

# Descriptive cross-sectional study on knowledge, awareness and adherence to medication among hypertensive patients in a tertiary care center, Eastern Sri Lanka

SAGE Open Medicine  
Volume 9: 1–8  
© The Author(s) 2021  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/20503121211012497  
journals.sagepub.com/home/smo



Selladurai Pirasath<sup>1</sup>  and Thadchanamoorthy Sundaresan<sup>2</sup>

## Abstract

**Introduction:** Hypertension is one of the common non-communicable diseases and public health problem among developed and developing countries. The lack of knowledge and awareness on hypertension and poor adherence of medication are a major challenge to control hypertension and prevent its complications. Our study aimed to assess the knowledge, awareness of hypertension and adherence to medication among hypertensive patients attending the medical clinics of a tertiary care center, Eastern Province of Sri Lanka.

**Methods:** A descriptive cross-sectional study was conducted among hypertensive patients to assess knowledge, awareness of hypertension and adherence to medication in medical clinics in a tertiary care for 6 months duration. Data were collected by using pretested and validated Hypertension Facts Questionnaire. Their medication adherence and the reasons for nonadherence were studied using Medication Adherence Scale. Data were analyzed using SPSS (version 18) analytical package and the chi-square test was performed. The scoring system was used to categorize the level of knowledge and awareness of hypertension among patients.

**Results:** The majority of patients had moderate-to-high knowledge (101, 65.8%) about hypertension and had moderate-to-high awareness (111, 73.2%) on hypertension. Even though, 134 (87.6%) patients knew that they have hypertension, and 108 (70.6%) patients did not know their blood pressure value at the time of diagnosis. Most of the patients (90, 58.8%) had good drug adherence, and most of them (141, 92.1%) thought that taking medicine plays a key role to control their blood pressure. The main reasons for nonadherence of medication were forgetfulness (39, 32%) and expenses (46, 35.4%). The knowledge and awareness about hypertension among respondents were significantly associated with educational level ( $p < 0.05$ )

**Conclusion:** Most of the patients had adequate knowledge on the risk factors and complications of hypertension. But they were unaware about their disease status, and their diagnosis, target organ damage and recent blood pressure values. The drug adherence was reasonably adequate. The main reasons for nonadherence of medication were forgetfulness and expenses.

## Keywords

Hypertension, knowledge, awareness, drug adherence

Date received: 19 November 2020; accepted: 1 April 2021

## Introduction

Hypertension is one of the common non-communicable diseases in the world affecting most of the adult population. It is one of the major risk factors for stroke, coronary artery diseases and chronic kidney disease.<sup>1,2</sup> It is a global public health problem which is related to urbanization and socioeconomic changes favoring sedentary lifestyle.<sup>3</sup> The lack of knowledge and awareness on hypertension and poor adherence of medication among patients are a major challenge to control hypertension and prevent its complications. Patient education is

vital in programs and interventions to control hypertension. Efforts are targeted to increase public knowledge and awareness about the risks associated with uncontrolled blood pressure. Improved recognition of the importance of systolic

<sup>1</sup>Colombo South Teaching Hospital, Kalubowila, Sri Lanka

<sup>2</sup>Teaching Hospital, Batticaloa, Sri Lanka

### Corresponding author:

Selladurai Pirasath, Colombo South Teaching Hospital, Kalubowila, Ilavai North, Ilavai, Jaffna 40,000, Sri Lanka.  
Email: selladurairasath81@gmail.com



blood pressure is mandatory for medical professionals as one of the major public health and medical challenges in the prevention and treatment of hypertension.<sup>4</sup> Therefore, it is important to assess a patient's knowledge and awareness of hypertension. There were few previous studies conducted to assess the knowledge, awareness and attitudes of hypertension especially related to systolic blood pressure in a hypertensive population in Sri Lanka.<sup>5-7</sup> These studies showed that lack of knowledge and awareness on hypertension and poor adherence of medication among patients are a major challenge to control hypertension in Sri Lanka. Our study aimed to assess the knowledge, awareness of hypertension and adherence to medication among hypertensive patients attending the medical clinics of a tertiary care center, Eastern Province of Sri Lanka.

