ORIGINAL ARTICLE

FREQUENCY OF SEVERELY ELEVATED BLOOD PRESSURE ON ADMISSION IN KNOWN HYPERTENSIVE PATIENTS PRESENTING WITH ACUTE HAEMORRHAGIC STROKE

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Objectives: To determine the frequency of severely elevated blood pressure on admission in known hypertensive patients presenting with acute hemorrhagic stroke.

Methodology: This cross-sectional Study conducted at Neurology Department, Lady Reading Hospital, Peshawar, the duration of study is 6 months from 2/12/2020 to 2/5/2021. In the present study a total of 90 patients 20 to 70 years old patients of either sex with a known history of hypertension (HTN) who present with acute hemorrhagic stroke were included in the study. The blood pressure of these patients was measured at the time of admission. The weight of the patient in kilograms was measured with the help of a digital electronic scale and height was measured with the help of a stadio-meter.

Results: In the present study mean age was 53 years with standard deviation (SD) ± 10.02. Sixty two percent patients were male and 38% patients were female. Mean body mass index (BMI) was 26 kg/m^2 with SD ± 3.31. Mean duration of hypertension was 3 years with SD ± 3.14. Eighty eight percent patients had use of antihypertensive medications while 12% patients' did not had use of antihypertensive medications. Eighty percent patients had compliance with antihypertensive medications while 20% patients didn't had compliance with antihypertensive medications. More over 18% patients had extremely raised blood pressure while 82% patients' didn't had very high blood pressure.

Conclusion: Our study concludes that the frequency of severely elevated blood pressure was 18% on admission in known hypertensive patients presenting with acute hemorrhagic stroke.

Keywords: severely elevated blood pressure, known hypertensive patients, acute hemorrhagic stroke

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INTRODUCTION

The Severely elevated Blood Pressure, coated for this study, refers to systolic blood pressure (SBP) of 185 mmHg or greater, or diastolic blood pressure of 110 mm Hg or greater. It can be classified as hypertensive urgency or hypertensive emergency. Hypertensive urgency can be defined as severely elevated blood pressure in a patient without signs or symptoms of end-organ damage. Hypertension is the most important risk factor for ischemic and hemorrhagic stroke, and an acute hypertensive emergency is often observed in patients with intracranial hemorrhage (ICH).[1] SBP before admission is directly correlated with blood pressure on admission and associated with ICH volume expansion at the time of admission.[2] According to the latest research conducted by Jessica lin, systolic blood pressure varied dramatically among intracerebral causes, at the time of admission and during hospitalization. This study concluded that BP in the acute intracerebral hemorrhage is at least partly associated with ICH cause.[3]

Hypertensive emergency (hypertensive crisis) occurs when signs or symptoms of end-organ damage occur.[4] Blood pressure should not be corrected until and unless the blood pressure is very high (systolic blood pressure >220 mm Hg).[5] A study published in Lancet Neurology in 2014 showed that substantially raised systolic blood pressure compared with usual premorbid levels in patients after intra-cranial hemorrhage ICH. This raised blood pressure in the acute period after a hemorrhagic stroke is detrimental for the recovery after stroke and is also a risk factor for the recurrence of hemorrhage. Moreover, a study published in the journal of neurology illustrated that acute blood pressure dys-regulation in patients with ICH leads to the development of ischemic lesions (hyper-intense lesions on Diffusion Weighted MRI) and these in turn are associated with a poor prognosis.[6]

The optimal management of very high blood pressure in the hyper acute or acute post-stroke period is controversial. Previously, it was advised that we

should be cautious against immediate reduction in blood pressure after acute intra-cerebral hemorrhage because of fear of a drop of cerebral blood flow in the vicinity of the ICH. However according to the New England journal of Medicine 2013 INTERACT-2 trial, ordinal analysis of the modified Rankin score (a score of neurological disability) showed that intensive reduction of blood pressure (defined as targeting a systolic blood pressure <140 mmHg in less than one-hour within five to six hours of symptom onset in comparison with target of SBP less than 180 mmHg) might be superior (Odds Ratio = 0·87, 95% Confidence Interval = 0·77–1·00; p value = 0·04). This has resulted in the European Stroke Organization (ESO) to make a weak recommendation on the basis of moderate quality evidence that in case of acute intra-cerebral hemorrhage within six hours of onset, intensive blood pressure lowering (systolic target <140 mmHg in <1 hour) is safe and may be superior to a systolic target <180 mmHg. On the contrary, the ATACH-2 trial published in 2016 concluded that treatment of participants with intra-cerebral hemorrhage to achieve a target SBP of 110 to 139 mmHg did not result in a lower rate of morbidity or mortality at 3 months than standard reduction of BP to a target of 140 to 179 mm Hg.[7]

The rationale of this study was to find out the frequency of severely elevated blood pressure in known hypertensive patients with acute hemorrhagic stroke on admission to the Neurology ward of Lady Reading Hospital, Peshawar. This gave us an idea about the contribution of poor blood pressure control to hemorrhagic stroke in our local population. The data can be used to improve awareness about the importance of effective blood pressure control and encouraging compliance with antihypertensive medications in patients.

