Study on blood pressure control status and predictors of uncontrolled blood pressure among hypertensive patients under medication

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ABSTRACT

Widespread treatment options are available for hypertension, but the target range of blood pressure achieved with treatment has been viewed unsatisfactory worldwide. The study was designed to see what proportion of hypertensive under medication had controlled blood pressure and to analyse basic characteristics of uncontrolled subjects and factors associated with blood pressure control status. Hypertensive subjects under medication for at least 6 months were enrolled. They were interviewed and examined. Baseline characteristics and variables to be tested were recorded. Data analysis was done using SPSS. Among 147 hypertensive patients enrolled in the study 49 (33.33%) had controlled blood pressure and 98 (66.66%) had uncontrolled blood pressure despite medication. Blood pressure control status had no significant correlation with sex (p=0.90). The uncontrolled subjects had mean age more than the mean age of the total enrolled group (53.12±10.3 years versus 49.09±10.65 years). Physical activity (p=0.04) and adherence to therapy (p<0.01) had significant positive correlation with blood pressure control. There was significant positive correlation between blood pressure control status and awareness of target blood pressure (p=0.028), awareness of complications of uncontrolled blood pressure (p=0.019) and frequency of blood pressure check up (p<0.01). Blood pressure control in our set up was comparable to previously reported articles. By encouraging patients to adhere to therapy, to adopt physically active life style, creating awareness about the target blood pressure and complications of uncontrolled blood pressure and frequent blood pressure check up can improve the outcome.

Keywords: Adherence to therapy, hypertension, medication, uncontrolled blood pressure.

INTRODUCTION

Higher than optimal Blood Pressure (BP) is the number one attributable risk factor for death throughout the world and approximately 7.6 million deaths are attributed to uncontrolled hypertension annually.[1,2] Hypertension in most case is controllable risk factor.[3] Widespread treatment of hypertension is the major contributor to the decline in the incidence of stroke and heart disease over past 30 years. However the percent of persons in whom hypertension is controlled is widely viewed as unsatisfactory and may in fact have decreased since 1990. Despite proven benefits of anti-hypertensive drugs in reducing blood pressure and events such as stroke and coronary heart disease the problem of uncontrolled hypertension is enormous.[4]

Data from phase II (1992 to 1994) of the third National Health and Nutrition Examination Survey (NHANES III) indicate that 32 percent of all persons with hypertension are unaware of their condition and are not receiving treatment, 15 percent are aware of it but are not receiving treatment and 26 percent have treated but uncontrolled hypertension, leaving only 27 percent in whom hypertension is controlled.[5] Despite concerted efforts to improve the treatment of hypertension, only 64% of hypertensive patients in the United States who were treated in 2003 and 2004 had controlled BP (<140/90 mm of Hg).[6] Understanding the relative contributors of the factors to uncontrolled hypertension is important for designing effective interventions to improve hypertension control.[7]

Several factors can have influence on the magnitude of BP control among hypertensive patients under medications. BP control is potentially determined by underlying patho-physiology, the presence of co morbid illness, and patient knowledge, as well as patterns of treatment and systems of care. Studies have shown good adherence is associated with good blood pressure control.[8]

Hypertension is an internationally common disease. Afford to improve the extent of control of hypertension in any population is based upon thorough understanding of the characteristics of patients of that population who have poorly controlled BP.

The present study was designed to see what proportion of subjects with hypertension taking medication had their BP at controlled level and basic characteristics of patients having uncontrolled BP. The study further aimed to see if age, sex, literacy level, physical activities,

Table-1: Baseline characteristics of enrolled hypertensive subjects

Particulars	Values
Mean Age (yrs)	49.09±10.65
Male sex (No; percentage)	83(56.46%)
BMI (Kg/m^2)	24.42±4.02
Average Systolic BP (mmHg)	146.66±17.14
Average Diastolic BP (mmHg)	85.15±7.94
Literacy (No; percentage)	113(76.87%)
Active lifestyle (No; percentage)	61(41.49%)
Smoking (No; percentage)	53(36.05%)
Target BP awareness (No; percentage)	35(23.8%)
Complications awareness (No; percentage)	29(19.72%)
Adherence to Therapy (No; percentage)	44(29.93%)
Concomitant diabetes (No; percentage)	25(17%)

smoking habit, adherence to therapy, frequency BP check up, knowledge about target BP and complications of uncontrolled BP can influence the BP control status.

MATERIALS AND METHODS

Study Design and Settings: Cross sectional prospective study was conducted among the hypertensive subjects visiting out patient department (OPD) at the Department of Cardiology, National Academy of Medical Sciences (NAMS), Bir Hospital from 1st February 2011 to 31st July 2011. Bir hospital is one of the tertiary care center in Nepal.

