Association between Knowledge and Self-care Adherence among Elderly Hypertensive Patient in Dwelling Community

by Yuliarni Syafrita

Association between Knowledge and Self-care Adherence among Elderly Hypertensive Patient in Dwelling Community

Reni Gusty[1]* , Nursyirwan Effendi[2] , Khatijah Lim Abdullah[3] , Yuliarni Syafrita[4]

[1]Department of Public Health Sciences, Faculty of Medicine, Universitas Andalas, West Sumatera, Indonesia; [2]Department of Anthropology, Faculty of Social, Universitas Andalas, West Sumatera, Indonesia; [3]Department of Nursing, School of Medical and Life Science, Sunway University, Subang Jaya, Malaysia; [4]Department of Neurology, Faculty of Medicine, Universitas Andalas, West Sumatera, Indonesia

Abstract

BACKGROUND: Hypertension contributes significantly to the increase in cardiovascular disease cases, especially in the elderly. Knowledge and self-care compliance are needed, but in reality, awareness and regularity of control are still lacking in hypertensive patients in urban communities.

AIM: The aim of the study was to determine the relationship of knowledge with self-care and get an overview of existing knowledge and self-care in the elderly with hypertension.

METHODS: This is a quantitative and cross-sectional design recruited 383 hypertensive patients in three community health centers. Sampling with proportional random sampling from three health centers that have the highest cases of hypertension in the city of Padang. Knowledge instrument using hypertension knowledge-level scale. Moreover, hypertension self-care adherence using hypertension self-care activity level effects. Analysis using Chi-square test

RESULTS: The sample of this study was 383 respondents. About 66.3% are women, 88.3% have low education, and 86.9% do not work. 51.2% had duration of hypertension 0–5 years and the average age was 60.89 ± 8.072 years. About 94.8% of respondents have poor knowledge. Self-care practice showed 64% non-adherence to medication, 88.5% non-adherence to the DASH diet, and 82.5% non-adherence to weight management. However, 78.6% indicated non-smoking adherence and 100% alcohol avoidance adherence. There was a relationship between knowledge and adherence to weight management (p=0.000; odds ratio [OR] 6.7 (95% confidence interval [CI] for Exp B; 2.65–16.91)) and physical activity (p=0.000; OR 14.99 (95% CI for Exp B; 5.65–39.79)).

CONCLUSION: Providing comprehensive and repeated health education for the elderly with hypertension can increase their knowledge. The involvement of patients and families is needed to improve self-care behavior.

Introduction

Cases of hypertension have an increasing trend, not only in Indonesia, the whole world has a rising trend, the WHO estimates that hypertension will reach 29.2% in 2025 [1]. Hypertension is an important risk factor for cardiovascular morbidity and mortality, particularly in the elderly [2]. According to the Seventh Report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure (JNC-7), more than two-thirds of people aged over 60 years have hypertension [3]. The mortality and morbidity rates caused by uncontrolled hypertension, such as cardiovascular disease, will also increase [4].

Almost all research in the world proves that the occurrence of uncontrolled hypertension is caused by poor self-care practices such as consumption of unhealthy food, unbalanced diet, smoking, taking irregular medication, and comorbidities [5], [6], [7]. Good knowledge will provide a positive correlation to self-care practices. Self-care adherence is influenced by a person's ability to control behavior. This behavioral control requires cognitive control to make decisions. The complexity of non-compliance makes it not just one approach [8].

A lot of literature mentions that knowledge affects the level of adherence. There are still few studies that look at the relationship of knowledge to each component of self-care proposed by Warren [9]. If knowledge is increased by health literacy, it can improve the self-care behavior of patients with hypertension [10]. This study investigates the relationship between knowledge of hypertension and self-care adherence in elderly hypertension. The elderly are targeted because most hypertension cases occur in old age.

Methods

This research design used a cross-sectional study. Participants were taken from three public health centers with the highest hypertension cases, namely,

the Andalas Community Health Center, Lubuk Buaya, and Lubuk Begalung.

The number of samples in this study was 383 people with hypertension. The three public health centers were conducted by proportional random sampling, with 160 respondents from Andalas, 120 from Lubuk Buaya, and 103 from Lubuk Begalung. The sample criteria are at least 6 months of being diagnosed with hypertension, good communication, reading, and writing, not having other comorbid diseases such as heart disease, diabetes mellitus, stroke, and kidney failure, and having medical record data at public health centers. The investigative question is whether there is a relationship between knowledge and self-care adherence in the elderly. How is the description of knowledge and self-care in the elderly with hypertension?

