IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 22, Issue 10 Ser.5 (October. 2023), PP 29-34
www.iosrjournals.org

MRI Brain Spectrum Of Clinically Suspected Stroke

Piyush Bansal[1], Bhavika Garg[2], Monu Sarin[3], Rajesh Arora[4], Disha Gupta[5], Kashish Garg[6], Shiv Gaurav Rajput[7]

1&2. Junior residents, Department of Radio diagnosis, SGT medical college, Gurugram
3. Professor, Department of Radio diagnosis, SGT medical college, Gurugram
4. Assosiate Professor, Department of Radio diagnosis, SGT medical college, Gurugram
5. Assistant Professor, Department of Radio diagnosis, SGT medical college, Gurugram
6. Senior resident, Department of Radio diagnosis, SGT medical college, Gurugram
7. Junior resident, Department of Radio diagnosis, SGT medical college, Gurugram

Abstract:
Background*: In many nations, cerebral ischemic stroke remains to be the predominant factor in death and disability.MRI is crucial for stroke patients, especially those with acute ischemic stroke.MR techniques, however, have been shown to be much more sensitive than conventional CT for determining the presence of early infarction*
Materials and Methods*: MRI scans on a 1.5 T Philips Multiva were performed on all patients referred to the Department of Radio-Diagnosis at SGT Medical College, Gurugram for a period of 6 months with clinically suspected stroke.Sequences used are T2WI axial and coronal, flair axial, gradient echo axial, T1WI axial, DWI axial and ADC maps. All collected data were evaluated using standard statistical methods and analyzed by SPSS software.*
Results*:The study of 50 patients showed that 78% of them had infarcts, 10% had haemorrhage and 12% had stroke mimics.Males in age group of 60- 69 years were found to be the most vulnerable population with left MCA territory most commonly involved.*
Conclusion: *The findings of our study are quite comparable to those of other stroke surveys. Different stroke patterns may be caused by genetic, environmental, or societal causes as well as variations in the way risk factors are managed.*
Key Word*:Stroke, Haemorrhage, Stroke mimics, and MRI.*

Date of Submission: 08-10-2023 Date of Acceptance: 18-10-2023

I. Introduction

In many nations, cerebral ischemic stroke continues to be the predominant factor in death and disability. Stroke is characterized as a sudden, localized neurological deficit, more preciselycaused by cerebrovascular illness.[1]MRI is crucial for stroke patients, especially those with acute ischemic stroke. It aids in the early detection of hemorrhagic stroke, differentiating irreversible infarcted tissues from salvageable tissue, identifying vascular malformations, treatment planning for intravenous thrombolysis, and outcomes prediction. Other causes of stroke are distinguished, including stroke mimics like cerebral venous thrombosis, tumors, metabolic disturbance, and peripheral or cranial nerve disorders.[2,3]

Recent developments have made neuroimaging an essential component of stroke therapy. Disability and long-term stroke consequences are still common despite recent improvements in the fields of neuroradiology and interventional neuroradiology for the early therapy of acute stroke and a drop in death and morbidity rates.[4,5,6,7]

In the past, CT was used more frequently to evaluate patients who had acute and hyperacute strokes. Advanced MR techniques, however, have been shown to be much more sensitive than conventional CT for determining the presence of early infarction; in addition, these MR techniques offer unique information that is likely to be crucial for managing early stroke.[8]

The majority of infarcts can be seen with conventional MR sequences, although diffusion weighted MR imaging is more sensitive to the presence of hyperacute ischemia.[9]

II. Material And Methods

This prospective observational study was carried out on patients of Department of Radio-diagnosis, SGT Medical College, Hospital & Research Institute, Gurugram over a period of 6 months. A total 50 subjects (both male and females) irrespective of age were included in this study.

Study Design: Prospective observational study

Study Location: This was a tertiary care teaching hospital based study done in Department of Radio-diagnosis, SGT Medical College, Hospital & Research Institute, Gurugram.

Study Duration:6 months.
Sample size: 50 patients.
Sample size calculation: The sample size was estimated on the basis of footfall of patients to SGT medical college with suspicion of stroke.
Subjects & selection method: The study population was drawn from consecutive patients who presented to Department of Radio-diagnosis, SGT Medical College, Hospital & Research Institute, Gurugram with clinically suspected stoke and were referred for MRI brain.