## Methods

### Study design

This was a descriptive cross-sectional study.

### Study area

The study area was medical outpatient clinics of a tertiary care center, Eastern Province of Sri Lanka.

### Study setting

The hypertensive patients attending the medical clinics of a tertiary care center, Eastern Province of Sri Lanka, were included in this study. The Teaching Hospital, Batticaloa, is the only tertiary care center in eastern Sri Lanka. Majority of the hypertensive patients from all over the Batticaloa attended the general medical clinics of Teaching Hospital, Batticaloa. Hence, we hope that the knowledge, awareness and adherence of the community will be represented in this study.

### Sampling size

A total of 153 patients were recruited from the medical outpatient clinics of a tertiary care center, Eastern Province of Sri Lanka.

### Sampling and recruitment procedure

The eligible respondents were selected by simple randomized technique. The purpose, risk and benefits of study were explained and their informed written consent was obtained. Patients who refused to give informed written consent were excluded. The blood pressure measurements were taken by medical officers on the day of interview, using a mercury sphygmomanometer, in a comfortable resting position, sitting with forearm supported and the palm upward. The target blood pressure of <130/80 mmHg for patients

with diabetes and chronic kidney disease and <140/90 mmHg for patients with non-diabetic and non-chronic kidney disease are considered safe.

### Sampling period

The study was conducted for a period of 6 months from 1 February to 31 July 2019.

### Inclusion and exclusion criteria

Patients above 18 years of age who are mentally competent, previously diagnosed as hypertensive by consultant physicians and attending medical clinics for 3 months or more to the Teaching Hospital, Batticaloa, were included. Patients who are pregnant and those who are unable to give consent were excluded in this study.

### Sample size determination

There were few previous studies conducted to assess the knowledge, awareness and attitudes of hypertension especially related to systolic blood pressure in a hypertensive population. According to previous studies and sample calculation formula, the final sample size was calculated. The sample size calculation formula is as follows:

$$N = \frac{Z^2 p (1 - p)}{d^2}$$

where N is the minimal sample size, Z is the critical value (1.96) of specified 95% confidence interval, P is the anticipated population proportion (0.5), and d is the absolute precision required on either side of the proportion (5%); a non-response rate of 5% is assumed. Thus, the final sample was 153.

### Development of questionnaire

Hypertension Fact Questionnaire was used to collect data which was designed as a tool, using the existing literature, practicing physicians and cardiologists to assess the knowledge and awareness among the hypertensive patients.<sup>5-7</sup> The questionnaire was initially designed in English and then translated to Sinhala and Tamil language. The questionnaire consists of 14 questions with different appropriate responses to assess the patients' knowledge and 12 questions with different appropriate responses to assess the patients' awareness on hypertension. A score of >10, 6-10 and <6 are considered as high, moderate and low level of knowledge and awareness, respectively.

### Medication Adherence Scale

Their medication adherence and the reasons for non-adherence were studied using Medication Adherence Scale.<sup>5-7</sup> This

questionnaire consists of several questions with “yes” or “no” responses and a set of open-ended questions for reasons for nonadherence. The score for the scale range within low (<6), medium (6 to <8) and high (8) adherence. Higher scores indicate poor adherence. All patients who answered yes for at least one question were considered as nonadherent.

### Pretest and validation of the questionnaire

A self-prepared, pretested and validated questionnaire was based on the pre-existing facts related to hypertension without copying originality and obtained content expert validation of facts consisting of two medical professors, two consultant physicians, one cardiologists, two senior registrars and one highly qualified English, Sinhala and Tamil teacher. It was pretested during the pilot study with patients. The questionnaire was initially designed in English and then translated to Sinhala and Tamil languages.

