



THE ASSOCIATION OF EDUCATIONAL LEVEL WITH KNOWLEDGE, RISK FACTORS, MANAGEMENT AND COMPLICATIONS OF HYPERTENSION AMONG SOUTH ASIANS WITH HYPERTENSION TREATED IN A TERTIARY CARE HOSPITAL

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ABSTRACT

INTRODUCTION: Hypertension is a major global health problem with low and middle-income countries bearing 80% hypertension burden and complications. Patients' awareness contributes to reducing morbidity and mortality. **MATERIALS AND METHODS:** 200 hypertensive patients attending medical clinics in National Hospital of Sri Lanka were evaluated using an interviewer-administered questionnaire. Their body mass index (BMI) and arterial blood pressure were measured. **RESULTS:** Mean age was 65 years (SD=±9.35) and 37% were males. Most had hypertension for >5 years(64.5%), were educated up to ordinary level(58%) and had symptoms or complications(65%) at diagnosis. Hypertension-related complications were present in 67%. All received antihypertensive medications. Majority was aware of risk factors: sedentary lifestyle(70.5%), obesity(58%), smoking(56%), complications: myocardial infarction(84%) and stroke(86%) and non-pharmacological management: physical activity(78%), smoking cessation(63%), weight reduction(83.5%), salt restriction(84.5%). Educational level showed significant association with knowledge about risk factors for hypertension: kidney disease(p=0.01) & emotional factors(p=0.03), complications: myocardial infarction(p=0.02) & stroke(p=0.006), non-pharmacological management: exercise(p=0.01) & weight reduction(p=0.001), awareness of the target blood pressure(p<0.000) and their last blood pressure reading(p=0.045). Mean systolic (SBP) and diastolic (DBP) blood pressure were 147.65mmHg and 87.41mmHg respectively, and 43% had elevated blood pressure. The majority(54%) were obese or overweight (mean BMI: males=24.65kg/m², females=22.67kg/m²). Females had significantly higher SBP(p=0.007) though males had significantly higher BMI(p=0.003). SBP(p=0.004) and DBP(p=0.002) increased significantly with BMI. **CONCLUSIONS:** Patients' knowledge regarding aetiology, complications and management of hypertension was satisfactory, and was significantly associated with educational level. Blood pressure and BMI were suboptimal. Improving education and implementing measures for better management is required in this population.

KEYWORDS: Hypertension Knowledge Educational level South Asian Risk factors.

INTRODUCTION

Hypertension is fast becoming a major global health problem, with the world population with hypertension projected to increase to 29% by 2025.^[1] Low-income and middle-income countries bear about 80% of the burden of hypertension and its complications.^[2] The prevalence of hypertension varies between 15-35% in urban adult populations of Asia.^[3] The prevalence of hypertension in South Asia, has been reported as 17.9% in Bangladesh, 17.1% in Bhutan, 14.5% in India, 9.3% in Nepal^[4], and 18% in Pakistan.^[5] Hypertension and stroke occur at a relatively younger age in Asians.^[3] Awareness about the

risk factors of hypertension and about the complications is poor in Asian countries.^[6]

Sri Lanka, a developing country in the South Asian region, has a population of 20.2 million.^[7] Hypertension is one of the common disorders found in adults in Sri Lanka with reported prevalence ranging from 23.7 %^[8] to 43.5% population^[9], 18.8%-23.4% for men and 19.3%-23.8% for women.^[8,10] It is expected that an increasing number of patients in Sri Lanka will be hospitalised due to hypertension.^[11]

Both systolic blood pressure (SBP) and diastolic blood pressure levels (DBP) are independently related to ischaemic heart disease, stroke, heart failure and end-stage renal disease.^[2,12,13,14,15,16,17] Optimum control of blood pressure in hypertensive patients is an important aspect of management, contributing to the reduction in complications, morbidity and mortality.^[18,19,20,21]

Knowledge serves to stimulate compliance of a treatment regimen. Studies have shown that Good knowledge of hypertension was independently associated with better blood pressure control,^[22,23] and patients who complied with their treatment experienced a clinically significant reduction in blood pressure.^[22,24] Therefore assessment of knowledge is a crucial element of hypertension control, but little information is available from developing countries where hypertension has lately been recognized as a major health problem. Knowledge about hypertension and proper control of hypertension will help to reduce the morbidity and mortality in hypertensive patients. There is a need to maximize the efficiency of hypertension prevention and control programs, so that any delay in achieving effective hypertension control is minimized in countries experiencing recent emergence of hypertension as a major public health problem.^[25]

The objectives of this study were to describe the patients' knowledge regarding risk factors, control and complications of hypertension and to evaluate the relationship of educational level with knowledge and disease control among patients treated for hypertension in medical clinics of an urban tertiary care hospital in Sri Lanka.

