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Study of clinical profile and risk factors in Lacunar stroke patients of tertiary care hospital

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Abstract

Background: After ischemic heart disease, stroke remains the second leading cause of death worldwide. Lacunar infarcts are small deep infarcts resulting from occlusion of a penetrating artery which is responsible for most of the ischemic strokes. Occasionally, cortical infarcts and intracranial haemorrhages can mimic lacunar infarcts, but true cortical infarct signs are always absent in lacunar strokes. **Methodology**- The study was conducted on 38 patients diagnosed with lacunar stroke, admitted in medical ward and ICU of tertiary care hospital. Duration of the study was from January 2022 to December 2022. A predesigned and pretested case record form was used as a tool for data collection. Medical history, past history, presenting complaints, risk factors followed by general examination and systemic examination. **Results**- Most common risk factor for lacunar stroke among study subjects was Hypertension contributing 25(65.78%) followed by Smoking 19(50%), Obesity 17(44.73%), Physical Inactivity 16(42.10%), Alcohol consumption 16(42.10%), Diabetes Mellitus 14(36.84%), Dyslipedemia 13(34.21%), Prior TIA or stroke 12(31.57%) and known Ischemic heart disease in 5(13.15%) cases respectively. **Conclusion**- The alarming lacunar stroke can be prevented by controlling or avoiding these modifiable risk factor.

Keywords: Lacunar, stroke, heart disease, hypertension, risk factors

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Introduction

Stroke remains the second leading cause of death after ischemic heart disease worldwide.[1] Early diagnosis and treatment is necessary to prevent mortality and morbidity.[2] Lacunar infarcts are small deep infarcts ranging from 2 to 20 mm in size, resulting from occlusion of a penetrating artery which accounts for approximately 25% of all ischemic strokes. Each of five classical lacunar syndromes as described by Fischer has a relatively distinct symptom complex.[3] Symptoms may occur suddenly, progressively, or in fluctuating manner [e.g the capsular warning Syndrome] Occasionally, cortical infarcts and intracranial hemorrhages can mimic lacunar infarcts, but true cortical infarct signs [such as aphasia, neglect, and visual field defects] are always absent in lacunar strokes. The exact mechanism underlying the lacunar stroke is still not clear. The exact mechanism underlying the lacunar stroke is still not clear.[4] However, there are studies suggesting that lacunar stroke could be caused due to

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embolism/stenosis of a middle cerebral artery resulting in occlusion of distal perforating arteries like lenticulo-striate artery.[5] Hypertension and diabetes have been found to be strongly associated with lacunar stroke.[6-7] It is evident that lacunar infarcts are more commonly associated with white matter abnormalities and small vessel ischemic changes, and in long-term are associated with memory impairment.[8-9] Pure motor stroke/hemiparesis, Ataxic hemiparesis, Dysarthria/clumsy hand, Pure sensory stroke, mixed sensorimotor stroke are five classic lacunar syndrome.[11-12] As Lacunar infarcts, possibly due to their lower incidence and better short term recovery, have been less studied in stroke hospital registries in spite of their significant health impact .Thus there are still many controversial aspect about their natural history when compared to the rest of cerebral infarction such as risk factors and clinical profiles. Therefore, the present study was conducted to evaluate clinical profile and risk factors in patients of lacunar stroke at tertiary care hospital.

Materials And Methods

Study place- The study was conducted at Medicine department of tertiary care hospital from January 2022 to December 2022.

Study Design- The study utilized Cross sectional design. Predesigned and pretested case record form was used for data collection.

Inclusion criteria- Patients of lacunar stroke above 18 years of age, acute stroke syndrome and depiction of acute subcortical infarct on CT SCAN or MRI with maximally allowed axial diameter of 25 mm and those were ready to give consent were included.

Exclusion criteria- Patient below the age of 18 years, concomitant acute cortical or cerebellar infarct or multiple acute subcortical infarct and those who were not willing to participate were excluded.

Sample size- Reference for sample size: Singh H et al (2018)[10]

Among 50 patients of ischemic stroke, about 40% of the patients had lacunar infarcts.

Sample size (N) = $4 \times P \times Q / L^2$

P= 40

Q=100-40= 60

L= 16% Absolute

N=4 × 40× 60 / 256

N= 37.5

However, 38 subjects were included in the study.

Data analysis- Data was collected and in Microsoft Excel and analysed using SSPS version 21 software accordingly.

