Brief Report

Citation: Nandasena, H.M.R.K.G., Prasanga, P.T.S. and Witharana, K.S., 2020. Socio-Demographics, Clinical Characteristics and the Status of Blood Pressure Control Among Hypertensive Patients Attending to a Medical Clinic of a Primary Care Level Hospital in Sri Lanka. Sri Lanka Journal of Medicine, 29(2), pp 58-64 DOI: <http://doi.org/10.4038/sljm.v29i2.225>

Socio-Demographics, Clinical Characteristics and the Status of Blood Pressure Control Among Hypertensive Patients Attending to a Medical Clinic of a Primary Care Level Hospital in Sri Lanka

H. M. R. K. G. Nandasena¹, P. T. S. Prasanga² and K. S. Witharana²

¹Department of Nursing, Faculty of Allied Health Sciences, University of Peradeniya, Sri Lanka.

²Divisional Hospital (C), Ganthuna, Kegalle, Sri Lanka.

Correspondence: H. M. R. K. G. Nandasena
Lecturer, Department of Nursing,
Faculty of Allied Health Sciences,
University of Peradeniya, Sri Lanka
Email: renu88kalahari@gmail.com
<https://orcid.org/0000-0003-3240-3472>

Abstract

Background: Hypertension is a major public health challenge in the world. It is an important predictor of cardiovascular disease, cerebrovascular accidents and death.

Objectives: To describe the socio-demographic characteristics, clinical characteristics and status of blood pressure control among hypertensive patients attending a medical clinic of a primary care hospital in Sri Lanka

Methods: A descriptive cross-sectional study was conducted among hypertensive patients followed up at the medical clinic in Divisional Hospital Ganthuna, Kegalle, Sri Lanka. An interviewer administered questionnaire was used to collect data on socio demographic, disease related and treatment related characteristics. Weight, height and blood pressure were measured. Data was entered and analyzed using SPSS and findings were presented using descriptive statistics.

Results: Among 173 hypertensive patients (rate of participation 92.5%) the majority were females (73.4%). Mean age of the participants was 64 years (SD = 10.8) and 61.8% of them were in the 58 to 77-year age group. More than three fourths of the hypertensive patients of this group (76.9%) had dyslipidaemia and 16.8% were diagnosed to have diabetes mellitus. Of all participants, 83.1% were on two or more antihypertensive drugs per day. Seventy eight percent of the participants had achieved the target blood pressure.

Conclusion: Majority of the hypertensive patients had targeted blood pressure. The most frequently reported co-morbidity was dyslipidaemia followed by diabetes mellitus. Multi centric analytical studies with adequate numbers of patients are needed to explore the factors related to blood pressure control among hypertensive patients.

Keywords: Hypertension, Blood pressure control, Primary care hospital.

INTRODUCTION

Hypertension, also known as raised or high blood pressure is considered as an important independent predictor of cardiovascular disease, cerebrovascular accidents and death [1]. It doubles the risk of coronary heart disease, congestive heart failure, ischemic and hemorrhagic stroke, renal failure and

peripheral arterial disease [2]. World Health Organization (WHO) estimated 7.5 million deaths occur globally every year due to high blood pressure [3]. Studies have found that the number of people living with hypertension worldwide will escalate to more than 1.56 billion by the year 2025 [1]. Nearly two-thirds of hypertensive patients live in low- and middle-income countries and this has caused a huge

economic burden especially in low and middle income countries [3].

According to data published by WHO in 2018 deaths due to hypertension account for 1.55% of total deaths in Sri Lanka [4]. A study done in 2013 found that nearly one-third of the Sri Lankan adult population is hypertensive [5]. In developed countries, an enormous effort has been made to investigate the factors affecting blood pressure control among hypertensive patients and adherence to their antihypertensive medications. It helps to reduce risk factors for hypertension, provide optimum management, prevent complications and improve clinical outcomes. Therefore, identifying the status of blood pressure control, socio-demographic and clinical characteristics among hypertensive patients is an important step of enhancing the understanding on hypertension management in a clinical setting. The extensive literature search revealed that despite the alarming increase in the prevalence of hypertension in Sri Lanka, studies on the status of blood pressure control among patients with hypertension attending medical clinics at primary level hospitals in Sri Lanka has not been reported or published [6].