MATERIALS AND METHODS

This study was conducted in out-patient general medical clinics in National hospital of Sri Lanka, over a period of 4 consecutive months. A series of 200 hypertensive patients, selected by systematic sampling was interviewed using an interviewer-administered questionnaire after obtaining informed consent. Body mass index (BMI) and arterial blood pressure was assessed at the end of the interview. Ethical clearance for this study was granted by Ethics Review Committee, Faculty of Medicine, Colombo, Sri Lanka (No: EC/08/102).

The questionnaire, the main data collecting instrument consisted of four parts. First part was structured to collect the general information of individuals such as age, gender, ethnicity and educational level. We selected educational level as marker of socioeconomic status, because it is reliably recalled, can be easily quantified in terms of numbers of years, and reverse causation does not confuse interpretation. Educational level was categorized in to five groups: No basic education, primary education, up to ordinary level (O/L), up to advanced level (A/L) and higher education. Questions in the second part assessed the hypertension history of the

patient including duration of the disease, mode of diagnosis, complications of hypertension, presence of other co-morbidities, presence of family history of common non-communicable diseases and pharmacological management of the hypertension. This information was obtained by the patient and the patients' medical records. In the third part two series of blood pressure recordings during the period of last three months and during three months one year ago were obtained from the medical records. In the fourth part the questionnaire assessed the awareness and knowledge about hypertension.

Current hypertension control was determined from blood pressure measurement and clinic records. The average of two BP readings measured twice at an interval of 5 min was used to measure blood pressure. Blood pressure measurement obtained during the interview was taken as the measure of current status of hypertension control. The two series of blood pressure recordings, obtained from past medical records were used to assess the blood pressure control over last one year. The body weight and height were measured using a stadiometer and balance beam scale.

Statistical analysis

Statistical analysis was done using SPSS version 18.0. Continuous data were described using mean and standard deviation. Categorical data were tabulated as counts and percentages. Statistically significant relationships between selected binary and categorical data were assessed using chi-squared statistics. independent sample T test and analysis of variance (ANOVA) were used to analyze the differences among group means when comparing blood pressure values and BMI. Significance was considered at 5% level.

RESULTS

In the study participants, mean age was 65 years (SD=+/- 9.35) and 37% were males. Most were of sinhalase ethnicity (72.5%), had hypertension for >5 years (64.5%), were educated up to ordinary level (O/L) examination (58%), had symptoms (41.5%) or complications (23.5%) at the time of diagnosis and had a family history of hypertension or hypertension-related complications. 8% have had no schooling. 6.5% were smokers. Hypertension related complications were found in 67%, with ischaemic heart disease in 58% and stroke in 11.5%. All patients received drug treatment for hypertension. Hypertension was treated in most patients with angiotensin-converting enzyme inhibitors (ACEI), followed by beta blockers and diuretics (Table 1). However, only 64.5% patients claimed to have used all the medications regularly.

When evaluating the patients' knowledge, emotional factors, sedentary lifestyle, obesity, kidney disease and smoking were identified as risk factors by (89%), (70.5%), (58%), (36%) and (56%) respectively.

Myocardial infarction and stroke were identified as complications by (84%) and (86%) respectively.

Majority of the patients were aware of non-pharmacological treatment options in the management of hypertension: physical activity (78%), weight reduction (83.5%), salt reduction (84.5%) and quitting smoking (63%). 73.6% stated that antihypertensive treatment is necessary even when asymptomatic. A high proportion believed in myths: that patients with hypertension will always have symptoms (38.5%), patients with hypertension have too much blood in system (44.5%) and hypertension can cause cancer (35.5%). Though (12.5%) were informed of the target blood pressure by doctor, only (9.5%) were aware of it. Only (11%) were aware of their last blood pressure reading.

Higher educational level showed significant association with knowledge about kidney disease ($p=0.01$) and emotional factors ($p=0.03$) as risk factors for hypertension, myocardial infarction ($p=0.02$) and stroke ($p=0.006$) as possible consequences and exercise ($p=$

0.01) and weight reduction ($p=0.001$) as non-pharmacological treatment methods. The awareness of the target blood pressure ($p<0.000$) and their last blood pressure reading ($p=0.045$) showed a significant association with the educational level (Table 2).

Mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) during the interview was 147.65mmHg and 87.41mmHg respectively. Elevated SBP and DBP were found in 88(44%) and 86(43%) respectively. The majority (54%) of patients were obese (13.5%) or overweight (40.5%). Mean body mass index (BMI) was 24.65kg/m² in males and 22.67kg/m² in females. Females had significantly higher SBP ($p=0.007$) compared to males though males had significantly higher BMI compared to females ($p=0.003$). Both SBP ($p=0.004$) and DBP ($p=0.002$) increased significantly with body mass index. Though a significant increase in BMI noted in muslims, there was no significant association of blood pressure or BMI with educational level (Table 3 and table 4).