Ethical Considerations-Institutional Ethics Committee approval was obtained before starting the study. Written informed consent was obtained from all study participants.

CNS- A detail history of with particular attention to date of onset of neurological sign and tempo of ensuing functional disability. Repeat examination of muscle power was performed on alternate days till discharge. Autonomic function test was performed at admission and related at peak disability. Pure motor stroke/hemiparesis, Ataxic hemiparesis, Dysarthria/clumsy hand, Pure sensory stroke, mixed sensori motor stroke were noted. Predesigned and pretested questionnaire was used to record the necessary information. Questionnaires included general information, such as age, sex, Medical history, past history, presenting complaints, risk factors followed by general examination and systemic examination was done.

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RESULTS

Table 1: Distribution of study participants according to age (N=38)

Age (Years)	Frequency	Percentage
≤40	4	10.52
41-50	6	15.78
51-60	18	47.36
>60	10	26.31
Total	38	100

Majority of study participants were from age group 51-60 years contributing 18(47.36%) followed by >60 years 10(26.31%), 41-50 years 6(15.78%) and 4(10.52%) were from ≤40 years respectively.

Table 2: Risk factor for lacunar stroke among study subjects (N=38)

Risk factor	Frequency	Percentage
Hypertension	25	65.78
Smoking	19	50
Obesity	17	44.73
Diabetes Mellitus	14	36.84
Dyslipedemia	13	34.21
Physical Inactivity	16	42.10
Alcohol consumption	16	42.10
Prior TIA or stroke	12	31.57
Ischemic heart disease	5	13.15

Most common Risk factor for lacunar stroke among study subjects was Hypertension contributing 25(65.78%) followed by Smoking 19(50%), Obesity 17(44.73%), Physical Inactivity 16(42.10%), Alcohol consumption 16(42.10%), Diabetes Mellitus 14(36.84%), Dyslipedemia 13(34.21%), Prior TIA or stroke 12(31.57%) and known Ischemic heart disease in 5(13.15%) cases respectively**.**

Table 3: Descriptive statistics (N=38)

Variable	Mean	SD	95% CI
Age (Years)	56	10.66	56 ±3.392
SBP	143.15	27.26	143.15 ±8.67
DBP	87.63	9.42	87.63 ±2.997

Mean age of the study participants was 56 ±3.392 years. Mean systolic Blood pressure was 143.15 ±8.67 mm/Hg, Mean Diastolic BP was 87.63 ±2.997 mm/Hg.

Table 4: Distribution of patients according to lacunar syndrome subtypes (N=38)

Subtype	Frequency	Percentage
Pure Motor	18	47.36
Ataxic Hemiparesis	9	23.68
Mixed Sensory Motor	5	13.15
Dysarthia and clumsy hand	3	7.89

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Pure Sensory	3	7.89

Most of study participants presented as Pure Motor contributing 18(47.16%) followed by Ataxic Hemiparesis 9(23.68%), Mixed Sensory Motor 5 (13.15%), Dysarthia and clumsy hand 3 (7.89%) and Pure Sensory 3 (7.89%) respectively.

Table 5: Distribution of patients according to brain imaging findings (N=38)

Imaging findings	Frequency	Percentage
Small vessel ischemic changes	24	63.15
Acute Infarct in Anterior circulation	17	44.73
Chronic Infarct	19	50
Acute Infarct in Posterior circulation	10	26.31
Cerebral Micro bleed	2	5.26

MRI or CT brain of the study subjects shown that, most of the lacunar infarcts as Small vessel ischemic changes in 24 (63.15%) followed by Chronic Infarct 19 (50%), Acute Infarct in Anterior circulation 17(44.73%), Acute Infarct in Posterior circulation 10 (26.31%) and Cerebral Micro bleed in 2 (5.26%) respectively.

Table 6: Complications of Lacunar infarcts among study subjects (N=38)

Complication	Frequency	Percentage
Physical Disability	9	23.68
Urinary Tract Infection	4	10.52
Deep Venous Thrombosis	4	10.52
Aspiration Pneumonia	3	7.89
Decubits Ulcer	2	5.26

Out of 38 cases of lacunar stroke, in hospital complications were seen 22 cases (57.89%) cases. Most common complication was Physical Disability contributing 9 (23.68%) followed by Urinary Tract Infection 4 (10.52%), Deep Venous Thrombosis 4 (10.52%), Aspiration Pneumonia 3(7.89%) and Decubits Ulcer in 2 (5.26%) respectively.