Study Subjects: Hypertensive subjects visiting OPD were randomly selected in the study. The study subject had to have hypertension (systolic BP of 140 mmHg or more and/or diastolic BP of 90 mmHg or more) diagnosed for at least 6 months and under antihypertensive medication at least for same duration to be included in the study. The subjects were interviewed regarding their basic characteristics; age, physical activity, smoking habit, literacy level, knowledge about target BP and risks of uncontrolled BP, antihypertensive medicine adherence and information were recorded. They were interviewed regarding how often they come in contact with health care providers and have their BP checked up? Those who used to have at least 30 minutes or more moderate physical activity each day were categorized as physically active. Those who could answer at least 2 possible complications of uncontrolled BP were categorized as aware of complications of uncontrolled BP. Newly diagnosed hypertension, hypertensive not under medications and hypertensive emergencies were excluded.

Defining adherence and BP measurement: The 6 questions were adapted from the work of Choo and associates and Morisky and colleagues and as used by Rose AJ and associates to test adherence to antihypertensive therapy.[7,9,10] It included - (1) Some people have difficulty in taking blood pressure medication as prescribed, Do you have difficulty with this? (2) How many days in the past week did you forget to take your blood pressure medication? (3) How many days in the past week did you not take your medication on purpose? (4) How many days in the past week did you add an extra pill? (5) Did you ever take less medicine because you felt you needed less? (6) Sometimes if you feel worse when you take the medicine, do you stop taking it? Those who answered 2 or more positive reply were classified as non adherence to therapy.

BP was measured in a seated position after at least 5 min of rest over left brachial artery. Subjects were made absent from tea coffee or cigarette smoking for at least an hour. A mercury sphygmomanometer was used. General subjects with systolic BP of 140 mmHg or more and/or diastolic BP of 90mmHg or more and diabetic subjects with systolic BP of 130 mmHg or more and/or diastolic BP of 80mmHg or more categorized as uncontrolled group.

Statistical analysis: Frequencies and percentage distribution were obtained for each variable. Risk factors determination employed the univariate analysis for each individual variable for which Chi-square test was utilized to detect the level of significance. SPSS version 14 for windows was utilized to analyze the data and p values <0.05 was considered statistically significant.

RESULTS

A total of 147 hypertensive subjects presented to OPD from 1st February 2011 to 31st July 2011 were assessed. Among them 83 (56.46 %) were male. The mean age of presentation was 49.09 ± 10.65 yrs. Mean body mass index was 24.42±4.02Kg/m^2. The mean systolic and diastolic BP was 146.66±17.14 mmHg and 85.5 ± 7.94 mmHg respectively.

Table-2: Baseline characteristics of hypertensive subjects with uncontrolled BP

Particulars	Values
Mean Age (yrs)	53.12±10.3
Male sex (No; percentage)	55(56.12%)
BMI (Kg/m^2)	24.68±4.51
Literacy (No; percentage)	74(75.51%)
Active lifestyle (No; percentage)	35(35.71%)
Smoking (No; percentage)	37 (37.75%)
Target BP awareness (No; percentage)	18(18.36%)
Complications awareness (No; percentage)	14(14.28%)
Adherence to therapy (No; percentage)	17(17.34%)
Concomitant diabetes (No; percentage)	14(14.28%)

Among enrolled subjects, 113 (76.87%) were literate to the level at least read and write. A total of 61 (41.49%) had active lifestyle. Fifty-three (36.05 %) were smoker. Only 35 (23.8%) were aware about their target BP goal and 29 (19.72%) were aware about at least 2 complications associated with uncontrolled BP. A total of 44 (29.93%) subjects were adherent to therapy on the basis of questionnaires used. Among 147 subjects 25 (17 %) had concomitant diabetes. The baseline characteristics of the enrolled subjects are shown in Table-1.

Among the 147 subjects enrolled, 49 (33.33%) had target BP achieved during the OPD visit. A total 98 (66.66%) subjects did not have the target BP achieved. Among the uncontrolled, 55 (56.12%) were male. The mean age of presentation was 53.12±10.3yrs. A total of 74 (75.51%), were literate, 35 (35.71%) had active lifestyle and 37 (37.75%) were smoker. Only 18 (18.36%) were aware about their target BP goal and 14 (14.28%) were aware about two possible complications of uncontrolled BP. Among uncontrolled patients 14 (14.28 %) had concomitant diabetes. A total of 17 (17.34%) subjects were adherent to therapy. The baseline characteristics of those with uncontrolled blood pressure are as shown in Table-2.

Further, univariate analysis of the BP control status with different variables was done.

No significant correlation of BP control status with sex was seen. Among uncontrolled 98 subjects 55 (56.12%) were male and among controlled 49, 28 (57.14%) were male (p=0.90).

Those who had active life style were having more control of BP .Among 98 uncontrolled group 35 (35.71%) had active lifestyle where as among 49 controlled 26 (53.06%) had active lifestyle with significant positive correlation (p=0.04).

There was no significant correlation with presence or absence of diabetes. Among 98 uncontrolled subject 14 (14.28%) had diabetes whereas among 49 controlled 11 (22.44%) had diabetes (p=0.21).

