

## A Prospective Study in the Indian Emergency Setting to Sample the Significance of Undetected Hypertension Presenting as Raised Blood Pressure

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### Abstract

**Study objective:** To determine if the raised blood pressure at an ED visit was due to pain and anxiety or undetected hypertension. **Methods:** Patients visiting the Emergency department of Max Balaji Super Specialty Hospital, Delhi in a period of 6 months of 2013 were recruited for the study and a sample of 72 patients generated. Patients who passed the inclusion and exclusion criteria had an initial and a repeat ED blood pressure that were increased (SBP  $\geq$  140 or DBP  $\geq$  90 mm Hg). To gauge the causality of pain and anxiety in the rise in BP we used an ED Pain score, the Verbal descriptor scale and ED Anxiety score, the Beck's Anxiety Scale. With 95%CI and 10% precision we enrolled a total of 72 subjects in the study. **Results:** Out of 72 patients who fulfilled the criteria for study 40.28% were male and 59.72 were female. Average age of the participants was 48 years. Patients with raised ED blood pressure were older and more of females than males. The mean pain score (SD) for the sample was 4.1 and mean (SD) anxiety score was 37.8. Anxiety score showed a positive correlation change in systolic ED blood pressure than diastolic ED blood pressure. Mean (SD) systolic ED blood pressure at the First reading was Mean 154.6 (SD 6.7) and Second reading was a Mean 128 (SD 9.3). Mean (SD) diastolic ED blood pressure at the First reading was Mean 94.8 (SD 5.2) and second reading was a Mean 84.15 (SD 6.88). **Conclusion:** Even in Indian scenario non-hypertensive patients with raised blood pressure in ED, with pain and anxiety relief still remained in pre-hypertensive stage suggestive for routine reassessment and regular blood pressure follow up with the primary physician and lifestyle modification.

**Keyword:** Not Provided

### Introduction

Hypertension has been identified as one of the leading risk factors for mortality, and is ranked third as a cause of disability-adjusted life-years [1]. Existing data suggests that the prevalence of hypertension has remained stable or has decreased in economically developed countries during the past decade, while it has increased in developing countries [2]. Given the rising prevalence of hypertension in developing countries undergoing epidemiological transition like India, increased awareness, treatment, and control of high blood pressure are critical to the reduction of cardiovascular disease risk and

prevention of the associated burden of illness. This study was undertaken with the objective to gather both epidemiological data and data on awareness and control of hypertension in Delhi which represents urban north India. In 2003, the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure published their seventh report, which redefined hypertension categories and created a new category, prehypertension (systolic blood pressure 120 to 139 mm Hg or diastolic blood pressure 80 to 89 mm Hg) [5, 6]. The emergency department (ED) may be able to play an important public health role in early detection and prevention of hypertension by identifying patients who have not yet been diagnosed.

Recognizing the potential role of the ED and the importance of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, the American College of Emergency Physicians published a clinical policy in 2006, recommending that patients with persistently increased blood pressure readings (i.e., 2 or more systolic blood pressure readings greater than 140 mm Hg) referred for follow-up of possible hypertension. This policy also recognizes barriers to routine ED screening and referral, including (1) the general belief by both the physician and the patient that blood pressure screening is beyond the scope of the ED and (2) the emergency experience may result in false increased blood pressures because of pain and anxiety [7]. In an effort to address these barriers, evidence is needed to ED setting and to understand the relationship between ED blood pressures and pain and anxiety.

## Methodology

### *Study Design and Oversight*

We conducted a prospective cohort study. The Institutional scientific committee and Institutional Ethics Committee of the Max Super Specialty Hospital, Patparganj, Delhi; approved the protocol. The Study was registered to [www.ctri.nic.in](http://www.ctri.nic.in) prior to recruitment of the first patient into the study. Those patients who provided voluntary written informed consent were recruited into the study. The time frame for conduction of the study was a period of 5 months study from January 2013 to May 2013.

### *Sites and Patients*

We recruited a total of 72 participants of the 96 eligible participants from the ED of Max Super Specialty Hospital, Patparganj, Delhi that has approximately 72,000 adult ED patient visits yearly. Patients eligible for inclusion were if they were at least 18 years of age.

All the patients were included in the study that had an initial ED SBP (systolic blood pressure)  $\geq$  140 or DBP (diastolic blood pressure)  $\geq$  90 mm Hg. When a repeat set of BP was measured SBP  $\geq$  140 or DBP  $\geq$  90 mm Hg was recorded were included. Another inclusion criterion was patients without any history of HTN (hypertension).

The patients excluded from the study were who were admitted to the hospital, , homeless, who were unable to do BP measurements at home, pregnant

with previous or recently diagnosed history of medical instability or psychiatric illness. In the final data patients with inadequate contact information were excluded. Although there are no specific blood pressure upper limits for exclusion, we excluded patients if the emergency physician prescribed an antihypertensive agent at discharge.

### *Study Interventions*

After a brief patient interview, ED physicians instructed subjects on use of home BP monitor. The pain and anxiety of each participant was evaluated by using individual scores including the *ED Pain score* (0-10 verbal descriptor scale) and an ED Anxiety score, the *Beck's Anxiety Scale*. The Beck's scale Scores patients' report 20 questions grading low to high anxiety from *Not At All* as score 1 to *Very Much So* as score 4.