Inclusion criteria:
1. Patients with clinically suspected stoke, irrespective of age and gender.

Exclusion criteria:
1. Patients having metallic implants (non-MRI compatible) & pacemakers.
2. Extremely obese patients.
3. Patients with claustrophobia.

Procedure methodology

After written informed consent was obtained, a well-designed questionnaire was used to collect the data of the recruited patients. The questionnaire included socio-demographic characteristics such as age, gender, complains and symptoms.

The MR examination was performed on all patients who had a clinical suspicion stroke.MRI was carried out using a specialized head coil for the best signal capture on a 1.5 Tesla MR Unit: Philips Multiva.

Statistical analysis

Data was analyzed using SPSS version 20 (SPSS Inc., Chicago, IL). All data were evaluated using standard statistical methods. Descriptive statistics like-Tabulations, graphs & charts, proportions, percentages etc. were formulated.

III. Result

50 patients admitted to SGT medical college with clinical suspicion of cerebral infarct were taken up for MR brain, showed: -

- 39 patient had infarct
- 5 had haemorrhage
- 6 had stroke mimic.

Table 1: Showing case distribution according to findings.

	No. of cases	Percentage
Infarcts	39	78%
Haemorrhage	5	10%
Stroke mimics	6	12%

Figure 1: Showing case distribution.

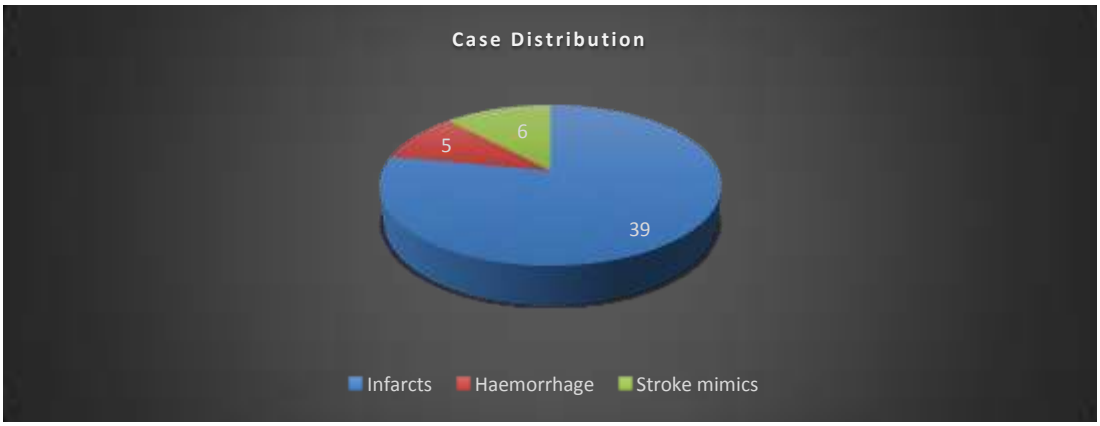
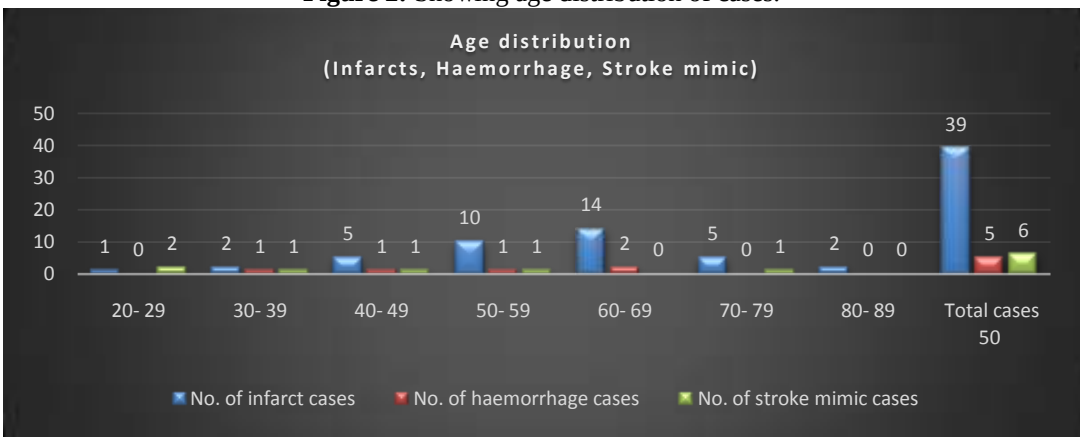


Table 2: Showing age distribution of cases.

