Correlation of the antihypertensive drugs with the type of stroke in elderly patients.

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ABSTRACT

Introduction:
High blood pressure, also known as hypertension, is a common condition among older individuals and is a major factor in developing cardiovascular diseases, including stroke. A stroke occurs when blood flow to the brain is suddenly disrupted and is a leading cause of long-term disability and mortality worldwide. Antihypertensive medications are essential for managing hypertension by lowering blood pressure and reducing the risk of complications. Scientific research has focused on understanding the relationship between antihypertensive drugs and stroke risk in elderly patients to determine if certain medications offer advantages or disadvantages in preventing stroke.

Objective:
The main goals are to determine the ability of antihypertensive drugs to reduce the risk of stroke in hypertensive patients and to determine whether the type of stroke that occurred was affected by the use of specific antihypertensive drugs.

Methods & Materials:
It was an observational study in four tertiary care hospitals in Peshawar, KP. The sampling technique was randomized, convenient sampling. A total of 151 patients participated in the study, 37 from each hospital. The data was collected from the database records of patients from the institutes with their permission and then analyzed in SPSS 22. Frequency and chi-square tables were made to signify our results.

Results:
A total of 151 patients contributed to the study, 53% of whom were males and 47% females. The association of age groups with the type of stroke (ischemic and hemorrhagic) was significant (p-value =0.035). The association of antihypertensive drugs used with the type of stroke was also substantial (p-value = 0.000).

Conclusion:
The major risk factors are diabetes, age, gender, and hypertension. We found out that people under the age of 40 to 50 years who used calcium channel blockers and beta blockers had a prevalence of ischemic stroke, while those under the age of 60 to 70 years who used ACE inhibitors had a prevalence of hemorrhagic stroke.

Keywords: Antihypertensive agents; Ischemic stroke; Older age; Diabetes; HTN; ACEI; ARB; B-blockers.

INTRODUCTION:

A Stroke is a medical condition in which poor blood flow to the brain results in cell death. There are two main types of stroke: ischemic, due to lack of blood flow, and hemorrhagic, due to bleeding. ~~— Both result in brain parts not functioning properly and cause high blood pressure.~~ Stroke is the 3rd leading cause of death worldwide and is a severe, long-term disability. Most people with a first stroke also have high blood pressure (HBP or hypertension). High blood pressure damages arteries throughout the body, creating conditions where they can burst or clog more easily.[1]

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It is estimated that 87 percent of strokes are ischemic. Different antihypertensive drugs are used for the prevention and treatment of stroke, but still, 87% of people have stroke although they were using antihypertensive drugs.

Stroke is more prevalent in Asian population than in European and American. In America, about 795000 people suffer a stroke each year. Three-quarters of all strokes in people over the age of sixty-five years.[2]

According to the World Health Organization (WHO), 15 million people suffer stroke worldwide each year, 5 million die, and 5 million are permanently disabled. In Pakistan, by 2020, Pakistan will be the most popular country in terms of stroke. According to studies in Major hospitals with busy neurological services in Karachi, 600 stroke patients were admitted over 22 months. The mortality rate in Pakistan is around 30 percent. It is 5th leading cause of death in Pakistan. Standardized mortality rises in People aged 40-70 years very 10-fold in countries with high rates. The stroke mortality rate is very high in underdeveloped and developing countries.it is even more fatal in Hypertensive people or people with family history.[3]

It occurs both in normotensive patients and in those who were receiving antihypertensive therapy before the stroke. In many cases, the hypertension that follows an ischemic stroke is transient, often lasting 24–48 hours. The blood pressure rise is due to 1 or more of the following mechanisms: impaired neurogenic cardiovascular control, autonomic deregulation, bar reflex failure, increased sympathetic drive, reflex response to cerebral ischemia, and mental stress.

Observational studies have shown a U-shaped relation between baseline blood pressure (immediately after the onset of the stroke) and the likelihood of adverse clinical outcomes. In one study, the best prognosis was associated with a baseline systolic blood pressure of about 150 mm Hg.[4]

In another study, the best prognosis was associated with a baseline systolic blood pressure of about 180 mm Hg, and the worst prognosis was a rapid blood pressure fall.[5] Despite these observations, the debate continues over whether such increases in blood pressure should be corrected early after a stroke. The issue is complicated by the clinical heterogeneity of acute ischemic stroke, the complexity of the post-stroke physiological response, and the rapidity of change of cerebral blood flow auto-regulation after stroke onset. Patients with lacunar infarcts — subcortical lesions more common in hypertensive and diabetic patients — tend to have milder

neurologic deficits and higher baseline blood pressures but a better clinical outcome than patients with either atherothrombotic or cardioembolic stroke of the anterior or posterior circulation.[6] Patients with lacunar infarcts more often die of cardiac complications, whereas those with atherothrombotic or cardioembolic stroke die of complications more directly related to the neurologic damage and immobilization. The better outcomes observed among patients with lacunar infarcts can likely be attributed to differences in lesion size since suchinfarcts tend to result in smaller lesions and less damage than atherothrombotic and cardioembolic strokes. However, these outcomes also suggest that a high baseline blood pressure is not necessarily harmful and may even be protective in some stroke patients.[7]