Providing a continuum of care has become a major challenge with the increased burden of non-communicable diseases [7]. Poor blood pressure control is a strong predictor of cardiovascular diseases [8]. Furthermore, cardiovascular disease case fatality rates have shown to be higher in rural than urban areas [5]. This fact emphasizes the importance of primary care level services in controlling hypertension in Sri Lanka as most of the population resides in rural areas. The health care delivery units closest to rural homes are primary care hospitals, and these play a major role in providing universal health coverage in Sri Lanka [9]. Therefore, this study was aimed to describe the socio-demographic characteristics, clinical characteristics and the status of blood pressure control among hypertensive patients who were followed up in a primary care hospital.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted at the medical clinic of Divisional Hospital Ganthuna in Sri Lanka, which is a type C divisional hospital providing services to a rural population in Kegalle district. The study population was hypertensive patients followed up at the medical clinic in Divisional Hospital Ganthuna. All hypertensive patients aged 18

or more and who were on anti-hypertensive therapy for at least 6 months were included in the study. Pregnant women, patients with major psychiatric illness or any severe illness that makes it difficult to follow the instructions were excluded from the study. All eligible patients were recruited into the study and the data collection was conducted over a period of one month to capture all clinic patients who were coming to the hospital for monthly visits.

An interviewer administered, judgmentally validated questionnaire was used to collect data which consisted of four sections. Section one was on the socio demographic data (age, gender, marital status, educational level, occupation) of the participants. Section two consisted of disease related characteristics including duration of hypertension diagnosis, other co-morbidities (diabetes mellitus, dyslipidaemia, asthma), complications (ischemic heart disease, cerebrovascular accidents, chronic kidney disease) and risk factors (high salt intake, smoking, physical activity). Data on co-morbidities and complications of hypertension were extracted from the past medical records of the patients. Knowledge on high salt intake and the frequency of smoking were inquired into. Level of physical activity of the patients was assessed according to the WHO: Global strategy on diet, physical activity and health [10]. Those who have achieved the recommended level of physical activity were categorized as physically active whereas others were categorised as physically inactive.

Treatment related characteristics like type of anti-hypertensive medication, status of clinic attendance and drug adherence were included in section three. Blood pressure, weight and height of the participants were documented in section four. Training and practical guide issued by the WHO STEP surveillance was used to measure blood pressure, weight and height [11].

Measurement of blood pressure: Blood pressure was measured after completing the questionnaire. Resting blood pressure was recorded using a calibrated sphygmomanometer. The patient was asked to sit quietly and rest for 15 minutes with legs uncrossed. Right arm was kept at an angle of 45 degrees on a table with palm up. The elbow was supported during the measurements. A cuff of appropriate size was wrapped firmly around the arm and three blood pressure measurements were taken. The mean of the second and third readings were calculated [11]. If the patient was younger than 60 years target blood pressure was defined as an average systolic blood pressure (SBP) < 140 and diastolic

blood pressure (DBP) < 90 mmHg and if the patient was older than 60 years average SBP < 150 and DBP < 90mmHg [12,13].

Measurement of height: Height was taken to the nearest cm in standing position with shoes off, feet together, heels against the backboard and knees straight. Patient was asked to look straight ahead and not tilt his/her head up [11].

Measurement of weight: Weight was measured using an electronic weighing scale to the nearest kilogram. The patient was asked to remove all excess clothing and made to stand upright on the scale, bare footed with face forward, arms on the side and wait until asked to step off [11].

Calculation of Body Mass Index (BMI): Body Mass Index (BMI) was calculated as weight in kilograms divided by height in meters square. WHO recommendations were used to categorize the BMI of the participants [14].

The data collection was carried out by the authors themselves with the permission of Medical officer in charge of the hospital. Ethical clearance for the study was obtained from the Ethical Review Committee, Faculty of Allied Health Sciences in University of Peradeniya.

Data analysis was done using SPSS version 22. Descriptive statistics were used to present data in text and tables.

RESULTS

Socio-Demographic characteristics

A total of 187 patients with hypertension were registered for the treatment at the Ganthuna Divisional Hospital medical clinic at the time of the study, representing the study population. Of the total study population, 173 participated in the study, giving a participation rate of 92.5%. Majority of them were females (73.4%). The age range of the study sample was 29-93 years with a mean age of 64 years (SD = 10.8). A little over sixty percent of the participants belonged to the 58 to 77year age group (Table 1).