Age group	No. of infarct cases	No. of haemorrhage cases	No. of stroke mimic cases
20- 29	1	0	2
30- 39	2	1	1
40- 49	5	1	1
50- 59	10	1	1
60- 69	14	2	0
70- 79	5	0	1
80- 89	2	0	0
Total cases 50	39	5	6

Figure 2: Showing age distribution of cases.

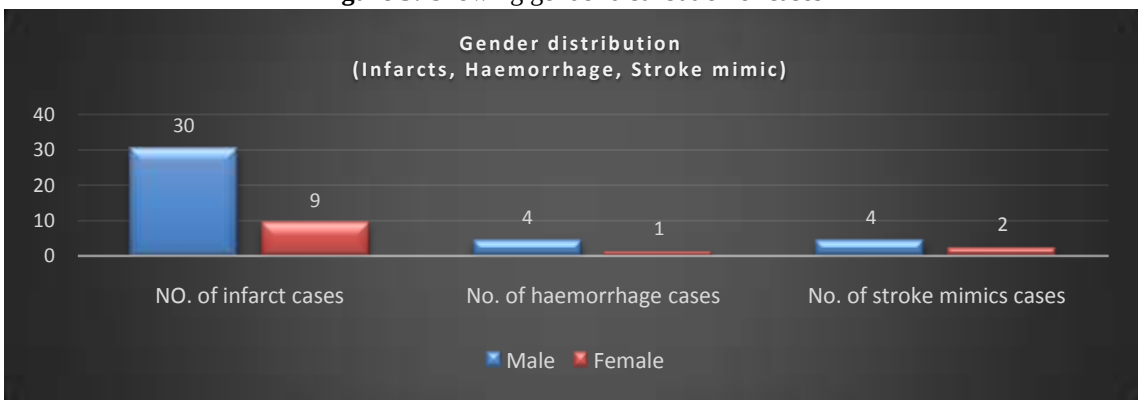


Maximum no. of patients with infarcts were in age group of 60- 69. No significant age distribution was noted in cases with haemorrhage and stroke mimics.

Table 3: Showing gender distribution of cases.

Gender	NO. of infarct cases	No. of haemorrhage cases	No. of stroke mimics cases
Male	30	4	4
Female	9	1	2

Figure 3: Showing gender distribution of cases

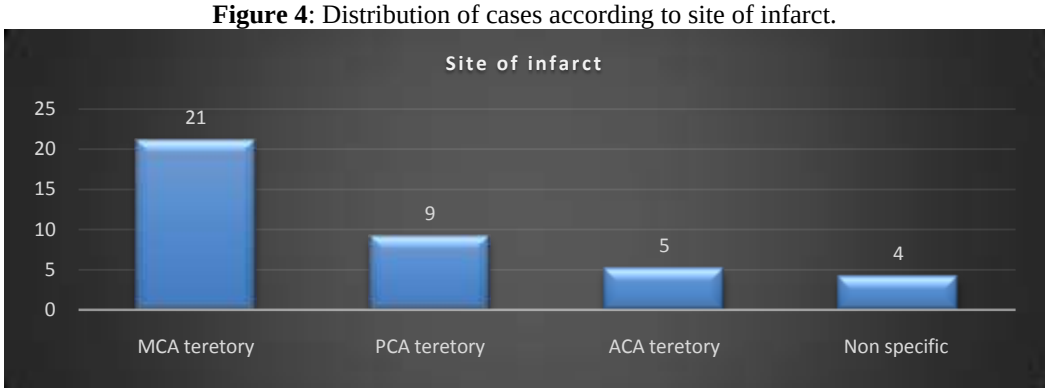


Males had preponderance over female in cases of infarcts, haemorrhage and stroke mimics.

Table 4: Distribution of cases according to site of infarct.

Site of infarct	No. of cases	Percentage
MCA teretory	21	54
PCA teretory	9	23
ACA teretory	5	13
Non specific	4	10

Figure 4: Distribution of cases according to site of infarct.