### Ethical consideration

Ethical approval was obtained from the Ethical Review Committee, Faculty of Health Sciences, Eastern University of Sri Lanka.

### Statistical analysis

The collected data were entered in a Microsoft Excel sheet and were analyzed using SPSS (version 18) analytical package, and the chi-square test was performed. The results were presented as counts, percentages, table of frequencies and mean  $\pm$  SD for continuous variables. The significance was declared at p-value less than 0.05 and presented using narrative texts and tables.

## Results

The basic sociodemographic details of the respondents are shown in Table 1. The total sample consisted of 153 hypertensive patients with a mean age of 60.78 years (SD  $\pm$  11.15) which includes 102 (66.7%) males and 51 (33.3%) female with a male-to-female ratio of 1:2. The majority of patients were Sri Lankan Tamil (55.9%) and Sri Lankan Muslim (45.1%). Most of them studied up to primary or ordinary level education (81.7%). Most are self-employed (61.4%). Furthermore, details of results analysis were shown in supplementary material.

### Knowledge about hypertension among respondents

The knowledge about hypertension among 153 patients with pretested and validated questionnaires and results is shown in Table 2. The score of knowledge and awareness is shown in Table 3. 65.8% of the patients had moderate-to-high

**Table 1.** Sociodemographic details of hypertensive patients (N = 153).

Factors	Types	n (%)
Age (years)	21–40	9 (5.9)
	41–60	56 (36.6)
	61–80	84 (54.9)
	>81	4 (2.6)
Sex	Male	51 (33.3)
	Female	102 (66.7)
Race	Sri Lankan Tamil	54 (35.1)
	Sri Lankan Muslim	99 (64.9)
Educational status	No schooling	6 (3.9)
	Primary level	41 (26.8)
	Ordinary level	84 (54.9)
	Advanced level	18 (11.8)
	Graduates	4 (2.6)
Occupation	Government officers	15 (9.8)
	Housewife	35 (22.9)
	Professionals	3 (2.0)
	Self-employee	94 (61.5)
	Unemployed	6 (3.9)
Alcoholism (mL/day)	Non-drinkers (0/occasional)	123 (80.4)
	Moderate (1–100 mL/day)	25 (16.3)
	Heavy (>100 mL/day)	5 (3.3)
Smoking (cigarettes/day)	Non-smokers (0/occasional)	125 (81.7)
	1–5 times	23 (15.0)
Monthly income	6–10 times	5 (3.3)
	High income (>Rs. 45,000)	9 (5.9)
Monthly income	Moderate income (Rs. 15,000–44,999)	64 (41.8)
	Low income (<Rs. 14,999)	64 (41.8)
	Depends on children	16 (10.5)

knowledge about hypertension. They did not know the normal values of blood pressure (53.6%) and cut-off values of hypertension (73.2%). Most patients (120, 78.4%) believed that medication alone is sufficient to control blood pressure. Most of the patients had adequate knowledge on the risk factors for developing hypertension. They believed that fatty diet (69.9%), salty diet (80.4%), obesity (70.6%), smoking (62.7%) and physical inactivity (71.6%) were important risk factors of hypertension.

### Awareness about hypertension among respondents

The patients were interviewed about the awareness of hypertension with pretested and validated questionnaires and the results are shown in Table 4. 73.2% of the patients had moderate-to-high awareness on hypertension. Even though, 87.6% of the patients knew the diagnosis of hypertension, 70.6% of patients did not know their values of blood pressure at the time of diagnosis and 65% of the patients who knew their last blood pressure value believe that their last measured blood pressure value was normal even though it was high.