Instrument

Hypertension knowledge

The instrument consists of 22 questions. For the assessment of the knowledge, it is divided into two categories, namely, good knowledge if the score is 18–22 (>80%) and less good 17 (≤80%). The instrument used is the hypertension knowledge-level scale [11]. The tool has been tested for its implementation in Indonesia, with Cronbach's alpha of 0.788 and the value of r=0.890 >r tablet. Valid and reliable instruments are used in Indonesia [12].

Hypertension self-care assessment

We used hypertension self-care activity level effects (H-SCALE) for self-care assessment of hypertensive patients, H-SCALE consists of JNC7 recommended hypertension self-care activities. The H-SCALE has six subscales, namely, medication adherence (items 1–3), DASH dietary compliance (items 4–15), physical activity adherence (items 16–17), adherence to avoid smoking (items 18–19), weight management adherence (items 20–29), and adherence to avoid alcohol consumption (items 30). Medication adherence score was 21, DASH diet adherence score was ≥72, physical activity adherence score was ≥8, tobacco exposure score was 0, and weight management adherence score was ≥40 [9], [13]. The questionnaire has been tested first on 30 hypertensive patients and the Cronbach's alpha value is 0.799 and the value of r=0.858 >r table.

Ethical aspect and declaration of interest statement

Research ethics approval was obtained from the Ethics Committee of the Faculty of Medicine, Andalas University (No: 459/KEP/FK/2018), as well as the Padang City Health Office, West Sumatra Province, Indonesia. Informed consent was given to respondents before the study was conducted.

Data analysis

Data were analyzed univariately, showing frequency, percentage, and mean tabulation. Chi-square test was used to see the relationship between knowledge and self-care adherence

Results

Characteristics of the respondents

The respondent's characteristic data shown in Table 1 explain that the average age of the respondents is 60.89 years, 66.3% are women, 88.3% have low education, and 86.9% do not work. 51.2% had duration hypertension was in the range of 0–5 years. Table 2 shows that almost all respondents (94.8%) have poor knowledge. The most of the respondents' self-care behavior is not compliant with taking medication (64%), nearly all respondents (88.5%) are not compliant with the DASH diet, 82.5% are not compliant with weight management, and 86.9% did not comply with physical activity. However, most 78.6% have not smoked and all respondents (100%) have never consumed alcohol.

Table 1: Characteristics of survey respondent (*n* = 383)

Characteristics	Frequencies (*n*)	Percentage
Age (mean ± SD) (60.89 ± 8.072)		
Gender		
Male	129	33.7
Female	254	66.3
Education		
Not in school	32	8.4
Lower (basic until senior high school)	338	88.3
Higher (College graduate)	13	3.4
Employment status		
Employed	50	13.1
Unemployed	333	86.9
Disease duration		
0–5 years	196	51.2
6–10 years	115	30
>10 years	72	18.8

Table 2: Frequencies of distribution research variables

Characteristic	Frequencies (*n*)	Percentage
Knowledge		
Good	20	5.2
Poor	368	94.8
Medication		
Adherence	138	36
Non-adherence	245	64
DASH diet		
Adherence	44	11.5
Non-adherence	339	88.5
Weight Management		
Adherence	67	17.5
Non-adherence	316	82.5
Physical activity		
Adherence	53	13.8
Non-adherence	330	86.9
Tobacco exposure		
Adherence	301	78.6
Non-adherence	82	21.4
Alcohol intake		
Adherence	383	100
Non-adherence	-	-