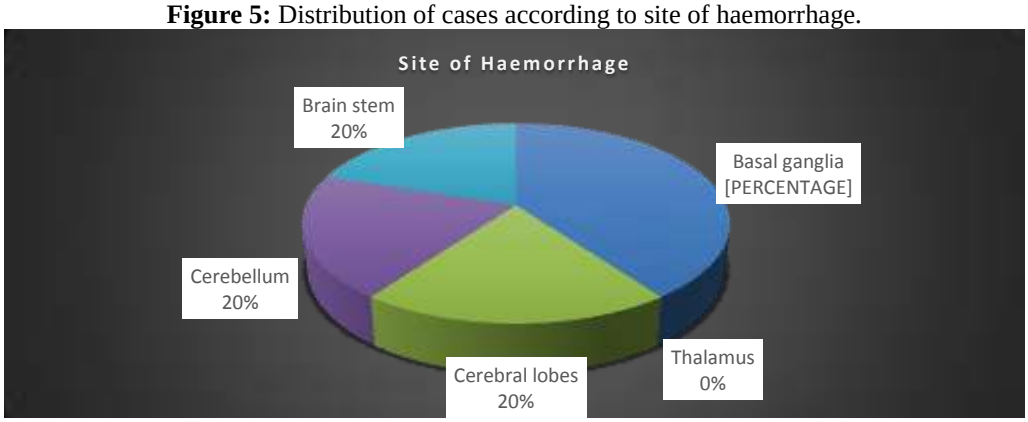


Out of 39 patients with infarcts, 21 were in MCA territory, 9 were in PCA territory, 5 were in ACA territory and remaining 4 were in non-specific locations.

Table 5: Distribution according to site of haemorrhage

Site of haemorrhage	No. of cases	Percentage
Basal ganglia	2	40
Thalamus	0	0
Cerebral lobes	1	20
Cerebellum	1	20
Brain Stem	1	20

Figure 5: Distribution of cases according to site of haemorrhage.



Out of cases with haemorrhage, basal ganglia was the most common site.