**Table 2.** Knowledge of hypertension among respondents (N = 153).

Questions	Responses	No. of responses, n (%)
Normal values of blood pressure as 120/80 mmHg	Yes	71 (46.4)
	No	82 (53.6)
Blood pressure is more than 140/90 mmHg called as hypertension	Yes	41 (26.8)
	No	112 (73.2)
Hypertension can progress along with the age	Yes	72 (47.1)
	No	81 (53.0)
Both sex have equal chance of developing hypertension	Yes	63 (41.2)
	No	90 (58.8)
Hypertension is a treatable condition	Yes	129 (84.3)
	No	24 (15.7)
Risk developing of hypertension among positive family history	Yes	78 (51.0)
	No	75 (49.0)
Elderly people have greater risk of having hypertension	Yes	89 (58.2)
	No	64 (41.8)
Smoking is a risk factor for hypertension	Yes	96 (62.7)
	No	57 (37.3)
Eating fatty foods is a risk factor for hypertension	Yes	107 (69.9)
	No	46 (30.1)
Overweight is a risk factor for hypertension	Yes	108 (70.6)
	No	45 (29.4)
Regular physical exercise lowers the chance of developing hypertension	Yes	110 (71.9)
	No	43 (28.1)
More salt consumption increases blood pressure	Yes	123 (80.4)
	No	30 (19.6)
Medication is alone to control hypertension	Yes	120 (78.4)
	No	33 (21.6)
Hypertension can lead to life threatening condition	Yes	129 (84.3)
	No	24 (15.7)

**Table 3.** Score of knowledge, awareness, and drug adherence of hypertensive patients (N = 153).

Factors	Score type	n (%)
Patient' knowledge	High (>10)	60 (39.2)
	Moderate (6–10)	56 (36.6)
	Low (<6)	37 (24.2)
Patients' awareness	High (>10)	10 (6.5)
	Moderate (6–10)	102 (66.7)
	Low (<6)	41 (26.8)
Patients' drug adherence	High (>10)	0 (0)
	Moderate (6–10)	5 (3.3)
	Low (<6)	148 (96.7)

Similarly, 68% of the patients thought that their blood pressure control was adequate for the last 12 months, even though their blood pressure records showed suboptimal range of their blood pressure. 47.3% of the patients had awareness on target organ damage due to hypertension (kidney, 43.7%; heart, 45.2%; brain, 56.7%; eye, 43.8%). 68% of the patients were

**Table 4.** Awareness of hypertension among respondents (N = 153).

Questions	Responses	No. of responses, n (%)
Knowing about diagnosis of hypertension	Yes	134 (87.6)
	No	19 (12.4)
Knowing about blood pressure values at the time of diagnosis	Yes	45 (29.4)
	No	108 (70.6)
Knowing the target personal values of blood pressure	Yes	80 (52.3)
	No	73 (47.7)
Control of blood pressure reduces the complications	Yes	120 (78.4)
	No	33 (21.6)
Uncontrolled hypertension can lead to your organ damage	Yes	103 (67.3)
	No	50 (32.7)
Knowing blood pressure level at most recent visit	Yes	78 (51.)
	No	75 (49.0)
Perception of recent values of personal blood pressure	High	43 (28.1)
	Low	17 (11.1)
	Normal	75 (49.0)
	Don't know	18 (11.8)
Serious of a personal health concern about high blood pressure	Very serious	36 (23.5)
	Serious	104 (68.0)
	Not serious	13 (8.5)
Importance of taking medicine to keep blood pressure control	Very important	53 (34.6)
	Important	88 (57.5)
	Not important	12 (7.8)
Curable condition of high blood pressure	Yes	121 (79.1)
	No	32 (20.9)
Lifestyle modification help to lower blood pressure?	Yes	121 (79.1)
	No	32 (20.9)
Perception of good control of own blood pressure over the last 12 months	Yes	106 (69.3)
	No	47 (30.7)

concerned that the high blood pressure is a serious health issue. 92.1% of the patients thought that taking medicine plays a key role in controlling their blood pressure.