AQ9 Table 3: Responses to hypertension knowledge

Sub-dimension item number	Item	Respondent answer	
		True n (%)	False n (%)
Definition			
1	Increased diastolic blood pressure also indicates increased blood pressure	115 (30)	268 (70)
2	High diastolic or systolic blood pressure indicates increased blood pressure	82 (21.4)	301 (78.6)
Medical treatment			
3	Drugs for increased blood pressure must be taken every day	211 (55.1)	172 (44.9)
4	Individuals with increased blood pressure must take their medication only when they feel ill	209 (54.6)	174 (45.4)
5	Individuals with increased blood pressure must take their medication throughout their life	121 (31.6)	262 (68.4)
6	Individuals with increased blood pressure must take their medication in a manner that makes them feel good	244 (63.7)	139 (36.3)
Drug Compliance			
7	If the medication for increased blood pressure can control blood pressure, there is no need to change lifestyles	170 (44.4)	213 (55.6)
8	Increased blood pressure is the result of aging, so treatment is unnecessary	239 (62.4)	144 (37.6)
9	If individuals with increased blood pressure change their lifestyles, there is no need for the treatment	194 (50.7)	189 (49.3)
10	Individuals with increased blood pressure can eat salty foods as long as they take their drugs regularly	179 (46.7)	204 (53.3)
Lifestyle			
11	Individuals with increased blood pressure cannot drink alcoholic beverages	296 (77.3)	87 (22.7)
12	Individuals with increased blood pressure must not smoke	236 (61.6)	147 (38.4)
13	Individuals with increased blood pressure must eat fruits and vegetables frequently	296 (77.3)	147 (38.4)
14	For individuals with increased blood pressure, the best cooking method is not frying	267 (69.7)	116 (30.3)
15	For individuals with increased blood pressure, the best cooking method is boiling or grilling	172 (44.9)	211 (55.1)
Diet			
16	The best type of meat for individuals with increased blood pressure is white meat	115 (30)	268 (70)
17	The best type of meat for individuals with increased blood pressure is red meat	209 (54.6)	174 (45.4)
Complications			
18	Increased blood pressure can cause premature death if left untreated	273 (71.3)	110 (28.7)
19	Increased blood pressure can cause heart diseases, such as heart attack, if left untreated	305 (79.6)	78 (20.4)
20	Increased blood pressure can cause strokes, if left untreated	280 (73.1)	103 (26.9)
21	Increased blood pressure can cause kidney failure, if left untreated	161 (42)	222 (58)
22	Increased blood pressure can cause visual disturbances, if left untreated	166 (43.3)	217 (56.7)

Score hypertension knowledge

The assessment of hypertension knowledge includes six dimensions. These six dimensions assess the understanding of hypertension sufferers about determining the definition of hypertension through blood pressure assessment, medical treatment, medication adherence, lifestyle, diet, and disease complications caused by hypertension. Table 2 and 3 show that 70–78.6% of respondents do not recognize blood pressure values, which is uncontrolled hypertension. The medical treatment sub-dimension describes that most 55.1% understand that taking hypertension medication is done every day because it can make their body feel healthy (63.7%). Taking medication should also be done when they feel sick (54.6%), but a small proportion (31.6%) of the respondents know that taking hypertension medication must be done throughout their lives.

The sub-dimension of medication adherence explained that most respondents (62.4%) already understood that hypertension occurs due to aging. Only half (50.7%) of respondents understand that lifestyle changes can control blood pressure, treatment is still being carried out. The most of the respondents understand that if the medicine they take can control their blood pressure, there is no need to change their lifestyle, and they can consume foods that contain salt freely.

The lifestyle sub-dimension illustrates that most respondents already understand that people with hypertension should not consume alcohol, smoke, increase their consumption of vegetables and fruit, and avoid cooking with the frying method. However, a small percentage (44.9%) of respondents understood that boiling and roasting cooking methods were suitable for people with hypertension. The diet sub-dimension shows that most respondents do not understand the best meat consumption for hypertension (70%).

Complications sub-dimension illustrates that most respondents understand that hypertension complications can be in the form of heart, stroke, and death. The most of the respondents were not aware of other difficulties. Hypertension can cause kidney failure and visual disturbances (58% and 56.7%).

Score H-SCALE

The description of the six respondents' self-care behaviors is shown in Table 4. The behavior assessed is the history of the past 7 days before the assessment. The treatment subdomain found that the most of the respondents did not comply with taking the drug at the same time every day; taking medication as recommended by the doctor; and taking medication every day (72.8%; 63.4%; and 58.5%).

The DASH diet subdomain describes that the majority (67.7%) of respondents not complying with the healthy diet plan recommended to them. It is indicated by almost all respondents not being obedient to not consuming grilled meat and fish, salt food at the table, and avoiding consumption of foods high in salt (84.1%; 81.7%; and 80.2%). In addition, the most of the respondents did not comply to avoid frozen food and adding salt when cooking (73.7% and 63.5%). What is essential and good for health is that the most of the respondents obediently avoid consuming packaged bread; avoiding fatty foods; fried foods and eat 5 times fruit and vegetables per day, and eat pickles, olives, or other vegetables in brine (77%; 74.4%; 72.6%; 61.6%; and 60.1%).