More of the subjects (80; 81.63%) with uncontrolled BP were unaware about the target BP as compared to controlled subjects(30; 61.22%)with significant p value(p=0.028) and 84 (85.71%) of uncontrolled subjects were unaware of two complications of hypertension which was more as compared to controlled (34; 69.38%) with significant positive correlation (p=0.019).

Table-3: Significant Variables associated with BP control status and p values

Variables	p value
Aware about target BP	p=0.028
Risk uncontrolled BP awareness	p=0.019
Adherence to Therapy	p<0.01
Frequent BP check up	p<0.01
Physical activity	p=0.04

Smoking had no obvious impact on control of BP. Among uncontrolled 98, 37(37.75%) were smoker and among 49 uncontrolled 16 (32.65%) were smoker (p=0.54). Similarly literacy rate did not show any significant correlation to BP control. Among 98 uncontrolled 24 (24.48%) were illiterate and among 49 controlled 10(20.40%) were illiterate (p=0.21).

The subjects who were adherent to therapy had relatively more of BP control as compared to those who were not adherent to therapy with strong positive correlation (p<0.01). Among 98 who were having uncontrolled BP 81(82.65%) were non adherent. Among 49 patients with controlled BP 27 (55.10%) were adherent.

Further the study found subjects who had their BP checked up frequently were having more BP controlled as compared to those who did not. Twenty four(24.48%) of 98 uncontrolled subjects had no BP checked up in last 6 months, 52 (53.06%) had 1 time, 14 (14.28%) had 2 time and 8 (8.16%) had more than 2 times BP checked up where as among controlled 49 subjects 11 (22.44%) had more than 2 times, 25 (51.02%) had 2 time, 8 (16.32%) had 1 time and 5 (10.20%) had no BP check up in last six months with significant correlation (p<0.01).

The significant variables associated with BP control status with p values are shown in Table-3.

DISCUSSION

This study found 33.33% of hypertensive patients with medication for at least 6 months had controlled BP. The result is comparable with the results in literatures. Knight *et al* have shown 39% had controlled BP.[11] Mehza *et al* have found 64% of their hypertensive were having uncontrolled BP during 63 months of follow up.[4] BP control in Kuwait was ranging between 27-40% in different primary center.[4]

Subjects with uncontrolled hypertension were more elderly than those with total subjects. Mean age of total subject was 49.09±10.65 yrs. Mean age of the uncontrolled subjects was 53.12±10.3 yrs. The mean age of the uncontrolled hypertensive was higher than that of the controlled hypertensive (55.8 vs. 51.7 years) shown in a previous study.[4] Risks of cardiovascular disease rise steeply with rising age, so requires more attention towards control of BP in elderly. There was no obvious difference on BP control status in relation to sex.

This study found no significant correlation between the literacy level and BP control. There was significant

correlation between the awareness of target BP and awareness of complications of uncontrolled BP towards BP control. The patient who were unaware about their target BP and who couldn't tell two complications of uncontrolled BP had poor BP controlled status. Such patients may have been less likely to take their medication, adopt healthy lifestyle, or see their physician if their blood pressure was outside the ideal range. The result is in accordance with studies done previously. Authors did find improvement in both compliance and BP control when patients were taught to measure their own BP and chart it.[12]

Adherence to therapy is described widely as an important factor for BP control.[13] Studies have documented various rate of medicine adherence.[14] This study found 44 (29.93%) of subjects adhered to therapy. Adherence to therapy had significant co-relation to blood pressure control status. Among 98 who were having uncontrolled BP 81 (82.65%) were non adherent. Among 49 patients with controlled BP 27(55.10%) were adherent. Adherence was measured using questionnaire asking about issues with adherence to therapy. The 6 questions were adapted from the work of Choo and associates and Morisky and colleagues which is widely used to measure adherence.[9,10] Measures to improve the adherence can be one of the important intervention to improve the outcome BP control which is also emphasized in Joint National committee (JNC) 7 report.[15]

The subjects who had less physical activity were more likely to have uncontrolled BP. Increased physical activity reduces BP and improve control.[16] Those who practices at least 30 min of regular physical activity per day were taken as physically active.

The subjects who had uncontrolled BP were more likely to have less frequent BP check up as compared to controlled subjects. Adequate contact with health care system and frequent evaluation of the subjects can obviously have better outcome.

Cigarette smoking is a risk factor for hypertension and smokers have a five fold increased risk of hypertensive crisis.[17] Study showed no obvious correlation between smoking and pattern of BP control. It is in accordance with results shown in various other studies. Even so every effort should be made to stop smoking among hypertensive subjects.

This study has several limitations. It was a hospital based study done at a tertiary care center; results of similar study at community level can be different. The study did not take consideration of different types and total number of antihypertensive medicines subjects were taking, which can have influence on outcomes. Categorization of patients into different stages of hypertension was not done.

In conclusion, BP control status of our hypertensive subjects is comparable. Considerable number of people despite of medication still had uncontrolled BP. This study focused on some of factors associated with it. Larger studies evaluating more possible associated factors are encouraged.

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