### Adherence and reasons for non-adherence

All the patients were interviewed about their drug adherence and reasons for noncompliance of treatment. The questionnaire consists of eight questions, of which seven are “yes” or “no” type questions and the eighth question is a multiple choice question. The results of drug adherence are shown in Table 5 and the reasons of non-adherence are shown in Table 6. The drug adherence among patients were reasonably adequate. However, a significant number of patients (43.5%) had poor drug adherence. The main reasons for poor compliances were forgetfulness (39, 32%) and financial limitations (46, 35.4%) (Table 6).

The knowledge and awareness about hypertension among respondents were significantly associated with educational level ( $p < 0.05$ ) (Table 7). The occupational status showed

**Table 5.** Drug adherence of medication among respondents (N = 153).

Questions	Response	No. of responses, n (%)
Forgetting sometimes to take your medication	Yes	61 (39.9)
	No	92 (60.1)
Forgetting to take medication over last 2 weeks	Yes	20 (12.5)
	No	133 (87.5)
Stopping medication own-self after feeling of discomfort with drugs/ adverse effects	Yes	18 (11.8)
	No	135 (88.2)
Forgetting to take medication while leaving out of home	Yes	30 (19.6)
	No	123 (80.4)
Taking medication yesterday	Yes	143 (93.5)
	No	10 (6.5)
Stopping drugs own-self with thinking good blood pressure control	Yes	18 (11.8)
	No	135 (88.2)
Feeling discomfort to take drugs daily	Yes	13 (8.5)
	No	140 (91.5)
The frequency of forgetting to take medication		
Rarely = 4	4	7 (4.6)
Once a while = 3	3	9 (5.9)
Sometimes = 2	2	54 (35.3)
Never = 1	1	83 (54.2)

**Table 6.** Reasons for non-adherence of drugs among respondents (N = 153).

Reasons for non-adherence of drugs	No. of respondents, n (%)
Expenses of drugs	46 (35.4)
Forgetfulness	39 (32.0)
Lack of reminders	22 (14.4)
Busy lifestyle	19 (12.4)
Side-effects of medicine	13 (8.5)
Drug out of supply	11 (7.2)
Interruptions of daily routine	11 (7.2)
Out of home/holidays	10 (6.5)
Misbelieves on medicine	7 (4.6)
Polypharmacy	6 (3.9)
Taking medication wrong time	5 (3.3)

no association with knowledge and awareness about hypertension among respondents ( $p > 0.05$ ) (Table 7).

## Discussion

The previous studies and our study showed similar findings that although patients had good knowledge of hypertension, control of blood pressure remained suboptimal.<sup>5,7-9</sup> Moreover, most patients were unaware about the normal values of blood pressure (53.6%) and the cut-off values of

hypertension (73.2%). Furthermore, a large-scale study in Australia in 1978 showed that a decreased level of knowledge and awareness with a long-term follow-up was 49% in 1978, 34% in 1993 and remained at 34% in 1998.<sup>10</sup> Therefore, we think that a patient's awareness toward hypertension had a significant positive impact on blood pressure control rather than knowledge. 65% of the patients who knew the values of blood pressure at the time of last visit thought wrongly that their blood pressure control was adequate. Similarly, 68% of the patients thought wrongly that their blood pressure control was adequate in last 12 months, even though their blood pressure records showed a suboptimal range of their blood pressure.

The results were highlighted in a previous study conducted in Northern Sri Lanka in 2017 which showed that 40.5% of the patients were unaware of hypertensive status.<sup>5</sup> Furthermore, another study among 424 patients in Eastern Sri Lanka showed that 92% of people had inadequate knowledge on hypertension, its complications and management strategies of hypertension which is in contrast to our findings.<sup>6</sup> Another study among 324 patients in the Western Province of Sri Lanka in 2020 showed findings similar to our study.<sup>7</sup> Another study among 525 hypertensive patients in three different healthcare systems over 1-year period showed a significant association between blood pressure control and knowledge about normal blood pressure.<sup>11</sup>

However, our study showed that knowledge about risk factors for the development of hypertension was adequate which was consistent with the results of the previous studies.<sup>12,13</sup> They believed that fatty diet (69.9%), salty diet (80.4%), obesity (70.6%), smoking (62.7%) and physical inactivity (71.6%) were important risk factors in hypertension.