The weight management subdomain showed that most (68.9%) respondents stated that they were careful about what they eat and rarely ate in restaurants or fast food places (55.4%). However, the most of the respondents cannot eat small portions of

Table 4: Responses to hypertension self-care activity level effects (H-SCALE)

Self-care Item	Activity level	
	Adherence n (%)	Non-adherence n (%)
Medication	Mean: 34.35%	
Take blood pressure pills	159 (41.5)	224 (58.5)
Take blood pressure pills at the same time every day	104 (27.2)	279 (72.8)
Take the recommended number of blood pressure pills	140 (36.6)	243 (63.4)
Diet DASH		
Follow a healthy eating plan	124 (32.3)	259 (67.7)
Eat five fruits and vegetables a day	236 (61.6)	147 (38.4)
Eat packaged bakery goods	295 (77)	88 (23)
Eat fried foods such as chicken, french fries, or fish	278 (72.6)	105 (27.4)
Avoid eating fatty foods and salt items	285 (74.4)	98 (25.6)
Eat potato chips, salted nuts, or salted popcorn	76 (19.8)	307 (80.2)
Eat processed meats such as ham, bacon, bologna, or sausage	317 (82.8)	66 (17.2)
Eat smoked meat or smoked fish	61 (15.9)	322 (84.1)
Eat pickles, olives, or other vegetables in brine	230 (60.1)	153 (39.1)
Eat frozen prepared dinners or frozen pizza	101 (26.3)	282 (73.7)
Salt food at the table	70 (18.3)	313 (81.7)
Add salt when cooking	140 (36.5)	243 (63.5)
Weight management		
I am careful about what I eat.	264 (68.9)	119 (31.1)
I read food labels when I grocery shop	183 (47.7)	200 (52.3)
I exercise to lose or maintain weight.	151 (39.4)	232 (60.6)
I have cut out drinking sugary sodas and sweet tea.	162 (42.3)	221 (57.7)
I eat smaller portions or eat fewer portions	144 (37.6)	239 (62.6)
I have stopped buying or bringing unhealthy foods into my home.	177 (46.2)	206 (53.8)
I have cut out or limit some foods that I like but that are not good for me.	186 (48.5)	197 (51.5)
I eat at restaurants or fast food places less often.	212 (55.4)	171 (44.6)
I substitute healthier foods for things that I used to eat	155 (40.4)	228 (59.6)
I have modified my recipes when I cook.	166 (43.4)	217 (56.6)
Physical activity		
Do at least 30 min total of physical activity	105 (27.4)	278 (72.6)
Do a specific exercise activity (such as swimming, walking, or biking) other than what you do around the house or as part of your work?	123 (32.1)	260 (67.9)
Tobacco exposure		
Smoke a cigarette or cigar, even just one puff	339 (88.5)	44 (11.5)
Stay in a room or ride in an enclosed vehicle while someone was smoking	299 (78.1)	84 (21.9)
Alcohol intake		
Drink alcohol in a week	383 (100)	0

food (62.6%); do not do physical activity (60.6%); did not add healthy food to their eating habits (59.6%); 57.5% of respondents still drink sweetened soda and tea; 51.5% did not limit favorite foods; 56.6% did not comply with modifying recipes for healthy foods; 53.8% did not comply with stopping buying unhealthy food; and 52.3% did not use to reading the label content of the food purchased. This data illustrate that the trend is that it is difficult for respondents to do good weight management for health.

The physical activity subdomain found that most respondents did not comply with 30 min of physical activity with at least three exercises a week. Subdomain exposed to cigarettes, almost all respondents obediently avoid smoking actively or passively. It is hoped that people with hypertension will stop being passive or active smokers. Data show that adherence not to become passive smokers is low.

Table 5 shows the results of the Chi-square analysis that there is a relationship between knowledge and adherence to weight management (p=0.000; 6.7 (95% Confidence Interval [CI] for Exp B; 2.65–16.91)) and physical activity (p=0.000; 14.99 (95% CI for Exp B; 5.65–39.79)).