Table 1: Characteristics of the study population

Characteristic	Number of patients (%)
Ethnicity	
Sinhala	145 (72.5)
Tamil	30 (15.0)
Muslim	23 (11.5)
Other	2 (1.0)
Educational level	
No basic school education	16 (8)
Primary education	45 (23.5)
Up to O/L	116 (58)
A/L and higher education	21 (10.5)
Duration of hypertension	
<1 year	10 (5.0)
1-5 years	61 (30.5)
6-10 years	61 (30.5)
>10 years	68 (34.0)
Mode of diagnosis	
Incidental finding	61 (30.5)
On routine screening	3 (1.5)
Presented with symptoms	83 (41.5)
Presented with complications	53 (26.5)
Presence of family history	
Hypertension	93 (46.5)
Diabetes Mellitus	64 (32.0)
Stroke	39 (19.5)
Ischaemic heart disease	50 (25.0)
Hyperlipidaemia	27 (13.3)
Presence of complications	
Any complication	134 (67.0)
Ischaemic heart disease	116 (58.0)
Cerebrovascular disease	23 (11.5)
Peripheral vascular disease	5 (2.5)
Chronic kidney disease	5 (2.5)
Hypertensive nephropathy	3 (1.5)
Hypertensive retinopathy	2 (1.0)

Co-morbidities	
Diabetes mellitus	81 (40.5)
Dyslipidaemia	96 (48.0)
Smoking	13 (6.5)
Antihypertensive drugs prescribed	
Beta blockers	92 (46.0)
Diuretics	83 (41.5)
Angiotensin-converting enzyme inhibitors	138 (69.0)
Angiotensin receptor blockers	45 (22.5)
Calcium channel blockers	71 (35.5)

Table: 2 Knowledge about hypertension according to level of education

Knowledge on hypertension N=200	Educational level				Significance
	No basic education n=16	Primary education n=47	Up to O/L n=116	A/L & higher education n=21	
Health care personnel made patient aware of target BP	1	3	12	9	0.000**
Aware of correct target BP	0	2	8	9	0.000**
Aware of correct BP in last visit	1	3	12	6	0.045*
Knowledge on risk factors					
Obesity	6	26	71	13	0.318
Kidney disease	1	14	46	11	0.018*
Emotional factors	11	41	106	20	0.039*
Sedentary lifestyle	8	36	87	18	0.087
Smoking	4	23	72	13	0.113
Knowledge on complications					
Myocardial infarction	11	36	100	21	0.028*
Stroke	10	38	103	21	0.006*
Nephropathy	4	21	63	12	0.121
Peripheral vascular disease	4	20	62	12	0.114
Retinopathy	8	34	84	16	0.278
Knowledge on non-pharmacological management					
Exercise	7	35	95	19	0.016*
Stress reduction	11	39	106	20	0.050*
Quitting smoking	7	26	74	19	0.076
Quitting alcohol	2	28	70	14	0.001*
Salt restriction	13	40	98	18	0.983
Weight loss	8	39	100	20	0.001**
Knowledge on using treatment without symptoms	11	33	84	19	0.305
Knowledge on common myths					
In hypertension, headache, nose bleeds, dizzy spells always present	5	16	48	8	0.763
In hypertension, there is too much blood in the body	5	14	54	16	0.003*
Hypertension causes cancer	3	11	43	14	0.003*

Compared using Chi square test

BP: Blood pressure

*Significant at p<0.05 level

** Significant at p<0.01 level

Table 3: Comparison of mean blood pressure values with gender, body mass index, ethnicity and educational level

	Systolic blood pressure 147.65 mmHg (SD=20.655)	Significance	Diastolic blood pressure 87.41 mmHg (SD=12.1)	Significance
Gender				
Male	150.63	0.007*	88.63	0.06
Female	142.49		85.29	
Body mass index				
Morbid obese	153.67	0.004*	91.67	0.002*
Obese	156.07		91.33	
Over weight	150.70		89.85	
Normal	142.79		84.22	
Underweight	135.85		80.15	
Ethnicity				
Sinhala	148.72	0.144	87.10	0.66
Tamil	142.00		87.07	
Muslim	150.26		90.17	
Other	125.00		83.00	
Educational level				
No schooling	153.13	0.729	90.50	0.699
Primary	146.39		86.30	
Up to O/L	147.41		87.47	
A/L and higher education	147.52		87.14	

Compared using ANOVA

*Significant at p<0.05 level

Table 4: Comparison of body mass index with gender, ethnicity and educational level

	Body mass index	Significance
Gender		
Male	24.6542	0.003*
Female	22.6658	
Ethnicity		
Sinhala	23.6175	0.038*
Tamil	23.8444	
Muslim	26.2779	
Other	19.7178	
Educational level		
No school	23.6323	0.366
Primary	22.9327	
Up to O/L	24.2471	
A/L and higher education	24.5275	

Compared using ANOVA

*Significant at p<0.05 level

DISCUSSION

In the population studied the majority had been symptomatic or had complications at the time of diagnosis, had a family history of hypertension or cardiovascular disease, or hypertension-related complications. All received pharmacological treatment for hypertension.