Furthermore, knowledge related to systolic blood pressure is a strong independent risk factor for cardiovascular morbidity and mortality.<sup>14,15</sup> Recently, lack of knowledge about systolic blood pressure level was an independent predictor of poor blood pressure control.<sup>11</sup> Therefore, assessment of awareness is important in controlling the hypertension. Most importantly, few patients could recall their blood pressure values at the time of diagnosis (29.4%) and were aware of their target values of blood pressure (52.3%) and could recall the blood pressure values of their last visit (51%). Patients thought that physicians did not emphasize the significance of blood pressure at the clinics. These results strongly suggest that the education of patients by healthcare professionals at the clinics is a major role to increase the knowledge and awareness of hypertension among patients. A recent study from Canada showed a positive impact of blood pressure tracker and a patient's education on the knowledge of hypertension at clinic visits.<sup>16</sup> Furthermore, another study showed improvement in blood pressure control and drug adherence while patients were educated to measure their own blood pressure and chart it along with their drug-taking schedule as well.<sup>17</sup>

**Table 7.** Association between knowledge, awareness, and educational and occupational status of respondents (N = 153).

Knowledge	Educational level (%)					Total (%)	p-value
	Primary level	Ordinary level	Advanced level	Graduate level	No schooling		
High	3.3	23.5	9.8	2.0	0.7	39.2	0.0001
Moderate	9.2	22.9	2.0	0.7	2.0	36.6	
Low	14.4	8.5	0.0	0.0	1.3	24.2	
Total	26.8	54.9	11.8	2.6	3.9	100.0	

Knowledge	Occupational status (%)					Total (%)	p-value
	Self-employed	Housewife	Officers	Unemployed	Professionals		
High	23.6	7.8	5.9	2.0	0.0	39.2	0.750
Moderate	22.2	8.5	3.3	1.3	1.3	36.6	
Low	15.7	6.5	0.7	0.7	0.7	24.2	
Total	61.5	22.9	9.8	3.9	2.0	100.0	

Awareness	Education level (%)					Total (%)	p-value
	Primary level	Ordinary level	Advanced level	Graduate level	No schooling		
High	0.0	3.9	1.3	1.3	0.0	6.5	0.0001
Moderate	15.7	37.9	10.5	1.3	1.3	66.7	
Low	11.1	13.1	0.0	0.0	2.6	26.8	
Total	26.8	54.9	11.8	2.6	3.9	100.0	

Awareness	Occupational status (%)					Total (%)	p-value
	Self-employed	Housewife	Officers	Unemployed	Professionals		
High	2.6	1.3	2.0	0.7	0.0	6.5	0.166
Moderate	40.5	15.0	7.8	2.6	0.7	66.7	
Low	18.3	6.5	0.0	0.7	1.3	26.8	
Total	61.5	22.9	9.8	3.9	2.0	100.0	

Chi-square test was used for significance and association.

Pharmacological treatment has been shown to be effective in decreasing blood pressure and cardiovascular events. Furthermore, polypharmacy and poor compliance are major challenges in clinical practices that result in the failure of treatment of hypertension.<sup>18</sup> Therefore, patients may forget to take their medicine or feel that there is no need to take them until they know the need to take drugs regularly for a long time as hypertension is mostly a chronic asymptomatic condition. Our study showed that 91.5% of the patients believe that hypertension is a serious medical issue and 91.3% thought taking their medication is important to control their blood pressure. Furthermore, our research showed various reasons for poor adherence of medication. Among them, forgetfulness and financial restrictions were the main reasons for nonadherence of their medication. Some of them preferred traditional medicines and have not taken due to religious misbeliefs. An article which reviewed adherence to

cardiovascular medications from 76 studies showed same findings.<sup>19</sup> Furthermore, poor knowledge, negative perception on medication, side-effects and lack of availability of drugs were also some of the reasons reported in our study. Moreover, drug adherence could be improved by enhancing the access to drugs by sustainable financing, affordable prices and reliable supply system.

