

Original Research Article


# Clinical profile of stroke in Kashmir

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## Abstract

Stroke is a major health problem in the world ranking among the top three causes of death, after heart disease and cancer in developed countries. We prospectively studied one hundred patients of acute cerebrovascular accident who presented to accident and emergency department. Definite diagnosis was done by cranial imaging. This was conducted last year in our hospital which is a tertiary care hospital in Kashmir valley catering a population of 7 million. We documented hemorrhagic stroke in 79 patients (79%) while 21 patients (21%) had occlusive stroke which is in contrast with most of the studies done earlier (most western studies). Risk factors viz., hypertension, smoking were contributing to the high incidence of stroke. Majority of the patients presented in the 5<sup>th</sup> to 7<sup>th</sup> decade, consistent with other studies. Majority of the patients presented during awake phase and presented with maximum neurodeficit at onset. Majority of the patients had hemiplegia (paresis) 71%. Basal ganglia was the major site of bleed 49.4%. Dietary habits, extremes of climate and decreased physical activity predispose to high incidence of strokes.

## Key words

Stroke, Hemorrhage, Basal ganglia, Hypertension.

## Introduction

Stroke is a major health problem in the world ranking among the top three causes of death, after heart disease and cancer in developed countries [1]. It affects the males 1.5 times more often than females. In average population, the annual incidence of new strokes is 2 per 1000

population [2]. Though the overall prevalence of the stroke is 794 per 100000 population [3].

Stroke is classified by the type of pathology (infarction or hemorrhage) although overlap does occur with the hemorrhagic infarction. Intracranial hemorrhage is subdivided into either intra cerebral or subarachnoid depending upon

site of bleed. Ischemic infarction is classified by the mechanism of ischemia into hemodynamic or thromboembolic. It is also classified on the basis of pathology of vascular lesion into atherosclerotic, lacunar, cardio embolic or indeterminate [4]. Approximately 85% -90% of the strokes are due to cerebral infarction and 10-15% due to brain hemorrhage. Hemorrhage constitutes a large percentage in Asia [3].

Brain receives approximately 800 ml of blood/min. Overall, regional cerebral blood flow is 40-60 ml/100gms/min. The Brain must receive adequate and continuous supplies of oxygenated blood and glucose because there are few energy reserves within the metabolically active organ. Oxygen consumption in the cerebral cortex averages approximately 6 ml/100gms/min in the grey matter and 2 ml/100gms/min. in the white matter. Glucose consumption average 4.5-7 mg/100gms/min with wide spread regional variation. Oxidative metabolism of the glucose is the major way of supplying energy to the brain [4].

Most aneurysms present as sudden subarachnoid hemorrhage without any prodromal warning symptoms. Occasionally, prodromal symptoms suggest the location of a progressively enlarging unruptured aneurysm e.g.; 3<sup>rd</sup> nerve palsy, 6<sup>th</sup> nerve palsy. Aneurysms can undergo small ruptures into subarachnoid space called warning leaks. Sudden unexplained headache at any location should raise suspicion of subarachnoid hemorrhage [5]. Under normal conditions ionic homeostasis of neurons is maintained with a large intracellular gradient, which is maintained by various ATP dependent ionic pumps [6]. Immediately, after Ischemia begins these energy dependent pump fail, leading to the rapid intracellular accumulation of sodium and chloride ions accompanied by inflow of water leading to cytotoxic edema [7]. Calcium also begins to enter the cell via Voltage and receptor mediated calcium channels. Intracellular Calcium released from the mitochondria and endoplasmic reticulum alter the onset of ischemia causes a substantial rise in free intracellular calcium

which leads to irreversible injury by a variety of mechanisms. Another important cause of injury to the nerve cells is production of intracellular lactic acidosis [4].