Disease related characteristics and the presence of risk factors related to hypertension

Only 12.7% (n=22) of this study sample had less than a one-year history of hypertension whereas all others had been diagnosed with hypertension for more than

one year at the time of the study. Among them 37.6% (n=65) had a 1 to 5 year history of hypertension, 26.6% (n=46) had a 5 to 10 year history of hypertension and 23.1% (n=40) had a more than 10 year history of hypertension.

Approximately three fourths of the hypertensive patients of this cohort had dyslipidemia (n=133, 76.9%) while 29 (16.8%) and 12 (6.9%) were diagnosed to have diabetes mellitus and asthma, respectively. When considering the complications of hypertension, seventeen (9.8%) had a past history of ischemic heart disease, four (2.3%) had a past history of cerebrovascular accident and two were on treatment for heart failure (1.2%). Among the patients who had hypertension for five or more years (n=86, 49.7%), sixteen (18.6%) had at least one of the above-mentioned complications. This figure was only six (6.9%) among the patients who had a less than five year history of hypertension.

Among the participants, 50 (28.9%) were not aware that high salt intake is a risk factor for high blood pressure. The level of engaging in physical activity was not up to the WHO recommendations among 144 (83.3%) patients. Out of them 69 (39.9%) were not engaged in any kind of exercise and the majority (n=46, 66.7%) of them were adults aged more than 65 years.

Treatment related characteristics

Of all participants, 31 (17.9%) were on three or more antihypertensives per day while 73 (43.2%) were on two drugs and 69 (39.9%) were on single drug therapy. Angiotensin receptor blockers were the most used antihypertensives (n=124, 39.4%) to control blood pressure. The majority of them 148 (85.5%) had attended the follow-up clinic continuously during the last three months. Furthermore 138 (79.8%) of them reported that they had taken their previous dose of antihypertensive medications at the time of data collection (Table 2).

Medical examination (BMI and Blood pressure)

Mean BMI of the participants was 23.4 kgm⁻² (SD= 4.4). More than half of the hypertensive patients were overweight (23–24.9 kg/m²) (n=44, 25.4%) or obese (≥25 kg/m²) (n=54, 31.2%). Another 20 (11.6%) were underweight (<18.5 kg/m²) and only 55 (31.8%) had normal BMI (18.5–22.9 kg/m²).

Table 1: Socio-Demographic characteristics of the hypertensive patients (n=173)

Variable	Number	Percentage (%)
Age (Years)		
18-37	1	0.6
38-57	51	29.5
58-77	107	61.8
78-97	14	8.1
Sex		
Male	46	26.6
Female	127	73.4
Marital Status		
Married	124	71.7
Unmarried	16	9.2
Divorced	2	1.2
Widowed	31	17.9
Education Level		
Not attending to school	22	12.7
Up to grade 5	69	39.9
Up to O/L	54	31.2
Up to A/L	24	13.9
Higher education	4	2.3
Occupation		
Unemployed	117	67.6
Self-employed	33	19.1
Employed	3	1.7
Retired	4	2.3

There were 15 (21.7%) patients age < 60 years with raised blood pressure more than 140/90 mmHg. Their mean SBP was 149.3 mmHg (SD=10.9) and mean DBP was 92.7 mmHg (SD=4.6). Among the patients age > 60 years, 23 (22.1%) had blood pressure over 150/95 mmHg. Their mean SBP and mean DBP were 152.6 mmHg (SD=10.1) and 91.7 mmHg (SD=3.9).

Majority of the participants 143 (82.7%) had achieved the target of SBP control and 165 (95.4%) had achieved the target of DBP control (Table 3).