Table 5: Correlation hypertension knowledge with hypertension knowledge and self-care level effect

Knowledge	Sub-division Self-care				
	Medication	Diet DASH	Weight management	Physical activity	Tobacco exposure
p-value	0.705	0.098	0.000*	0.000*	0.337
OR	1.20	0.88	6.7	14.99	0.62
(95% CI for Exp B)	(0.48–2.99)	(0.85–0.91)	(2.65–16.91)	(5.65–39.79)	(0.23–1.66)

*Significant

Discussion

This study indicates that most of the respondents are 60.9 years old, 66.3% are women, 88.3% have low education, 86.9% are unemployed, and the duration of hypertension is 5 years. This characteristic is similar to the study conducted in Riau [14]. Elderly women have a greater risk of hypertension because they have entered the menopause phase, which decreases the production of the sex hormone estrogen. This hormone plays a role in regulating vascular permeability. A decrease in this hormone can relieve vascular rigidity and decrease baroreceptor sensitivity. This condition makes elderly women vulnerable to increased blood pressure [15], [16]. Another study also explained that 48.8–63% of elderly women over 60 years experienced a stage two increase in blood pressure (160/100 mmHg) [4]. The findings of the study found that almost all respondents had poor knowledge. Various studies have shown that the low levels of education can contribute to inadequate self-care knowledge and practice [14], [17], [18], [19] about 4.5% educational status contributes to knowledge change [18]. In addition to education level, duration of experiencing hypertension plays a role in knowledge level. The study explains that more than 4 years of being diagnosed with hypertension will provide good behavior in self-care for people with hypertension compared to 4 years. The patients who are sick longer have better self-care because they have received continuous counseling and education [17].

The answers from the knowledge show majority of respondents (70–78%) not understanding the value of blood pressure, which was considered high blood pressure or uncontrolled. Similar results were also found in the study in Ethiopia, findings 37.5% [19] and 57% in Spain [20] do not know normal blood pressure values. The findings of this study suggest a much more prominent figure. It needs to be a concern to give skills to respondents. This knowledge is essential because it can increase individual awareness of their health. The elderly do not care about understanding blood pressure values because hypertension tends not to experience complaints, so they tend to be ignored. This lack of knowledge can make blood pressure monitoring poor, resulting in uncontrolled blood pressure [21].

Respondents thought that if the medication can control blood pressure, it is no longer necessary to regulate their lifestyle, and they can consume foods

that contain salt freely. The respondent's misperception could cause the free consumption of salt in the diet. This finding is similar to a study in North India which found that 90% were indifferent to the salt content consumed and preferred processed foods [22]. In addition, most respondents do not know that white meat is suitable for people with hypertension and do not know that the boiled and grilled cooking method is good for people with hypertension. This can be used to provide health education related to diet in patients with hypertension. The notion of the treatment can eliminate complaints and symptoms of hypertension to ignore the regulation of a healthy lifestyle [23]. Another found that most respondents knew that heart problems, strokes, and death could occur from hypertension. However, respondents do not know that hypertension can cause kidney failure and visual disturbances if not appropriately handled. Therefore, it is necessary to add information.

Self-care consists of six subdomains. Four subdomains (medication, DASH diet, weight management, and physical activity) showed high non-adherence, while two subdomains (alcohol and smoking) self-care showed high adherence. All respondents avoided alcohol consumption (100%) and did not smoke by 83.3%. The same study was found in Pakistan, where the behavior of self-care adherence of patients with hypertension was high, namely, not consuming 100% alcohol and not smoking 83.33% [24]. The increased commitment to not drinking alcohol and smoking shows that people with hypertension are aware of the dangers of this behavior. In addition, the Minang ethnic culture owned by the people of West Sumatra considers it inappropriate for parents to consume alcohol. Poor self-care in the elderly can occur because the elderly perceive hypertension as a normal thing that occurs due to aging. In addition, the asymptomatic nature of hypertension makes it difficult for the elderly to improve self-care behavior [25].

Knowledge is the basis for a person to practice self-care so that knowledge is positively correlated with self-care for people with hypertension [19], [26], [27]. Better knowledge leads to better practice in some ways. Studies in ethopia mention that there are four studies that explain that good knowledge will give you 4 times more possibility to practice self-care [26].

Studies show that non-adherence to treatment is still high in patients with hypertension. The lack or absence of severe symptoms is felt to make people with hypertension not comply with treatment, besides the belief in the existence of traditional medicine is an obstacle in medication adherence [19].Several studies have stated that the side effects of hypertension drugs can reduce hypertensive patients' compliance [21]. Uncertainty about the benefits of continuous drug consumption [28] and the absence of new drugs to treat hypertension [29] trigger the increasing number of non-adherence to treatment. This condition is one of the psychological barriers felt by the patient.

Another example from this study illustrates that the consumption of drugs is still routine, but they modify the way they are taken by changing the dose and time of taking them. Efforts that can be made to improve medication adherence can be increasing health literacy even though the success obtained is small. Increasing universal awareness relies on communication between health workers and sufferers [30].