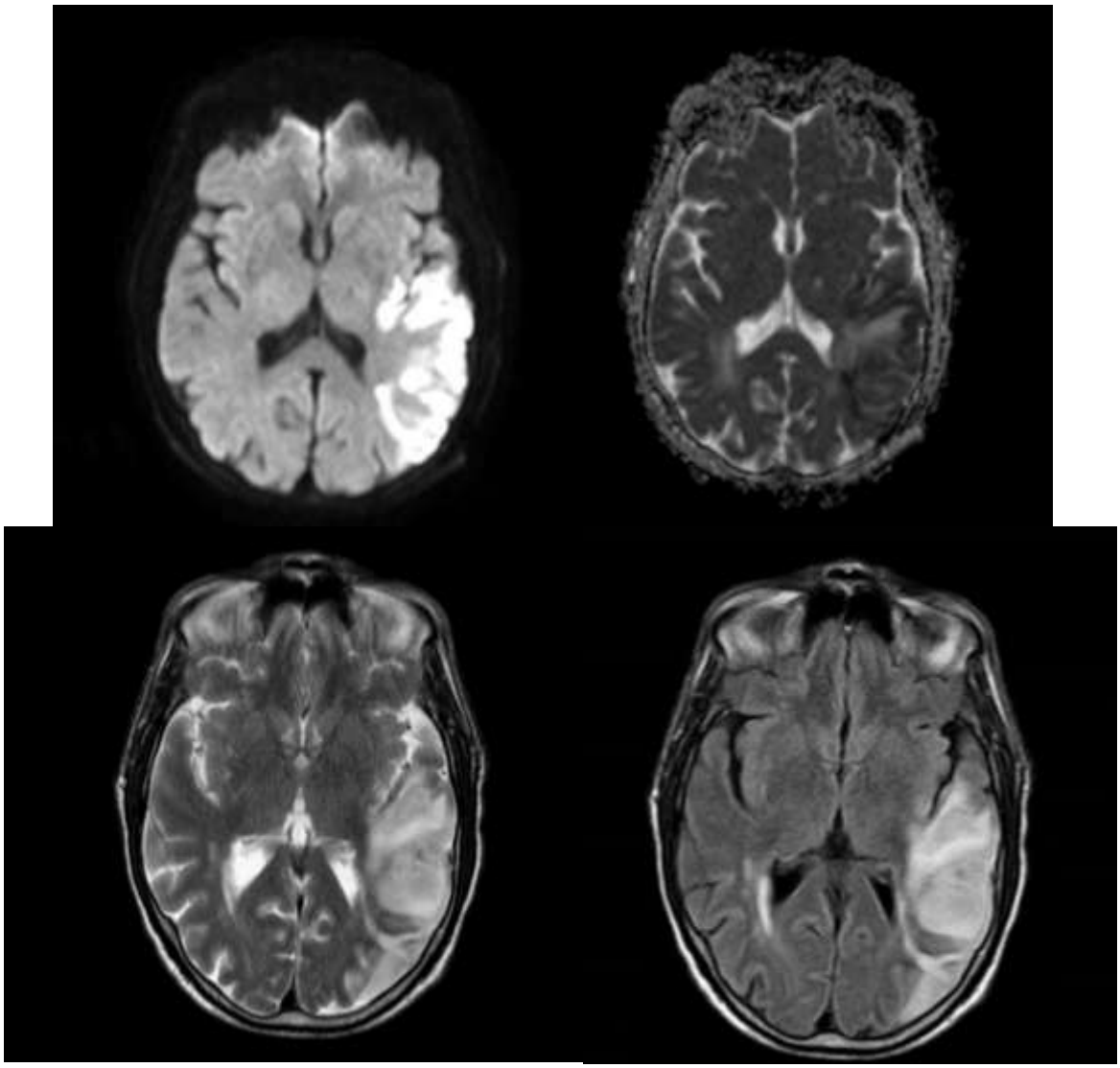


Figure 6: MRI brain of 60 year old patient, diffusion restriction seen as high signal intensity on DWI(a) and signal drop on subsequent ADC(b) sequences. Hyperintensity in left parieto-occipItal region seen on T2 (c) and FLAIR(d) sequences, finding consistent with acute infarct involving the left MCA territory.

IV. Discussion

The goal of this study was to evaluate the use of MRI in patients who had cerebral ischemic strokes, distinguish them from hemorrhages and other stroke mimics, and investigate common geographical involvement in ischemic stroke, common age group, and sex after an ischemic stroke.

A total of 50 patients who had a clinical suspicion of having a stroke underwent a brain MRI; of these, 39 (78%) had cerebral infarction and 5 (10%) had intracerebral hemorrhage.

The Framingham study found that cerebral atherothrombosis and cardioembolism caused 85% of cases of ischemic stroke, as well as 7.3% of subarachnoid hemorrhages, 6.7% of parenchymal hemorrhages, and 1.70 percent of other forms of hemorrhages.[10]

Patients with age group of 2nd to 8th decade were included in the study, and showed that patients with age group of 60- 69 were the most common age group involved. This was consistent with studies by A. Shuaib et al., which had shown a comparable mean age of onset of 66 years, and by Hideo Tohgi et al., which had reported a mean age of 65.6 years.[11]

Among our 50 cases, 38 (76.0%) were males and 12 (24%) were females. In our investigation, a clear male preponderance was seen. This was consistent with research by Hideo Tohgi et al. and A. Shuaib et al.[11,12]

39 (78%) of the 50 cases we saw had infarction. The MCA accounted for 54% (21 cases) of all infarcts in our study, making it the most prevalent vascular area. Additionally, H. Naess et al. found that, mostly in male participants, the left MCA territory was more involved than the right MCA territory. This might be linked to either more common left carotid artery atherosclerosis, cortical lateralization, or both.[13]

Our study showed that out of 39 patients with infarct 25 had acute infarct. In patients with acute infarcts the traditional T2W and DWI sequences were both positive in 15 cases(60%). There were 10 (40%) acute infarcts that were only visible on diffusion and not on traditional imaging (T2W). These findings were consistent with study done by Mullins ME. et al. found that DWI had a 97% sensitivity and 100% specificity, conventional MRI had a 58% sensitivity and 100% specificity, and CT had a 40% sensitivity and 92% specificity.[14]

10% (5) of the participants in our study had hemorrhagic strokes and basal ganglia being the most common site. Our results were comparible with the study of Yamamotel, et al. which revealed 42% basal ganglia involvement, 8% cerebellar, 4% thalamic, 6% brainstem, and 40% lobar involvement.[15]

6 (12%) patients presented as stroke mimics. Out of which 3 patients had cerebral venous thrombosis; 2 patients had tumour and 1 had metastasis.