On an Initial ED SBP  $\geq$  140 or DBP  $\geq$  90 mm Hg recording in a patient and no history of HTN, patient recruitment was evaluated. A repeat ED SBP  $\geq$  140 or DBP  $\geq$  90 mm Hg was recorded too. The highest and lowest SBP and DBP recordings were deleted. Mean monitor SBP and DBP were calculated for each individual.

### *Statistical Analysis*

Statistical calculations at the start and at the time of final analysis of the data were done by an Institutional Statistician who was blinded from the primary data. The prevalence of hypertension with a cut off mark of 140/90 mm of Hg is 24.9%. Sample size was calculated by n-Master (2.0) software. Sample size required for 95% confidence interval at 10 % precision minimum inclusion number of subjects in the study was calculated to be 75. Statistical Analysis was done using Chi-square and Fisher's exact test (categorical variables), t test (continuous variables), Pearson correlation coefficients to determine the correlations between the change from ED to home SBP and DBP with the ED mean pain score and anxiety score.

## Results

Total no of patient approached were 96 who visited the Emergency Department fulfilling the criteria for our study, out of which only 72 patient agreed and gave consent for study, as the rest did not gave consent for different reasons. Out of 72 patients who

fulfilled the criteria for study 40.28% were male and 59.72% were female. Average age of the participants were 48 years, out of them 33% were non vegetarians and 66% were vegetarian. Family history of hypertension was present in 27.78% patients. Patients with raised ED blood pressure were older and more likely to be obese and female gender. The mean pain score (SD) for the sample was 4.1 and mean (SD) anxiety score was 37.8. Anxiety score showed a positive correlation change in systolic ED blood pressure than diastolic ED blood pressure. Mean (SBP) systolic ED blood pressure at the First reading was Mean 154.6 (SD 6.7) and Second reading was a Mean 128 (SD 9.3). Mean (DBP) diastolic ED blood pressure at the

First reading was Mean 94.8 (SD 5.2) and second reading was a Mean 84.15 (SD 6.88). Anxiety score showed a positive correlation change in systolic ED blood pressure than diastolic ED blood pressure.

**Table 1**

96	Patients met inclusion criteria
24	Patients did not consent for the study
29	Patients were male
43	Patients were female
48	Patients were vegetarians
20	Patients had family history of hypertension

The table below lists the average blood pressures (systolic and diastolic) before and after survey in ED.

**Table 2**

<b>Systolic</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>SD</b>	<b>Mean+SD</b>	<b>Mean - SD</b>
Before Survey	145	180	154.64	6.71	161.35	147.927
After Survey	110	140	128.60	9.34	137.93	119.26
<b>Diastolic</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>SD</b>	<b>Mean+SD</b>	<b>Mean - SD</b>
Before Survey	84	110	94.89	5.30	100.19	89.59
After Survey	70	90	84.15	6.88	91.03	77.27

**Limitations**

Our analysis was limited to small time duration of only five months. Because many of the patients had to suffice multiple exclusion criteria, the presentation may be variable during a particular period of time. Nevertheless, we are of the belief that the obtained sample size is adequate to formulate a preliminary judgment of the original goal planned for the study. Secondly, this study was conducted at a single hospital setup which reduces the precision of predicting the application to the country as a whole. A similar limitation to the study was that it was conducted in a private institute wherein only a set group of economically well to do populace visits and the scenario may well end up being completely varied if conducted including patients from all possible setups including only government run institutes and charitable trusts. Finally only one invigilator was involved in collection of the data and hence introduces the possibilities of observer bias which could be eliminated by induction of more number of investigation members.

**Discussion**

Undiagnosed hypertension is common amongst the general population of every country, especially developing ones like India and presents a challenge

to the emergency physicians. The minor practice of attention to raised blood pressure during a single ED visit could allow for earlier detection and prevention of long term morbidity and mortality associated with undetected hypertension. However no previous published studies were found that adequately describe the significance of single raised blood pressure measurement in Emergency Department in the Indian scenario. We conducted a prospective cohort study using increased blood pressure in the first ED visit along with Pain and Anxiety score at the ED Visit to validate these findings. In this cohort we had blood pressure readings that met the 7th report of JNC in prevention, detection, evaluation and treatment of raised blood pressure criteria for hypertension. Most patients had blood pressure in the pre-hypertensive range. As blood pressure in the pre-hypertensive range is associated with increased cardiovascular risk, referral for overall cardiovascular risk assessment and lifestyle modifications is warranted. ED clinicians may believe that patients with raised blood pressure who are anxious or in pain may be normotensive after their acute problems has passed over therefore do not require referral for evaluation and management of hypertension. We found a similar correlation with blood pressure changes in ED. However, simultaneously it was also observed that considerable percentages of patient were still in pre-hypertensive stage at the time of discharge from ED.

In conclusion, a single emergency department visit could bring about a major change in the outlook and outcome of a serious health problem like hypertension. However as per the date till date, further more studies are a definitive need to assess and quantify the right methodology and processes to validate the same.

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