DISCUSSION

A total of 173 patients with known hypertension participated in this study giving a participation rate of 92.5%. This indicates that the results are applicable to the hypertensive patients attending the Ganthuna medical clinic in general. Mean age of the participants was 64 years with 61.8% of them aged between 58-77 years. Similarly, studies have found an increasing trend of the prevalence of hypertension with the advancement of age and three among four elders aged 70 years or more have hypertension. Furthermore it was estimated that more than half of the hypertensive patients belonged to the 60 to 69 year age

Table 2: Treatment related characteristics of the hypertensive patients (n=173)

Variable	Number	Percentage (%)
Type of Drug		
Thiazide	66	21
ACE Inhibitors*	31	9.8
ARB†	124	39.4
CCB Dihydropyridine‡	58	18.4
CCB Non Dihydropyridine‡	8	2.5
Beta Blockers	13	4.1
Aldosterone Antagonist	3	1.0
Alpha Blockers	5	1.6
Other drugs	7	2.2
Number of drugs		
1 drug	69	39.9
2 drugs	73	43.2
≥3 drugs	31	17.9
Clinic attendance in last 3 months		
1	5	2.9
2	20	11.6
3	148	85.5
Drug adherence		
Did you take all your medicine yesterday?		
Yes	138	79.8
No	35	20.2
Do you sometimes forget to take your pills?		
Yes	76	43.9
No	97	56.1
Do you sometimes stop taking your medicine when you feel better?		
Yes	14	8.1
No	159	91.9
Without telling your doctor, have you ever reduce the drug frequency or dose?		
Yes	24	13.9
No	149	86.1

(*Angiotensin Converting Enzyme, †Angiotensin Receptor Blockers, ‡Calcium Channel Blockers)

group[15,16]. Findings of the present study also support the above-mentioned fact as majority of the participants in this study were in 58 to 77-year age group. Moreover majority of the participants in this study were female (73.4%) which may be due to the higher prevalence of hypertension among females than males after the age of 60 years [5,17–19]. More than half of the participants (67.6%) were unemployed which could be because of the higher proportion of females and of older age in this group.

Findings of a study done in Saudi Arabia showed that the most common comorbidities among hypertensive patients were diabetes mellitus, dyslipidaemia, bronchial asthma and renal

diseases[16]. Similar to that 16.8% of the respondents had diabetes mellitus, 76.9% had dyslipidaemia, 9.8% had ischemic heart diseases and 6.9% had asthma in the present study. Majority of the participants who had more than a 5-year history of hypertension presented at least a single comorbidity. These findings were in line with other studies done in Nigeria, China and Korea as well [20–22].

Controlling blood pressure in people with hypertension is a major public health challenge in many developing countries including Sri Lanka [23]. Proper use of antihypertensive medications along with lifestyle modifications are hallmarks of hypertension management. A study done in the United States (US)

Table 3: Status of blood pressure control among hypertensive patients according to their age (n=173)

Variable	BP (mmHg)	< 60 years (n=69)	> 60 years (n=104)	Total (n= 173)
Normal BP	Systolic	60(87.0%)	83(79.8%)	143(82.7%)
	Diastolic	65(94.2%)	100(96.2%)	165(95.4%)
Raised BP	Systolic	9(13.0%)	21(20.2%)	30(17.3%)
	Diastolic	4(5.8%)	4(3.8%)	8 (4.6%)

among adults with hypertension showed that antihypertensive medication use had significantly increased over the past 10 years. Furthermore it described that combination therapy could facilitate achievement of blood pressure goals in comparison with single antihypertensive drug therapy [24]. Similar to that more than half of the participants (61.1%) in this study were using more than 2 or more drugs to control their blood pressure.

The present study found that 135(78%) participants had achieved optimal blood pressure. This finding was in contrast with most of the studies done in many other developing countries [25–27]. This difference may be due to 79.8% of them having reported that they had taken their previous dose of antihypertensive medications at the time of data collection. Another possible explanation is proper follow up at the monthly clinic. Around 85% of them had attended the monthly follow up clinic consecutively during last 3 months. Nevertheless 22% of the hypertensive patients following up in this clinic did not achieve the recommended blood pressure.

However, limitations present in this study should be considered before drawing conclusions from this study. Although the study was conducted in a well-defined homogenous population with a high participation rate, causality for the identified risk factors of hypertension could not be explained since across-sectional study design was applied. The present study was conducted in one primary health care hospital in Sri Lanka. Moreover, all the participants were primary hypertensive patients. Therefore, the generalizability of the study findings is very limited. However, the objective measurement of blood pressure at the time of visit indicates that the majority of patients had achieved the recommended BP level and appeared to be compliant with medication.