The study population was in the mid to low socioeconomic group, as they were attending the largest tertiary care hospital in the country providing free services. This is reflected in the education level with the majority receiving an education below O/L.

Most patients were aware of risk factors, complications and non-pharmacological treatment options in the

management of hypertension and the need to continue antihypertensive medication despite lack of symptoms. Nine of 10 adults in the United States knew that high blood pressure increases the risk of heart disease, and 3 of 4 knew that high blood pressure is the most significant risk factor for stroke.^[26] A Pakistan study showed that only 42% of the patients who suffered an acute myocardial infarction had good knowledge about modifiable risk factors of heart disease.^[27] Our findings are somewhat in between, with the majority being aware of risk factors and complications of hypertension.

The high awareness in our study regarding appropriate management options is likely to be due to media campaign and health education. There could be a lack of emphasis in health education campaigns dissipating

myths. The finding that patients with higher education level had better knowledge regarding risk factors, complications and management of hypertension, emphasize the importance of education in prevention and management of this non-communicable disease.

Blood pressure control was suboptimal (SBP 44% and DBP 43%) in both genders, and all educational levels. This is despite the use of standard antihypertensive medications in 100% of patients. Lack of awareness of their blood pressure readings and target blood pressure in approximately 90% of patients and the poor compliance in one third of patients may contribute to the suboptimal blood pressure control. Suboptimal blood pressure control has been found worldwide, ranging from 71%^[28] to 53%^[18] in USA, 51% in Malaysia^[29] and in China, only 4.1% of hypertensives in urban areas and 1.2% of hypertensives in rural areas have controlled arterial blood pressure.^[30] Cheong et al found that lower educational level and use of multiple drug therapy was associated with poor blood pressure control.^[18] In contrast to our population, the majority of the general public in USA with hypertension knew the results of their last blood pressure measurement; and, most importantly, almost two-thirds of the identified hypertensives reported that their pressures were under control at last measurement.^[26] In a study done in Saudi Arabia showed that the overall compliance rate was 34.2%. Overall compliance the rate was lower in those aged < 55 years than older patients (26.2% versus 48.5%; $P < 0.001$), and among patients with low literacy rates (30.4% $P < 0.001$).^[31] The reason for poor compliance is not clear among the Sri lankan study population, but is likely the lack of time for detailed explanation to individual patients by healthcare personnel contributed. This is evident in a systematic review which revealed that interventions aimed at improving patients' knowledge of medications had the greatest potential clinical value in improving adherence with antihypertensive therapy.^[23]

The mean BMI was suboptimal among males and muslim ethnic group the study population. The higher mean BMI in men (24.65kg/m²) is in contrast to a population study of over 6000 participants in Sri Lanka mean BMI was 21.5 kg/m² (SD = 3.7) in men and 23.3 kg/m² (SD = 4.5) in women.^[10] The higher BMI in this study may be attributed to including only patients with hypertension, but it is not clear as to why the men have a higher mean BMI than women. Obesity and hypertension are linked to each other, with patients with hypertension being prone to weight gain and hypertension being more common among obese patients.^[32,33] Cardiovascular risk In overweight and obese subjects, is significantly increased only when concomitant hypertension is present.^[34] It is therefore necessary to emphasize on addressing weight management when treating hypertension.

Though the educational level was associated with better knowledge on risk factors, complications and

management methods, the actual blood pressure or BMI did not have an association with educational level. It is possible that patients though they have adequate knowledge regarding the disease, may not be practicing what they know, eg. Complying with treatment and adherence to lifestyle modification. This emphasizes the need for identifying the reasons for this discrepancy in future studies. Improving health education may lead to better blood pressure control. As the medical clinics in this hospital is overcrowded, limited time is available for doctors to educate patients and reinforce their knowledge, the use of media and preventive healthcare services could be made use of to improve health education in patients.

CONCLUSIONS

A high proportion of patients with hypertension attending medical clinics, have co-morbidities and complications. Patients' knowledge regarding many aspects of aetiology, complications and management of hypertension was satisfactory, and was significantly associated with educational level. Blood pressure and BMI were suboptimal. Improving education, awareness of their blood pressure readings and target blood pressure and drug compliance as well as implementing measures for better management is required in this population.

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