In the first quarter of 20<sup>th</sup> Century the diagnosis of the stroke was made by history, clinical neurological examination which was supplemented by CSF examination, later the diagnosis would be revised by necropsy. Charles D. Aring, H Houston Merritt in 1935 made diagnosis on such lines [7]. They analyzed 245 cases with lesions of cerebral vessel disease in which the clinical diagnosis was proved at necropsy. Currently recognized risk factors for cerebrovascular disease include hypertension, diabetes mellitus, heart disease, TIA, hyperlipidemia, cigarette smoking, estrogens therapy, alcohol consumption and obesity [8]. Literature regarding stroke in Jammu and Kashmir State is scarce thus this study was undertaken to assess the relative frequency of occlusive (thromboembolic) and hemorrhagic stroke separately and clinical presentation of subtypes of stroke in population of Kashmir region of Jammu and Kashmir State.

## **Materials and methods**

The present study was conducted in Department of Radiodiagnosis, SMHS hospital, Jammu and Kashmir, India. Round the clock emergency services are rendered to the patients and most of the patients with stroke are referred to this hospital,

All the patients who presented symptoms of stroke were assessed last year, a maximum of 100 patients within this time period was assessed for the relative frequency of occlusive (thromboembolic) and hemorrhagic stroke separately and clinical presentation of subtypes of stroke in this selected population. The sample was taken by a quota sampling method where 100 patients presenting stroke within this time period were selected.

The patients coming to the department of Radiodiagnosis within these periods were subjected to detailed Neurological examination, from which a clinical impression of the case was made. These findings were substantiated by CT scanning of the cranium and lumbar puncture if indicated. All the patients who presented with stroke like illness irrespective of associated comorbid illness, age and sex were included in the study. In addition basic investigation like hemogram, serum biochemistry, chest X-ray, ECG were performed. Their lipid profile was also studied. CT was often the first neuroradiologic test used when the patient

presented with symptoms suggestive of ischemic infarction or hemorrhage.

### Results

A total of 100 subjects (59 males and 41 females) were registered for the study (**Table - 1**). 79 of these had hemorrhagic stroke whereas 21 had occlusive stroke. The mean age of the subjects was 57.41±12.4 years with a male: female ratio of 1.44:1. There was a significant difference in the number of the male and female patients (p>0.4).

**Table – 1:** Demographic characteristics of various patients groups.

Age in years						
		All Cases	Male	Female	t	p
1.	<b>Overall(n)</b>	100	59	41	0.68	>0.4
	<b>Age Mean±SD</b>	57.4±12.41	58.98±13.6	55.1±10.2		
2.	<b>Hemorrhagic stroke(n)</b>	79	47	32	0.41	>0.6
	<b>Age Mean±SD</b>	56.92±10.7	57.83±11.8	55.59±8.9		
3.	<b>Occlusive stroke(n)</b>	21	12	9	19	>0.8
	<b>Age Mean±SD</b>	59.14±17.6	63.5±19.1	53.33±14.6		

**Table - 2:** Risk factor profile of various patients with stroke.

Risk Factor	All cases (n=100)	Hemorrhagic (n=79)	Occlusive (n=21)
<b>Hypertension</b>	73 (73)	53 (72.2)	16(76.2)
<b>Smoking</b>	53 (53)	43 (54.4)	10(47.6)
<b>Hypercholesterolemia</b>	31 (31)	20 (25.3%)	11(52.4%)
<b>Diabetes mellitus</b>	5 (5)	5 (6.3)	--
<b>TIA</b>	11(11)	6 (7.6)	5(23.8)
<b>&gt;2 risk factors</b>	59 (59)	43(54.4)	16(76.2)

**Table - 3:** Status of activity of various patient groups at presentation.

	All [N=100 (%)]	Hemorrhagic [n=79 (%)]	Occlusive [n=21 (%)]
<b>While Awake</b>	69 (69)	60(75.9)	9(42.6)
<b>During Sleep</b>	27(27)	16(20.25)	11(52.4)
<b>Unknown</b>	04- (04)	03(3.8)	01(4.)
	100	79	21

**Table - 2** presents the risk factor profile of patient with stroke. Eleven patients (6 with hemorrhagic stroke and 5 with occlusive stroke) had history of Transient Ischemic Attacks (TIAs) or stroke in the past (>1 year ago). The other important findings shown are that > 2 risk factors

were present in 59% of all cases Comorbid illness was present in 10 patients. This includes rheumatic heart disease (3), ischemic heart disease (4), acute renal failure (2), and chronic renal insufficiency (1).