Dietary adherence and weight management are complementary. In weight management adherence, more emphasis is placed on self-care practices to control diet, including behavior to modify food processing and how to buy healthy foods and physical activity to lose and maintain weight. The study reported that most respondents had hypertension diagnosed for less than 5 years. Another study stated that non-adherence to weight management was 1.86 times worse in hypertensive patients <5 years [23], it is due to the opportunity to gain deeper knowledge of self-care practices for those diagnosed with <5 years compared to >5 years. The study also reported that knowledge was associated with adherence to weight management. It is positively correlated between knowledge and non-adherent self-care practices, like adding healthy foods to eating habits, making unhealthy food purchases, and not adhering to limiting favorite foods high in fat and salt. This finding is similar to a study in Iran which stated that 87.7% did not practice a healthy diet [13]. An unhealthy lifestyle is a significant factor causing uncontrolled blood pressure. Therefore, it is necessary to consistently provide health education about healthy lifestyle practices in patients with hypertension [26]

This study also found a relationship between knowledge and adherence to physical activity. Studies report insufficient knowledge of the appropriate duration of physical exercise. The data show that 27.6% of respondents do not comply with activities for 30 each exercise. According to the WHO recommendations, it is recommended that you do 30 min of exercise 5 times a week or 150 min per week to control blood pressure [27], [31]. However, other studies show different things, that the level of knowledge does not affect a person's level of physical activity [32]. Some studies show physical exercise adherence is influenced by lower health literacy levels and poor living conditions. Aging conditions make it difficult for elderly respondents to do physical activity exercises for a long time [2], [4], [23]. The study findings further explain that the level of activity in elderly hypertensive patients is influenced by knowledge and the old age factor, which limits physical activity due to a decrease in physical condition due to aging.

Although some respondents are obedient not to become active and passive smokers, this condition has not yet reached the target of hypertension sufferers free fromsmoking.

The study results showed that 21.9% of elderly hypertensive women were exposed to cigarette smoke from household members. Passive smoking is

hazardous because it will cause endothelial disorders of blood vessels; endothelial function disorders can cause functional diseases of micro blood vessels, causing an increase in blood pressure [33]. Physiologically, a decrease in the elasticity of blood vessels is also caused by the aging process [4]. Understanding the dangers of smoking is necessary for families and patients themselves; in addition to government policy to establish a smoking area, it can also reduce the number of active tobacco. A decrease will also follow this decrease in the number of passive smoking [34]. Active smokers should be motivated to quit smoking. Scientific studies prove an effective and safe effort in smokers to provide first-line treatment in the form of nicotine gum, inhalers, lozenges, patches, and the non-nicotine drug bupropion. Whereas the drugs clonidine, nicotine nasal spray, and nortriptyline can be given in the second line of the treatment [35], things need to be done immediately because partner studies get cigarettes are the dominant factor that affects uncontrolled blood pressure [36].

Conclusions

Poor knowledge and low compliance of elderly hypertensive patients in terms of medication, diet, weight management, and physical activity require a different strategy to design health education for the elderly with hypertension. The teaching given emphasizes the basic things about the value of blood pressure that patients and families must recognize, followed by other treatment materials. It takes families and the elderly to increase knowledge and adherence to self-care at home. A simple form of family involvement is not smoking when near hypertensive elderly people.

Acknowledgments

References

1. World Health Organization. Raised Blood Pressure. Geneva: World Health Organization; 2018. Available from: https://www.who.int/gho/ncd/risk_factors/blood_pressure_prevalence_tex/en [Last accessed on 2019 Jan 31].

2. Lionakis N, Mendrinos D, Sanidas E, Favatas G, Georgopoulou M. Hypertension in the elderly. World J Cardiol. 2012;4(5):135-147 http://dx.doi.org/10.4330/wjc.v4.i5.135

PMid:22655162

3. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, et al. Seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. Hypertension. 2003;42(6):1206-52. https://doi.org/10.1161/01.HYP.0000107251.49515.c2

PMid:14656957

4. Lionakis N, Mendrinos D, Sanidas E, Favatas G, Georgopoulou M, Lionakis N, et al. Hypertension in the elderly. World J Cardiol. 2012;4(5):135-47. https://doi.org/10.4330/wjc.v4.i5.135

PMid:22655162

5. Mpande N, Chinamasa CF, Manangazira P, Mungati M, Takundwa L, Bangure D, et al. Factors associated with uncontrolled high blood pressure amongst patients with hypertension at harare central hospital in zimbabwe. J Hypertens Cardiol. 2016;2(2):1-10. https://doi.org/10.14302/issn.2329-9487.jhc-16-1020