Lifestyle measures are vital to control blood pressure and reduce the need for medications in hypertensive treatment which includes reduced alcohol intake, reduced sodium chloride intake, increased physical activity and control of overweight. Our results showed that most patients had sedentary lifestyle and habits of alcoholism and smoking. Although most of the patients were aware of the risk factors of hypertension in our study, practicing lifestyle modification was minimal among them. These findings also point out the importance of health education about lifestyle modification to

control blood pressure. Therefore, individualized evaluation of health behaviors and sustained behavioral changes are crucial role to reduce blood pressure among patients.<sup>20</sup> The models for behavior change, and the importance of evaluating the perceptions, attitudes, beliefs and outcome expectations of individuals are the crucial measures to understand and guide therapies.

According to Farquhar's theory, our study showed that most of the patients had lack of interest to change, even though they had sufficient knowledge and awareness of hypertension.<sup>21</sup> Similar findings were observed in several studies. Furthermore, most of the patients thought that their behavior and awareness were enough related to hypertensive control. They were not interested in behavioral changes in hypertension during conversation with them in future. We had an opportunity to educate and motivate to change the attitude on hypertension at the end of the study. Healthcare professionals can play a key role to educate patients to improve their attitude toward hypertension and its control. Control of systolic blood pressure and improved drug adherence should be achieved through an educational program. The individualized educational program should be implemented to increase the awareness of disease status, appropriate blood pressure levels and adherence of treatment to improve the outcome.

## Limitation

We have carried out a small-scale, simple, randomized study to assess the knowledge, awareness and medication adherence in a single tertiary care center of Eastern Sri Lanka. We have not conducted the study following the educational interventions. Therefore, large-scale, multi-centered systemic randomized studies should be carried out to strengthen our results and to assess participants' perceptual level following interventions.

## Conclusion

Our study revealed that patients of a tertiary care hospital in Eastern Sri Lanka had acceptable general knowledge of hypertension but they were unaware about their disease status and their diagnosis, target and recent blood pressure values, and about their target organ damage. Most of patients had adequate knowledge on risk factors for developing hypertension and complications of hypertension. There was significant correlation between educational status and knowledge of the respondents. Most of the patients had reasonable good medication adherence. The forgetfulness and cost of drugs were common reasons for non-adherence among patients. It is important to address on the knowledge and awareness to control hypertension among respondents to improve the control of blood pressure and to increase drug adherence at clinical settings. Moreover, an effective individualized health education program should be carried out

by healthcare professionals to improve the awareness and knowledge on hypertension.

## Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Ethical approval

Ethical approval was obtained from the Ethical Review Committee, Faculty of Health Sciences, Eastern University of Sri Lanka (approval no. EUSL/FHCS/ERC/E/2018/71).


## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## Informed consent

Written informed consent was obtained from the all patients for their anonymized information to be published in this article.

## ORCID iD

Selladurai Pirasath  <https://orcid.org/0000-0002-4274-4919>

## Supplemental material

Supplemental material for this article is available online.

