relation to displaying this behaviour amongst elderly patients living with other NCDs in addition to hypertension [43]. Hence, it is important to consider the positive correlation between perceived threat and level of adherence to self-care protocols amongst these patients, which will ultimately result in a better performance.

The model used in this project consist of factors affecting self-care activities and clarified the significant role of socioeconomic status, co-morbidities and family support in determining the management of hypertension in elderly adults Table 3.

In the present study, according to the 2nd and 3rd model used (Model 1: unadjusted model. Model 2: adjusted by, sex. Model 3: adjusted by sex, SES. Model 4: adjusted by sex, SES, Comorbidity disease, Blood pressure knowledgeAttitude about blood pressure, practise about blood pressure and cooperation of family members), we conclude that family support, socioeconomic status and co-morbidities have the greatest influence on level of adherence to self-care protocols in controlling hypertension and other chronic diseases in the elderly population. These results are also consistent with the previous studies [39,44,45].

In a study by Warren-Find low et al. (2012), 41% of African-American patients who were diagnosed with hypertension had a poor performance in terms of adhering to self-care measures, and they had a higher prevalence of poorly controlled hypertension compared to other White and Asian patients (13).

The study by Jeonet el. (2008) evaluated the factors influencing self-management of hypertension among the elderly adults. They emphasised that educational attainment level and awareness have a significant impact on creating a constructive collaboration between the clinical nursing staff and the patients' families [46]. Self-efficacy and self-awareness were identified by Jeonet el. (2008) to be the most influential factors in achieving a well-controlled hypertension amongst elderly patients. These conclusions alongside the findings of the current study highlight the importance of designing self-care activities based on an enhanced supportive input from the nursing staff and family members to ensure an acceptable hypertension control is maintained amongst the elderly adults.

Yang et al. (2014) identified socioeconomic status and age as the influencing factors on self-care activities amongst elderly women with low income who were diagnosed with hypertension [45].

Previous studies investigated the factors influencing self-care activities amongst different groups of patients such as elderly adults, women and other adults who were diagnosed with hypertension. However, there has been no prior study conducted to illuminate the impact of these factors on elderly adults with well-controlled hypertension or poorly controlled hypertension. Thus, the comparison of the results of the present study with previous studies would be challenging in principal.

To our knowledge, the current study is the first of its kind investigating factors influencing poor hypertension control amongst the elderly patients. As a result, the conclusions of this study would provide an invaluable basis to develop future clinical guidelines to aid the long-term management of poorly controlled hypertension amongst the elderly patients.

This study showed that elderly patients from a lower socioeconomic background, whose families were not supportive with regards to facilitating adherence to self-care measures, encountered more obstacles throughout the process of hypertension management.

Clinicians and healthcare managers should collaborate constructively to plan appropriate long-term nursing strategies to ensure elderly patients and their families are empowered alongside healthcare practitioners in achieving and maintaining a better control of hypertension through adhering to guidelines on self-care activities.

The findings of the study by Crowley et al. (2013) and the current study both suggested that self-care activities should be integrated into the care programme of elderly patients with well-controlled or poorly controlled hypertension. It is also of paramount importance to identify the factors affecting the adherence of patients and their families to self-care measures [47].

In conclusion, the current recommendations on self-care activities should be modified to achieve a better standard of hypertension control amongst the elderly adults. The current study evaluated different factors influencing hypertension management amongst elderly patients with either a poorly controlled or well-controlled hypertension. Hence, it is essential to take the conclusions of this study into consideration when designing future clinical guidelines to empower the elderly adults achieve a superior standard of hypertension management. Moreover, the present study highlighted the key role of educating the patients and their families in raising their awareness of the benefits associated with self-care activities in terms of long-term management of hypertension. It should be noted that having a strong system of family support is advantageous in implementation of self-care protocols; hence, clinicians should ideally involve and encourage the family in this process.

The recommendations of this study are applicable in the future to develop guidelines on self-care activities for patients with hypertension to reduce the burden of cardiovascular complications of poorly controlled hypertension amongst them. Therefore, our findings will ultimately aid the development of effective interventions to enhance engagement of the elderly adults with hypertension self-care protocols, regardless of their disease control status.

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