**Table - 4:** Presenting symptoms of various patient group.

Symptoms	All cases [n=100]	Hemorrhagic [n=79 (%)]	Occlusive [n=21 (%)]
Motor deficit	91	72(91.1)	19(90.5)
Headache	62	54(68.4)	8(38.1)
Vomiting	55	48(60.8)	7(33.3)
Altered consciousness	50	45(56.9)	5(23.8)
Speech disturbances	59	50(63.3)	9(42.9)
Sensory abnormalities	29	23(29.1)	6(28.6)
Vertigo	13	10(12.6)	3(14.2)
Convulsions	12	10 (12.7)	2(9.5%)
Visual disturbances	12	8(10.1)	4(19.0)
Sphincter disturbances	48	39(49.4)	9(42.9)

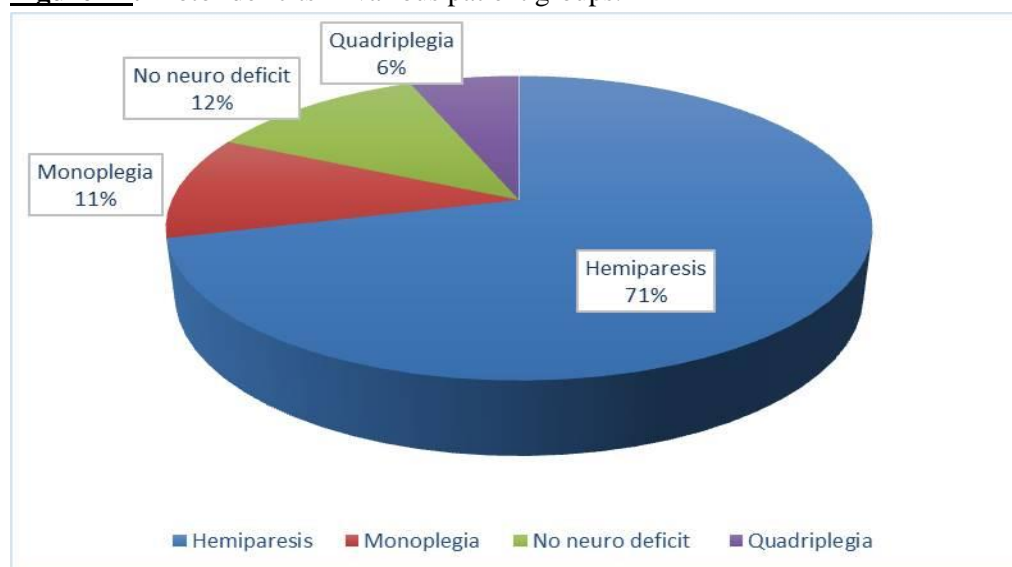
**Table - 5:** Neurological signs in various patient groups.

Signs	All cases [n=100]	Hemorrhagic [n=79]	Occlusive [N=21]
Motor deficit	89 (89)	69 (87.3%)	20(95.2%)
Sensory abnormalities	27 (27)	21(26.58)	6(28.6)
Facial paresis	51 (51)	37(46.8)	14(66.7)
Meningeal irritation	18(18)	18(30.4)	--
Cerebellar signs	03 (03)	03 (3.8)	--
Lobar signs	09(09)	08 (10.1)	01(4.8%)