We had two main objectives that are to determine the ability of antihypertensive drugs to reduce the risk of stroke in hypertensive patients and to determine whether the type of stroke that occurred was affected by the use of specific antihypertensive drugs. Stroke probability can also be calculated from the CHA2DS2-VASc score, as mentioned in the following table.

Comment [m4]:

Table: 1Stroke probability

Risk Factors	**Score**
Congestive heart failure/left ventricular dysfunction	1
hypertension	1
Age >75	2
Diabetes mellitus	1
Stroke	2
Vascular diseases	1
Age 64_75	1
sex eg female	1
Maximum score	**9**

Score of 0 or 1 aspirin is given; score of 2 warfarin is given

MATERIALS AND METHODS:

Study Design and Study Period: The current study was a cross-sectional, multi-sectorial study conducted from November 2022 to April 2023.

Study Technique: A prospective, cross-sectional, questionnaire-based study was conducted.

Study Setting: Medicine ward in all tertiary care hospitals (Rehman medical institute, lady reading hospital, Hayatabad medical complex and Khyber teaching hospital.) Peshawar, Khyber Pakhtunkhwa, Pakistan.

Survey Teams: Two survey teams were assembled for the data collection from the three different hospitals of Peshawar.

Selection Criteria: The participants were elderly patients at different hospitals of Peshawar who were using antihypertensive prescribed to them by doctors. Patients who had any chronic comorbid condition or to whom the medication was recently prescribed by the physician were excluded from the trial.

Sampling Methodology: Before the actual survey, the investigator team first tested the validity of the questionnaire on 10% of the sample. After that, four tertiary care hospitals were selected and the survey teams were deployed.

Data Collection: It was a questionnaire-based study in which a Performa was filled by the participants and later the data was analyzed using statistical analyzing techniques. The research team randomly inspects data entry for consistency, accuracy, and completeness across responses.

Data Entry and Data Analysis: The data collected from all the jurisdictions were entered into SPSS version 28. Percentages were calculated for the selected variables. Charts and figures were made through Microsoft Excel.

RESULTS:

The present study was carried out among 151 subjects, as there was the end of session in all the colleges. The mean age of students was 22.4 ± 1.41 years ranging from 19 to 28 years. Among the use and awareness regarding self-medication, 92.7% often self-medicate themselves because they believe they had enough knowledge about the medicine and illness (80%) and the students who had the awareness of the side effects inflicted by the self-medication were 79% as shown in

We have correlated the type of stroke with three parameters in our questionnaire, and they are
1-Age
2-Gender
3-Type of antihypertensive drugs.

Table 2: Demographic table. **n=151**

Age	Frequency	Percentage
40-50	44	29.1
50-60	54	35.8
60-70	29	19.2
70-80	14	9.3
80-90	10	6.6

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Gender		
Male	80	53
Female	71	47

According to our analysis our study was conducted more on people who fall under the age of 29 to 33 years of age and was more conducted on males.

Table 3: Association of age with type of stroke. n=151

Age	**Type of Stroke**		**p value**
	Ischemic	**Hemorrhagic**	
40 -50 yrs.	31	13	0.035
51 – 61 yrs.	28	26	
62 – 72 yrs.	10	19	
73 – 83 yrs.	8	6	
84 – 94 yrs.	7	3	

This table shows relationship between age and type of stroke as the value is significant it shows that people under age of 40 to 50 years of age have more occurrence of ischemic stroke and people under the age of 60 to 70 years of age have more occurrence of hemorrhagic type of stroke.

Comment [m9]: Under should be replaced with between

Table 4: Association of gender with type of stroke. n=151

Gender	**Type of Stroke**		**p value**
	Ischemic	**Hemorrhagic**	
Male	48	32	0.163
Female	36	35	

According to the relation between gender and type of stroke the ischemic stroke is more prevalent in both genders.