METHODOLOGY

This is a cross sectional study conducted at Neurology Department, Lady Reading Hospital, Peshawar, for six month duration from 02/12/2020 to 02/05/2021. Sample size was 90 patients and was calculated using the World Health Organization software "Sample Size Determination in Health Studies". The formula for "Estimating a population proportion with specified absolute precision" was used based on the following assumptions: Confidence level: 95%, absolute precision: 7%, anticipated proportion of severely elevated blood pressure in patients with acute hemorrhagic stroke: 13.1%[8]. Consecutive patients included in this study were 20 to 70 years old, of either sex with a known history of hypertension who present with acute hemorrhagic stroke confirmed according to the criteria mentioned above.

Patients with known endocrine or medical condition which causes secondary hypertension (e.g. hyper-aldosteronism) were not included in the study. Patients with known structural brain lesion for example a tumor and patients with subarachnoid hemorrhage were not included in this study.

The study was conducted after getting approval from hospital ethics and research committee. Informed consent was taken from the patient or patient's attendant. The patients meeting the inclusion criteria in the neurology ward of Lady Reading Hospital, Peshawar were recruited in the study after taking written informed consent. Known hypertensive patients with acute hemorrhagic stroke were identified based upon the criteria mentioned in the operational definitions above. The purpose of the study and the details of what this study entails were explained to all the recruited patients. The blood pressure of these patients was measured at the time of admission. Detailed history of the patient was taken to find out the duration of hypertension, use of any antihypertensive medication and compliance with antihypertensive medication. The weight of the patient in kilograms was measured with the help of a digital electronic scale and height was measured with the help of a stadio-meter. Body mass index (BMI) was calculated using the formula: BMI = weight in kg/square of height in meters. The old record of the patient was examined to determine if there is history of previously diagnosed diabetes (for at least the past 3 months). All of these patients had received the standard of care management for hemorrhagic stroke which is routinely given in such cases. All of the data was recorded in pre-designed proforma for subsequent analysis.

The data was entered and saved in SPSS version 23. To analyze the data, descriptive statistics was used. Frequencies and percentages were calculated for categorical variables such as gender, use of antihypertensive medications, compliance with antihypertensive medications and history of previously diagnosed diabetes. Mean and standard deviation was calculated for the numerical variables for example age, weight, height, BMI and duration of hypertension. The presence/absence of severe hypertension was stratified according to different age groups, gender, height, weight, BMI, duration of hypertension, history of previously diagnosed diabetes, previous use of antihypertensive medications and compliance with antihypertensive medications. Post-stratification chi squared test was applied in which a p-value of 0.05 or less was considered significant. All data was displayed in the form of graphs and tables.

RESULTS

In this study, age distribution amongst 90 patients was evaluated as, 11 (12%) patients have been in age variety of 30-40 years, 30 (33%) sufferers have been in age range 41-50 years and 49 (55%) patients have been in age range 51-60 years. Mean age was 53 years with SD ± 10.02.

The gender distribution amongst ninety patients was analyzed as 56 (62%) patients were men and 34 (38%) were women. Body Mass Index (BMI) of patients was assessed as, 52 (58%) patients had BMI less than 25 kg/m^2 while 38 (42%) patients had BMI more than 25 kg/m^2. Mean BMI was 26 kg/m^2 with SD ± 3.3. Duration of hypertension amongst ninety sufferers have been evaluated as 33 (37%) patients had duration of hypertension ≤ 3 years while 57 (63%) had duration of HTN >3 years. Mean duration of elevated BP was 3 years with SD ± 3.14 Among 90 patients, 28 (31%) patients were diabetic while 62 (69%) patients were non diabetic.

Use of antihypertensive medications was analyzed as, 79 (88%) patients had use of antihypertensive medications while 11 (12%) patients had no use of antihypertensive medications 72 (80%) patients had compliance with antihypertensive medications while 18 (20%) patients didn't had compliance with antihypertensive medications.

Table 1: Severely elevated blood pressure with age distribution

	Age of patients			Total
	30-40 years	41-50 years	51-60 years	
Total (N)	**11**	**30**	**49**	**90**
Severe Hypertension				
Present	2 (18.2%)	5 (16.7%)	9 (18.4%)	16 (17.8%)
Absent	9 (81.8%)	25 (83.3%)	40 (81.6%)	74 (82.2%)

P value <0.05

Extremely high blood pressure among patients was explored as 16 (18%) patients had severely elevated blood pressure while 74 (82%) patients didn't had extremely raised blood pressure, the mechanism is still unknown how the normotensive patients develop ICH. Stratification of very high blood pressure with respect to age gender and initial GOS score is given in (Table 1-2).