## References

1. Ezzati M, Lopez AD, Rodgers A, et al. Selected major risk factors and global and regional burden of disease. *Lancet* 2002; 360: 1347–1360.
2. Omoleke SA. Chronic non-communicable disease as a new epidemic in Africa: focus on The Gambia. *Pan Afr Med J* 2013; 14: 87.
3. Chobanian AV, Bakris GL, Black HR, et al. The seventh report of the joint national committee on prevention detection, evaluation, and treatment of high blood pressure: the JNC 7 Report. *JAMA* 2003; 289: 2560–2572.
4. Boutayeb A and Boutayeb S. The burden of non-communicable diseases in developing countries. *Int J Equity Health* 2005; 4: 2.
5. Pirasath S, Kumanan T and Guruparan M. A Study on knowledge, awareness, and medication adherence in patients with hypertension from a tertiary care centre from Northern Sri Lanka. *Int J Hypertens* 2017; 2017: 9656450.
6. Kisokanth G, Ilankoon I, Arulananthem K, et al. Assessment of knowledge on hypertension, its consequences and management practices among hypertensive patients—a descriptive study. *J Postgrad Ins Med* 2016; 3: 301–311.
7. Pirasath S, Sugathapala AGH and Wanigasuriya K. Descriptive cross-sectional study on knowledge, awareness, and adherence to medication among hypertensive patients at a tertiary care centre in Colombo District, Sri Lanka. *Int J Hypertens* 2020; 2020: 1320109.
8. Viera AJ, Cohen LW, Mitchell CM, et al. High blood pressure knowledge among primary care patients with known hypertension: a North Carolina family medicine research network (NC-FM-RN) study. *J Am Board Fam Med* 2008; 21(4): 300–308.

9. Muntner P, Anderson A, Charleston J, et al. Hypertension awareness, treatment, and control in adults with CKD: results from the chronic renal insufficiency cohort (CRIC) study. *Am J Kidney Dis* 2010; 55(3): 441–451.
10. Schmeiser-Rieder A and Kunze U. Blood pressure awareness in Austria. A 20-year evaluation. *Europ Heart J* 2000; 21(5): 414–420.
11. Knight EL, Bohn RL, Wang PS, et al. Predictors of uncontrolled hypertension in ambulatory patients. *Hypertension* 2001; 38(4): 809–814.
12. Mahajan H, Kazi Y, Sharma B, et al. Assessment of KAP, risk factors and associated co-morbidities in hypertensive patients. *IOSR J Dent Med Sci* 2012; 1: 6–14.
13. Rampal L, Rampal S, Azhar MZ, et al. Prevalence, awareness, treatment and control of hypertension in Malaysia: a national study of 16,440 subjects. *Public Health* 2008; 122(1): 11–18.
14. Izzo JL Jr, Levy D and Black HR. Importance of systolic blood pressure in older Americans. *Hypertension* 2000; 35(5): 1021–1024.
15. Degli Esposti E, Di Martino M, Sturani A, et al. Risk factors for uncontrolled hypertension in Italy. *J Human Hypertension* 2004; 18(3): 207–213.
16. Bowry ADK, Shrank WH, Lee JL, et al. A systematic review of adherence to cardiovascular medications in resource-limited settings. *J Gen Intern Med* 2011; 26(12): 1479–1491.
17. Dawes MG, Kaczorowski J, Swanson G, et al. The effect of a patient education booklet and BP “tracker” on knowledge about hypertension: a randomized controlled trial. *Fam Pract* 2010; 27(5): 472–478.
18. Alefan Q, Ibrahim MIM, Razak TA, et al. Cost of treating hypertension in Malaysia. *Asian J Pharm Clin Res* 2009; 2: 1–5.
19. Pound P, Britten N, Morgan M, et al. Resisting medicines: a synthesis of qualitative studies of medicine taking. *Social Sci Med* 2005; 61: 133–155.
20. Sabouhi F, Babae S, Naji H, et al. Knowledge, awareness, attitudes and practice about hypertension in hypertensive patients referring to public health care centers in Khor & Biabanak. *Iran J Nurs Midwifery Res* 2011; 16: 34–40.
21. Farquhar JW, Maccoby N and Wood PD. Education and communication studies. In: Holland WW, Detels R and Knox G (eds) *Oxford textbook of public health*. Oxford: Oxford University Press, 1985, pp. 207–221.