6. Tesfaye B, Haile D, Lake B, Belachew T, Tesfaye T, Abera H. Uncontrolled hypertension and associated factors among adult hypertensive patients on follow-up at Jimma University Teaching and Specialized Hospital: Cross-sectional study. Res Reports Clin Cardiol. 2017;8:21-9. https://doi.org/10.2147/rrcc.s132126

7. Yang ZQ, Zhao Q, Jiang P, Zheng SB, Xu B. Prevalence and control of hypertension among a community of elderly population in changning district of Shanghai: A cross-sectional study. BMC Geriatr. 2017;17(1):1-9. https://doi.org/10.1186/s12877-01-0686-y

PMid:29281978

8. Easthall C, Barnett N. Using theory to explore the determinants of medication adherence; moving away from a one-size-fits-all approach. Pharmacy. 2017;5(4):50. https://doi.org/10.3390/pharmacy5030050

PMid:28970462

9. Warren-Findlow J, Basalik DW, Dulin M, Tapp H, Kuhn L. Preliminary validation of the hypertension self-care activity level effects (H-SCALE) and clinical blood pressure among patients with hypertension. J Clin Hypertens. 2013;15(9):637-43. https://doi.org/10.1111/jch.12157

PMid:24034656

10. Warren-Findlow J, Coffman MJ, Thomas EV, Krinner LM. ECHO: A Pilot Health Literacy Intervention to Improve Hypertension Self-Care. Health Lit Res Pract. 2019;3(4):e259-67. https://doi.org/10.3928/24748307-20191028-01

PMid:31893258

11. Erkoc SB, Isikli B, Metintas S, Kalyoncu C. Hypertension knowledge-level scale (HK-LS): A study on development, validity and reliability. Int J Environ Res Public Health. 2012;9(3):1018-29. https://doi.org/10.3390/ijerph9031018

PMid:22690180

12. Ernawati I, Fandinata SS, Permatasari SN. Translation and validation of the indonesian version of the hypertension knowledge-level scale. Open Access Maced J Med Sci. 2020;8:630-7. https://doi.org/10.3889/OAMJMS.2020.5152

13. Motlagh SF, Chaman R, Sadeghi E, Eslami AA. Self-care behaviors and related factors in hypertensive patients. Iran Red Crescent Med J. 2016;18(6):e35805. https://doi.org/10.5812/ircmj.35805

PMid:27621938

14. Putri SE, Rekawati E, Nurviyandari D, Wati K. Effectiveness of self-management on adherence to self-care and on health status among elderly people with hypertension. J Public health Res. 2021;10(S1):75-81. https://doi.org/10.(s1):2406

PMid:34060750

15. Ahmad A, Oparil S. Hypertension in women recent advances and lingering questions. Hypertens J. 2017;70(1):19-26. https://

doi.org/10.1161/HYPERTENSIONAHA.117.08317

PMid:28483918

16. Ferdinand KC, Fleg JL. Hypertension across a woman's life cycle. J Am Coll Cardiol. 2019;71(16):1797-813. https://doi.org/1016/j.jacc.2018.02.033

PMid:29673470

17. Gebremichael GB, Berhe KK, Beyene BG, Gebrekidan KB. Self-care practices and associated factors among adult hypertensive patients in Ayder Comprehensive Specialized Hospital, Tigray, Ethiopia, 2018. BMC Res Notes. 2019;12(1):489. https://doi.org/10.1186/s13104-019-4502-y

PMid:31387617

18. Kilic M, Uzunçakmak T, Ede H. The effect of knowledge about hypertension on the control of high blood pressure. Int J Cardiovasc Acad. 2016;2(1):27-32. https://doi.org/10.1016/j.ijcac.2016.01.003

19. Chimberengwa PT, Naidoo M. Knowledge, attitudes and practices related to hypertension among residents of a disadvantaged rural community in southern Zimbabwe. PLoS One. 2018;14(6):e0215500. https://doi.org/10.1371/journal.pone.0215500

PMid:31237883

20. Estrada D, Sierra C, Soriano RM, Jordán AI, Plaza N, Fernández C. Grade of knowledge of hypertension in hypertensive patients. Enferm Clin (English Ed). 2020;30(2):99-107. https://doi.org/10.1016/j.enfcle.2018.11.003