CONCLUSION/RECOMMENDATION

Majority of the hypertensive patients in this cohort had achieved target blood pressure. Overweight or obese and physical inactivity were common risk factors among the participants. The most frequently reported comorbidity was dyslipidaemia followed by diabetes mellitus and ischemic heart disease. Many of them were on multi drug therapy and their routine participation for clinic follow up was satisfactory. Furthermore, the study highlighted the areas where interventions are possible through education on salt intake, exercise and weight control. Therefore, multi centric analytical studies with adequate numbers of patients are needed to explore the factors related to blood pressure control among hypertensive patients.

Author declarations

Acknowledgements

All the participants who participated in the study are acknowledged.

Author contributions

HMRKGN and PTSP collected and analysed data and wrote the research paper. KSW participated in data collection.

Funding sources

This study was self-funded by the authors.

Availability of data and materials

Data will be available from corresponding author on request

Ethics approval and consent to participate

Ethical clearance was obtained from the Ethics Review Committee of the Faculty of Allied Health Sciences, University of Peradeniya. Informed written consent was taken prior to data collection from each participant.

Competing interests

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

REFERENCES

- WHO | Hypertension [Internet]. WHO. World Health Organization; 2017 [cited 2018 Dec 15]. Available from: <https://www.who.int/topics/hypertension/en/>
- World Health Organization [Internet]. Cardiovascular disease. World Health Organization; 2011 [cited 2019 May 1]. Available from: https://www.who.int/cardiovascular_diseases/about_cvd/en/
- WHO | Raised blood pressure [Internet]. WHO. World Health Organization; 2015 [cited 2018 Dec 15]. Available from: https://www.who.int/gho/ncd/risk_factors/blood_pressure_prevalence_text/en/
- World Health Rankings [Internet]. Hypertension in Sri Lanka. [cited 2020 Jan 17]. Available from: <https://www.worldlifeexpectancy.com/sri-lanka-hypertension>
- Katulanda P, Ranasinghe P, Jayawardena R, Constantine GR, Rezvi Sherif MH, Matthews DR. The prevalence, predictors and associations of hypertension in Sri Lanka: a cross-sectional population based national survey. Clin Exp Hypertens [Internet]. 2014 Nov 16 [cited 2019 Jun 23];36(7):484–91. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24433043>
- World Health Organization. Status, determinants and interventions on cardiovascular disease & diabetes in Sri Lanka: desk review of research 2000-2018. World Health Organization. Regional Office for South-East Asia; 2019.
- Kassa M, Grace J. The Global Burden and Perspectives on Non-Communicable Diseases (NCDs) and the Prevention, Data Availability and Systems Approach of NCDs in Low-resource Countries. In: Public Health in Developing Countries-Challenges and Opportunities. IntechOpen; 2019.
- Antonakoudis G, Poulimenos I, Kifnidis K, Zouras C, Antonakoudis H. Blood pressure control and cardiovascular risk reduction. Hippokratia. 2007;11(3):114.
- Policy Analysis and Development Unit Ministry of Health. National Strategic Framework For Development of Health Services 2016 -2025 [Internet]. 2016. Available from: https://extranet.who.int/countryplanningcycles/sites/default/files/planning_cycle_repository/sri_lanka/national_strategic_framework.pdf
- World Health Organization. No Title [Internet]. Global Strategy on Diet, Physical Activity and Health - 2004. 2004. Available from: <https://www.who.int/ncds/prevention/global-strategy-diet-physical-activity-2004-goals/en/>
- World Health Organization. Training & Practical Guides. In: WHO STEPS Manual [Internet]. 2017. Available from: https://www.who.int/ncds/surveillance/steps/Section_4_Step_2_Physical_Measurements.pdf
- Ceylon College of Physicians. Hypertension management guideline [Internet]. 2016. Available from: <http://shri.lk/wp-content/uploads/2019/03/FINAL-CCP-Hypertension-Guideline-26-July-2016.pdf>
- Unger T, Borghi C, Charchar F, Khan NA, Poulter NR, Prabhakaran D, et al. 2020 International Society of Hypertension global hypertension practice guidelines. Hypertension. 2020;75(6):1334–57.
- Nishida C. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies [Internet]. Vol. 363, Lancet. 2004 [cited 2019 Apr 30]. Available from: www.thelancet.com
- Burt VL, Whelton P, Roccella EJ, Brown C, Cutler JA, Higgins M, et al. Prevalence of Hypertension in the US Adult Population. Hypertension [Internet]. 1995 Mar [cited 2019 Jun 23];25(3):305–13. Available from: <https://www.ahajournals.org/doi/10.1161/01.HYP.25.3.305>
- Anderson GH. Effect of age on hypertension: analysis of over 4,800 referred hypertensive patients. Saudi J Kidney Dis Transpl [Internet]. 1999 [cited 2019 Jun 22];10(3):286–97. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/18212439>
- Ahmed N, Rahman M, Islam M. Socio-demographic, Clinical Characteristics and Status of Hypertension Control among Rural Hypertensive Patients. Faridpur Med ... [Internet]. 2011;6(1):5–9. Available from: <http://www.banglajol.info/bd/index.php/FMCJ/article/view/7402>
- Choi HM, Kim HC, Kang DR. Sex differences in hypertension prevalence and control: Analysis of the 2010-2014 Korea National Health and Nutrition Examination Survey. PLoS One [Internet]. 2017 [cited 2019 Jun 23];12(5). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5444798/>
- Wijewardene K, Mohideen M, Mendis S, Fernando D, Kulathilaka T, Weerasekara D, et al. Prevalence of hypertension, diabetes and obesity: baseline findings of a population based survey in four provinces in Sri Lanka. Ceylon Med J [Internet]. 2010 Feb 3 [cited 2019 Jun 23];50(2):62. Available from: <https://cmj.sljol.info/article/10.4038/cmj.v50i2.1571/>
- Pharmaceu Sci GJ, Peter OA, Joshua EF, Daughter OA, Nelson EC. Co-Morbidities of Patients with Hypertension Admitted to Amassoma General Hospital, Bayelsa State South-South of Nigeria. 2017 [cited 2019 Jun 23];2. Available from: <https://juniperpublishers.com/gjpps/pdf/GJPPS.MS.ID.555594.pdf>
- Wang J, Ma JJ, Liu J, Zeng DD, Song C, Cao Z. Prevalence and Risk Factors of Comorbidities among Hypertensive Patients in China. Int J Med Sci [Internet]. 2017 [cited 2019 Jun 23];14(3):201–12. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28367080>
- Noh J, Kim HC, Shin A, Yeom H, Jang S-Y, Lee JH, et al. Prevalence of Comorbidity among People with Hypertension: The Korea National Health and Nutrition Examination Survey 2007-2013. Korean Circ J [Internet]. 2016 Sep [cited 2019 Jun 23];46(5):672–80. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27721859>

23. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. *Lancet*. 2005;365(9455):217–23.
24. Gu Q, Burt VL, Dillon CF, Yoon S. Trends in Antihypertensive Medication Use and Blood Pressure Control Among United States Adults With Hypertension. *Circulation* [Internet]. 2012 Oct 23 [cited 2019 Jun 23];126(17):2105–14. Available from: <https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.112.096156>
25. Cheong AT, Tong SF, Sazlina SG, Azah AS, Salmiah MS. Blood Pressure Control Among Hypertensive Patients With and Without Diabetes Mellitus in Six Public Primary Care Clinics in Malaysia. *Asia Pacific J Public Heal* [Internet]. 2015 Mar 27 [cited 2019 Jun 22];27(2):NP580–9. Available from: <http://journals.sagepub.com/doi/10.1177/1010539513480232>
26. Horsa BA, Tadesse Y, Engidawork E. Assessment of hypertension control and factors associated with the control among hypertensive patients attending at Zewditu Memorial Hospital: a cross sectional study. *BMC Res Notes* [Internet]. 2019 Dec 18 [cited 2019 Jun 22];12(1):152. Available from: <https://bmresnotes.biomedcentral.com/articles/10.1186/s13104-019-4173-8>
27. Mohammed Al-Qahtani A. Prevalence and Determinants of Blood Pressure Control among Hypertensive Patients in Primary Care Centers, Najran, Saudi Arabia. *Biomed Pharmacol J* [Internet]. 2018 Jun 28 [cited 2019 Jun 22];11(2):821–5. Available from: <http://biomedpharmajournal.org/vol11no2/prevalence-and-determinants-of-blood-pressure-control-among-hypertensive-patients-in-primary-care-centers-najran-saudi-arabia/>