**Table - 6:** Site of bleed in various hemorrhagic stroke patients on CT.

Site	Total [n (%)]	RT [n (%)]	LT [n (%)]
Basal ganglia	39 (49.4)	24 (64.9)	15 (40.5)
Thalamus	15 (18.9)	11 (73.3)	4 (26.7)
Lobar	11 (13.9)	5 (45.5)	6 (54.51)
Brainstem	4 (5.1)	-	-
Cerebellum	2 (2.5)	-	2 (100)
SAH	8 (10.1)	-	-

**Figure - 1:** Motor deficits in various patient groups.



**Table - 3** presents the status of activity of various patient groups at presentation. Hemorrhagic stroke occurred more commonly while awake (75.9%). More than 50% occlusive strokes occurred during sleep.

Symptoms of various patient groups are presented in **Table - 4**. Motor deficit was seen in highest number of patients (91). Headache, vomiting, altered consciousness and speech disturbances were seen in more than 50 cases and these were the predominant symptoms in hemorrhagic stroke while Vertigo, Convulsions, Visual disturbances were seen in less than 15 patients.

Neurological signs in various patient groups are shown in **Table - 5**. Motor deficit and facial paresis were common neurological signs in occlusive strokes.

**Figure - 1** shows the motor deficits in various patient groups. Hemiplegia (paresis) was the major (71%) motor deficit, Monoplegia (paresis) (11%), Quadriplegia 06% and No neurodeficit was seen in 12%.

Site of bleed in various hemorrhagic stroke patients on CT is detailed in **Table - 6**. Basal ganglia were seen as the major site of bleed in 49.4% subjects while Cerebellum was seen in only 2.5 %.

## Discussion

Stroke is a major health problem in the world ranking among the top three causes of death after heart disease and Cancer in developed countries [1]. Stroke commonly occurs after the age of 50 years but is not uncommon below it. It affects the male 1.5 times more often than females [2]. Stroke is a clinical syndrome consisting of a constellation of neurological finding, sudden or rapid in onset, which persists for more than 24 hours and whose vascular origin are limited to Thrombotic or embolic occlusion of a cerebral artery resulting in infarction or Spontaneous rupture of a vessel resulting in intra cerebral or

subarachnoid hemorrhage [9, 10]. Approximately 85-90% of the stroke is due to Ischemic cerebral infarction and 10-15% due to parenchymal hemorrhage. Hemorrhage constitutes a large percentage in Asia [3]. Cerebral hemorrhage is more common in oriental than occidental (western) population.

The results of the present study are not in accordance with previous study carried out by Dalal PM, et al. in 1968 published a report on cerebrovascular disease in west central India where it was found that 82.7% strokes were due to Ischemic cerebrovascular disease and 17.3% due to hemorrhagic stroke [5]. Similarly, Bamford J, et al. in 1990 found cerebral infarction in 81% [11]. Primary intracerebral hemorrhage in 10%, SAH in 5%, uncertain 5% has been reported by Lindgreen Arne, et al. in 1994 in a population base study [12]. In accordance to these studies Matsumoto N, et al. found among 930, patients 75% due to thrombotic infarction, 10% embolic infarction and 11% due to intra cerebral hemorrhage while Ostfeld AM, et al. (1974), in their study 80% of the stroke were due to the thrombotic occlusion [13, 14] 1% due to embolic occlusion, 12% due to hemorrhage. Zupping R, et al. (1976) a study conducted in Tartu Estonia, USSR among 667 patients 80% were occlusive, 13% were hemorrhagic [15]. In most of the above studies the frequency of these stroke were reverse of the present study. The reasons for change in pattern of cerebrovascular disease could be either Less sample size, Extremes of climatic conditions or Thrombotic stroke with minor neurodeficit and altered sensorium, as these are managed at peripheries or at home. While as patient of hemorrhagic stroke with altered sensorium and extensive neurodeficit are referred to the tertiary referral Centre. Patient with occlusive stroke with mild neurodeficit usually seek neurologist advice late, are not the formal candidate for admission in the hospital.