PMid:30954394

21. Tan CS, Hassali MA, Neoh CF, Saleem F. A qualitative exploration of hypertensive patients' perception towards quality use of medication and hypertension management at the community level. Pharm Pract (Granada). 2017;15(4):1074. https://doi.org/10.18549/PharmPract.2017.04.1074

PMid:29317924

22. Bhattacharya S, Thakur J, Singh A. Knowledge attitude, and practice regarding dietary salt intake among urban slum population of North India. J Fam Med Prim. 2018;7(3):526-30. https://doi.org/10.4103/jfmpc.jfmpc

PMid:30112302

23. Aynalem GA, Bekele TA, Berhe TT, Endazenew G. Factors affecting adherence to lifestyle modification among patients with hypertension at Yekatit 12 Hospital Medical College, Addis Ababa, Ethiopia, 2019. SAGE Open Med. 2021;9:205031212110125. https://doi.org/10.1177/20503121211012523

PMid:33996085

24. Ajani K, Gowani A, Gul R, Petrucka P. Levels and predictors of self-care among patients with hypertension in Pakistan. Int J Gen Med. 2021;14:1023-32. https://doi.org/10.2147/ijgm.s297770

PMid:33790631

25. Sarrafzadegan N, Mansourian M, Alikhassi H, Sherafat A, Khosravi A. Self-Care Behaviours and Determinants Associated with Hypertension Control in Elderly Patients. J Pat Care, Vol.7

Iss. 3 No: 157 2021;1-8.

26. Wondmieneh A, Gedefaw G, Getie A, Demis A. Self-care practice and associated factors among hypertensive patients in Ethiopia: A systematic review and meta-analysis. Int J Hypertens. 2021;2021:5582547. https://doi.org/10.1155/2021/5582547

PMid:33898063

27. Seangpraw K, Ong-Artborirak P. Knowledge and behaviors toward health care for elderly patients with hypertension, and quality of life among informal caregivers in Northern Thailand. J Multidiscip Healthc. 2020;13:1771-80. https://doi.org/10.2147/JMDH.S284886

PMid:33293820

28. Karthikeyan G, Ranganayakulu D. Evaluation of hypertension knowledge and drug adherence among South Indian population. Int J Pharm Sci Res. 2014;5(9):4056-60. https://doi.org/10.13040/IJPSR.0975-8232.5

29. Burnier M. Drug adherence in hypertension. Pharmacol Res. 2017;125:142-9. https://doi.org/10.1016/j.phrs.2017.08.015

PMid:28870408

30. Martin LR, Feig C, Maksoudian CR, Wysong K, Faasse K. A perspective on nonadherence to drug therapy: Psychological barriers and strategies to overcome nonadherence. Patient Prefer Adherence. 2018;12:1527-35. https://doi.org/10.2147/PPA.S155971

PMid:30197504

31. Abed Y, Abu-Haddaf S. Risk factors of hypertension at UNRWA primary health care centers in gaza governorates. ISRN Epidemiol. 2013;2013:1-9. https://doi.org/10.5402/2013/720760

32. dos Santos RZ, Korbes AS, Martins ET, De Lucca M, De Lucca L, Karsten M, et al. Does hypertension knowledge influence levels of physical activity in hypertensive patients from a southern Brazilian community? Int J Cardiovasc Sci. 2021;34(5):542-9. https://doi.org/10.36660/ijcs.20200141

33. Akpa OM, Okekunle AP, Asowata JO, Adedokun B. Passive smoking exposure and the risk of hypertension among non-smoking adults: The 2015-2016 NHANES data. Clin Hypertens. 2021;27(1):1-12. https://doi.org/10.1186/s40885-020-00159-7

34. Lusno MF, Haksama S, Wulandari A, Sriram S. Association between smoking and hypertension as a disease burden in Sidoarjo: A case-control study. Int J Appl Biol. 2020;4(2):9-16.

35. Hughes JR. Motivating and helping smokers to stop smoking. J Gen Intern Med. 2003;18(12):1053-7. https://doi.org/10.1111/j.1525-1497.2003.20640.x

PMid:14687265

36. Mitra M, Wulandari W. Factors affecting uncontrolled blood pressure among elderly hypertensive patients in Pekanbaru City, Indonesia. Open Access Maced J Med Sci. 2019;7(7):1209-13. https://doi.org/10.3889/oamjms.2019.255

PMid:31049109

Association between Knowledge and Self-care Adherence among Elderly Hypertensive Patient in Dwelling Community