V. Conclusion

The findings of our study are quite comparable to those of other stroke surveys. Different stroke patterns may be caused by genetic, environmental, or societal causes as well as variations in the way risk factors are managed.

MRI is non-invasive and radiation risk-free. MRI's multiplanar imaging capacity and excellent grey-white matter resolution aid in the early diagnosis of stroke. Our study found that diffusion weighted imaging improves the traditional MR assessment's sensitivity and specificity. DWI plays a significant role in the treatment of stroke.

References

[1]. Chan LL, et al. Diffusion weighted MR imaging in acute stroke : The SGH experience. Singapore Med J 2002;43(3):118-123.

[2]. Hand PJ, Kwan J, Lindley RI, Dennis MS, Wardlaw JM. Distinguishing between stroke and mimic at the bedside: the brain attack study. Stroke. 2006 Mar;37(3):769-75. [PubMed]

[3]. Allder SJ, Moody AR, Martel AL, Morgan PS, Delay GS, Gladman JR, Fentem P, Lennox GG. Limitations of clinical diagnosis in acute stroke. Lancet. 1999 Oct 30;354(9189):1523. [PubMed]

[4]. Benjamin EJ, Blaha MJ, Chiuve SE, Cushman M, Das SR, Deo R, de Ferranti SD, Floyd J, Fornage M, Gillespie C, Isasi CR, Jiménez MC, Jordan LC, Judd SE, Lackland D, Lichtman JH, Lisabeth L, Liu S, Longenecker CT, Mackey RH, Matsushita K, Mozaffarian D, Mussolino ME, Nasir K, Neumar RW, Palaniappan L, Pandey DK, Thiagarajan RR, Reeves MJ, Ritchey M, Rodriguez CJ, Roth GA, Rosamond WD, Sasson C, Towfighi A, Tsao CW, Turner MB, Virani SS, Voeks JH, Willey JZ, Wilkins JT, Wu JH, Alger HM, Wong SS, Muntner P., American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart Disease and Stroke Statistics-2017 Update: A Report From the American Heart Association. Circulation. 2017 Mar 07;135(10):e146-e603. [PMC free article] [PubMed].

[5]. Xu J, Murphy SL, Kochanek KD, Arias E. Mortality in the United States, 2015. NCHS Data Brief. 2016 Dec;(267):1-8. [PubMed]

[6]. Xu J, Kochanek KD, Murphy SL, Tejada-Vera B. Deaths: final data for 2007. Natl Vital Stat Rep. 2010 May;58(19):1-19. [PubMed]

[7]. Hankey GJ. Stroke. Lancet. 2017 Feb 11;389(10069):641-654. [PubMed]

[8]. Atlas SW. Magnetic resonance imaging of the brain and spine. 4th edn., Philadelphia, London : Lippincott Williams and Wilkins; 2009 p.772-773.

[9]. Srinivasan A, Goyal M, Azri FA, Lun C. State of the art imaging of acute stroke. Radiographics 2006;26:875-895.

[10]. Adams RJ, et al. American Heart association, American stroke association: Framingham study update to the AHA/ASA recommendations for the prevention of stroke in patients with stroke and transient ischemic attack. Stroke 2008;39:1647.

[11]. Tohgi H, et al. Cerebellar infarction – clinical and neuroimaging analysis in 293 patients. Stroke 1993;24:801-804.

[12]. Shuaib A, et al. The impact of magnetic resonance imaging on the management of acute ischemic stroke. Neurology 1992;42:856-818.

[13]. Naess H, Waje U, Thomassen L, Myhr K. High incidence of infarction in the (L) cerebral hemisphere among young adults. Journal of Stroke and Cerebrovascular Diseases 2006;15(6):241-244.

[14]. Mullins ME. CT and conventional and diffusion weighted MR imaging in acute stroke : Study in 691 patients at presentation to the emergency department. Radiology 2002;224:353-360.

[15]. Yamamotel, et al. The Lausanne stroke registry : A Europeans stroke database, GP4-5, stroke in Asia and Western Countris; 2002.