Table 2: Stratification of severely elevated blood pressure compliance with antihypertensive medications

	Compliance with antihypertensive medications		Total
	Compliant	Non-compliance	
Total (N)	**72**	**18**	**90**
Severe Hypertension			
Present	2 (18.2%)	14 (46.7%)	16 (32.7%)
Absent	70 (636.4%)	4 (13.3%)	74 (151%)

P value <0.05

DISCUSSION

According to the data, every year in the US, round about 795,000 people have new or recurrent stroke. Among them, 610,000 patients having new attacks, and 185,000 patients were those who have recurrent episode of strokes. According to the epidemiologic studies of stroke in the US, approximately 87% of strokes are ischemic, 10% are due to intra-cerebral hemorrhage, and only less than 3% may be secondary to subarachnoid hemorrhage. This study illustrates that mean age was 53 years with SD ± 10.02, among them sixty-two percent patients were male and thirty-eight percent patients were female. The outcomes considered from hematoma expansion and MRI brain DWI signals and from the consciousness, functional status and morbidity and mortality of patients.[8] According to the research of six hundred patients, intracranial hemorrhage and Diffusion weighted image signals in 27%, and associated variables are age, ethincity, White blood cell count, and acute HTN management.

Mean BMI was 26 kg/m^2 with SD ± 3.31. Mean duration of hypertension was 3 years with SD ± 3.14. Eighty eight percent patients had use of antihypertensive medications while 12% of patients did not took antihypertensive medications. Eighty percent patients had compliance with antihypertensive medications while 20% patients were noncompliant to antihypertensive medications. More over 18% patients had extremely raised blood pressure while 82% of patients had no raised blood pressure.

The research conducted by Adnan I et al, had reported that the occurrence of the intense hypertensive response relies upon on affected person selection, study layout and referral patterns.[9] In a systematic review of 18 case studies,[10]extremely elevated BP

response were reported in 52% of patients with stroke at the time of admission. Definition of high blood pressure varied significantly, according to the criteria the systolic BP ranged from 149 to 200 mm Hg and diastolic BP from 90 to 115 mm Hg. In one of the survey conducted in the US using the NHAMC (National Hospital Ambulatory Medical Care),[11] SBP more than 140 mm Hg was recorded in 563,704 (63%) young stroke patients, DBP more than 90 mm Hg in 28% patients, and mean arterial pressure (MAP) more than 107 mm Hg in 38% stroke patients. In the International Stroke Trial (IST),[12] three hundred ninety-eight affected patients were randomized within first 48 hours of stroke onset (median time was 24 hours) from 467 hospitals in thirty-six states. At the time of admission the mean SBP was 160.1 mm Hg, and 82% of patients had very high BP based on the definition of hypertension by WHO (SBP more than 140 mm Hg).

Similar outcomes were observed in another study conducted by Qureshi AI et al, in which of the five lac, sixty-three thousand seventy four patients with stroke, SBP was below 139 mm Hg in 173120, thirty-one percent patients initially, more than 140 to 184 mm Hg in 315207, fifty-six percent patients, 185 to 219 mm Hg in 74586, thirteen percent patients, and 220 mm Hg or greater levels in (0.1%). The four to eight times higher rates of raised BP was recorded in acute stroke than the existing rates of stages 1 and 2 HTN in the United States population. In 6126 (1%) and 2262 (0.4%) patients, labetalol and hydralazine were used respectively. In 1283 patients (0.4%), thrombolytics were utilized, but only in those patients with systolic BP of 140 to 184 mm Hg. Limitations of this research are small sample size, only limited number of patients included in this research. The future directions are: this gave us an idea about the contribution of poor blood pressure control to hemorrhagic stroke in our local population. The data can be used to improve awareness about the importance of effective blood pressure control and encouraging compliance with antihypertensive medications in patients.

CONCLUSION

Our study concludes that the frequency of critically expanded blood pressure was 18% on admission in known hypertensive patients imparting with acute hemorrhagic stroke to the neurology department of The Lady Reading Hospital, Peshawar. Elevated blood pressure is very common in subtypes of stroke, this data offers in addition aid for further research that cope with the treatment of hypertension and clinical outcomes in patients with hyper-acute and acute cerebrovascular accident (stroke).

AUTHORS' CONTRIBUTION:

ZU: Concept and design, data acquisition, interpretation, drafting, final approval, and agree to be accountable for all aspects of the work. SI, MZ, AI, MA, SNP: Data acquisition, interpretation, drafting, final approval and agree to be accountable for all aspects of the work.

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