The results of the present study depict that Age wise distribution of 100 patients of cerebrovascular disease revealed majority of

patients with stroke were in the age group of 40-80 years (91%). These observations are comparable with the study carried out by Aring CD and Merritt HH who found majority of cases were between 50 -80 years (92%) [7]. Various risk factors which were studied in the study included hypertension, smoking, hypercholesterolemia, diabetes Mellitus, previous TIA and stroke. In all types of strokes hypertension was found in more than two-thirds of patients (73%) and two or more than two risk factors were found in more than half of the patients (59%), eleven patients had a prior history of TIA (Transient ischemic attack) or stroke in the past. Our findings are consistent with the pattern of risk factor by Foulkes MA, Wolf PA, et al. and Davis LE, Xie JG, et al. so who found prevalence of chronic hypertension in 72-75%, diabetes in 4-15% and preceding TIA in 11-19% [16, 17]. However, our data was not consistent with Bogouslasky J, et al. who found hypertension in 45.5%, diabetes mellitus in 12.6% and hypercholesterolemia in 14.5% and smoking in 45.6% [10]. When these risk factors were stratified in terms of occlusive and hemorrhagic stroke hypertension and smoking were found in majority of patients more than 50%. We found that hypertension is the most powerful predictor of stroke and is a risk factor in nearly 70% of stroke patients which is consistent with other studies [18]. About (81%) of the patient had maximum deficit at onset of neurological symptoms only 19(19%) had stroke in evolution, 87.3% of the hemorrhagic stroke presented with maximum deficit at onset, more than half of the occlusive stroke presented suddenly which is consistent with the Flora GC, et al. [18]. More than two-third (75.9%) of hemorrhagic stroke developed stroke during awake phase, about half of the occlusive stroke developed during awake period. The data is not comparable to many previous studies [19].

Motor deficit in our study ranged from Monoplegia in 11%. hemiplegia in 71%, which included 75.3% hemorrhagic stroke and 61.9% occlusive stroke, quadriplegia 6%, out of which 66.7% in hemorrhagic and 33% in occlusive

stroke, Speech disturbances were found in 39% out of which 63.3% had hemorrhagic stroke, 42.9% had occlusive stroke. The results of the present study are not comparable with the study lead carried out by Walker AE, et al., who found hemiplegia in 56.8% which included 53.8% hemorrhagic stroke and 62.0% ischemic stroke [19]. However, our results are comparable with the above mentioned study speech disturbance (60%). Speech disturbances were present in terms of sp 41. 59% of our patients which included dysarthria in 16%, motor aphasia 17%, sensory aphasia in 14% and global aphasia in 12% of the patients. Our results were comparable in terms of hemiplegia with the study carried out by Hatano S who reported it as 70% [20].

In present study, major site of bleed in 79(79%) of cases with hemorrhagic stroke on CT was found in Basal ganglia 39(49.4%), thalamus 15(18.90%), lobar 11(13.9%), Brainstem 4(5.1%). cerebellum 2(2.5%), subarachnoid hemorrhage in 8(10.1%). There were total of 79% hemorrhagic strokes and 21% occlusive strokes. Our results are somewhat similar to the study conducted by Wiggins Stoves in which hemorrhage was most frequently found to be in the Basal 56%, pons 3%, cerebellum 16%, Thalamus 9% and others 16% [21]. It was also similar to study by Aring CD and Merritt HH in which basal ganglia bleed was 50%, Brain stem 0.86%. Midbrain 2.5%, cerebellum 1.72% and lobar bleeds were 39.9% [7].

## **Conclusion**

The observations of the present study concluded that, Hemorrhagic stroke is the most common stroke in the valley of Kashmir which constituted about 79% while 81% of all the stroke patients had maximum neurological deficit at onset. It was also observed that 42.6% of the occlusive stroke occurred during awake phase. Moreover, Basal ganglionic bleed are common (49.4%) while, Hypertension was found to be the most common risk factor.

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