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Table 5: Association of antihypertensive drugs used with type of stroke. n=151

Antihypertensive drugs used	**Type of stroke**		**p value**
	Ischemic	**Hemorrhagic**	
Diuretics	7	10	0.000
Beta blocker	3	7	
Ace inhibitor	5	18	
Alpha blockers	3	0	
Calcium channel blockers	29	8	
Angiotensin 2 antagonist	11	5	
Renin inhibitors	0	1	
Diuretics and calcium channels blockers	6	0	
Ace inhibitors and angiotensin 2 antagonist	5	4	
Beta blockers and ace inhibitors	0	5	

Calcium channels blockers and ang 2 antagonist	9	2
Beta blockers and calcium channels blockers	1	6
Diuretics and Angiotensin 2 antagonist	5	1

This table shows the relation between antihypertensive drugs and type of stroke. The P-value is significant which shows the people who used calcium channel blockers have more occurrence of ischemic stroke and people who have used ACE inhibitors have more occurrence of hemorrhagic stroke.

DISCUSSIONS:

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In our research, we aim to find the association of antihypertensive drugs with the type of stroke in older adults in Peshawar. We found out that most people were suffering from ischemic stroke in both genders. We found out that people under the age of 40-70 suffer more from stroke (28%). People under the age group 40-70 suffered more from the ischemic type of stroke, while those under the age group of 60-70 suffered more from the hemorrhagic type of stroke. In the light of our research, we found out that people who used calcium channel blockers and beta blockers had more prevalence of ischemic stroke. At the same time, people who used ACE inhibitors had a higher prevalence of hemorrhagic stroke.

According to research conducted by First Affiliated Hospital of Medical School, Xi'an Jiao Tong University, Xi'an, Shaanxi, China, Compared with hypertensive people who did not use antihypertensive drugs and adhered to ≥3 healthy lifestyle factors, the multivariable-adjusted hazard ratios in hypertensive people who used antihypertensive drugs and adhered to <3 Healthy lifestyle factors were associated with 37% to 42% increased risks of total, ischemic, and hemorrhagic stroke in men and 121% to 131% increased risks of stroke in women.[2]

So, it is concluded that both drug history and a healthy lifestyle are important factors for the prevention of stroke.

According to research conducted in the Department of Medicine, University Hospital, and Malmö, Sweden. In elderly subjects, it has been shown that systolic blood pressure (SBP) elevation, in particular, is the most important risk predictor for stroke. This is also the rationale for treating elevated SBP in older people.
This coexists with our study that hypertension is a risk factor for stroke.
Several clinical trials have repeatedly shown the benefits of blood pressure control for prevention of stroke.[4]

Results of research conducted by National Clinical Research Centre, Kuala Lumpur General Hospital, Kuala Lumpur, Malaysia; Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht, the Netherlands.

A total of 710 patients were included. ACEIs were the most commonly prescribed antihypertensive drug in patients using Angiotensin II suppressors (74%) and CCBs; in patients prescribed with Angiotensin II increased at 77%. There was no significant difference in the severity of ischemic stroke between patients who were using Angiotensin II increases compared

to patients with Angiotensin II suppressors (OR: 1.32, 95%CI: 0.83-2.10, p = 0.24). According to our study, we also found out that people who used ACE inhibitors had a prevalence of hemorrhagic stroke, and those who had calcium channels had a prevalence of ischemic stroke.[5]

Limitations:
Effects of other drugs along with antihypertensive drugs should be taken into account. Research time was short and and lack of drug history of the patients and their knowledge about it.

Recommendations:
Questionnaire canbe made easy so that it is easily understandable. There shall be enough time for data collection so that proper history shall be taken from the patients

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Results:
Hypertension remains most important in the establishment of stroke. Its treatment is most effective in preventing organ related damage. Reduction of BP is more important than everything else. Some antihypertensive drugs offer neuroprotective benefits, those acting on renin angiotensin system blockade. A fixed dose of these drugs may increase patient compliance and persistence to anti-hypertensive treatment. However, further studies are required to elevate more drugs.

Conclusion:
The major risk factors are diabetes, age, gender and hypertension. We found out that people under the age of 40 to 50 years and who used calcium channels blockers and beta blockers had more prevalence of ischemic stroke while those under age of 60 to 70 years who used ACE inhibitors had more prevalence of hemorrhagic stroke. Hypertension remains most important established and modifiable classical risk factor for stroke. Anti hypenstive treatment remains most important in preventing organ damage. A fixed dose combination of these drugs may increase patient compliance and persistence to the treatment.
In conclusion, ARBs and B blocker consistently increase risk for Ischemic stroke. a higher risk factor for b blocker and ARBs was independent of mean BP and BPV, Ca channel blocker most commonly prescribed in the treatment. It is used as a monotherapy. SBP has a great impact on both 5-10 years of stroke risk.

Comment [m13]: under can be replaced with between

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