Table 7: Association between age and gender among cases of lacunarinfarct (N=38)

Age (Years)	Gender				Total	P
	Male		Female			
	N	%	N	%		
≤50	6	60	4	40	10	0.809
>50	18	47.36	10	35.72	28	
Total	24	63.15	14	36.85	38	

The chi-square= 0.0582. Df=1; *Not* significant at $p < .05$.

Inference: There was no statistical significant association between age and gender among cases of lacunar infarcts (p>0.05). However, proportion of cases of lacunar infarcts was comparatively high among males more than 50 years of age (47.36%) than males ≤50 years of age.

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Table 8: Association between risk factors and lacunar infarct in accordance with gender (N=38)

Risk factor	Gender		Total	P*	Remark
	Male	Female			
Hypertension	15	10	25	0.646*	NS
Smoking	19	0	19	<0.0001**	HS
Obesity	14	3	1	0.0273*	S
Diabetes Mellitus	13	1	14	0.0037*	S
Dyslipedemia	9	4	13	0.575	NS
Physical Inactivity	14	2	16	0.007*	S
Alcohol consumption	16	0	16	<0.0001**	HS
Prior TIA or stroke	11	1	12	0.013*	S

P*- By chi square test, p**- By Fisher Exact test

TIA-Transient Ischemic attack, NS-Not significant, S –Significant, HS-Highly significant A statistical significant association was seen between smoking, obesity, DM, Physical Inactivity, Alcohol consumption, Prior TIA or stroke and gender in present study($p<0.05$). Proportion of cases of lacunar infarcts were significantly high among males as compared to females.

Discussion

Mean age of the study participants was 56 ±3.392 years Majority of study participants were from age group 51-60 years contributing 18(47.36%) followed by >60 years 10(26.31%), 41-50 years 6(15.78%) and 4(10.52%) were from ≤40 years respectively. A similar study by Nair R et al[13] revealed consistent finding with present study. It was seen that, Lacunar stroke occurred most frequently between the ages of 55 and 75, with mean age of 60.7 years. A study by Singh H et al[10] found comparable findings. It was seen that, most of the patients of lacunar infarcts were of 6 th decade of life. Another study by Kaul S et al[14] found that, mean age at presentation was 56.9 years.

Most common Risk factor for lacunar stroke among study subjects was Hypertension contributing 25(65.78%) followed by Smoking 19(50%), Obesity 17(44.73%), Physical Inactivity 16(42.10%), Alcohol consumption 16(42.10%), Diabetes Mellitus 14(36.84%), Dyslipedemia 13(34.21%), Prior TIA or stroke 12(31.57%) and known Ischemic heart disease in 5(13.15%) cases respectively. A similar study by Nair N et al[13] shown that, Hypertension was present in 74.2% and 37.8%had diabetes mellitus, past history of stroke was present only in 7.5%. Cardiac abnormalities including ischemic heart disease was present in 6 (4.5%), History of smoking was present in 38(28.8%), hyperlipidemia was present in 23 (17.4%) of patients. Mean age of the study participants was 56 ±3.392 years. Mean systolic Blood pressure was 143.15 ±8.67 mm/Hg, Mean Diastolic BP was 87.63 ±2.997 mm/Hg. which is comparable with a study by Singh H et al.[10] It was found that, the mean value of systolic blood pressure in lacunar infarcts was 172.10 ± 28.33 mm Hg and The mean value of diastolic blood pressure was 99.75 ± 14.89 mm Hg.

Most of study participants presented as Pure Motor contributing 18(47.16%) followed by Ataxic Hemiparesis 9(23.68%), Mixed Sensory Motor 5 (13.15%), Dysarthia and clumsy hand 3 (7.89%) and Pure Sensory 3 (7.89%) respectively. A study by Nair R et al[13] found

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that, Pure motor hemiparesis was the most common clinical syndrome accounting for 75% of patients, followed by ataxic hemiparesis 24.2%, Less common subtypes included sensory-motor 6.1%, pure sensory 3.0%, and dysarthria clumsy hand syndrome 3.8% in a of patients. Another studies by Gan R et al[15] and Donnan GA et al[15] found consistent findings with present study. It was observed that, prevalence of pure motor hemiparesis was found to be between 40-60%, and the ataxic hemiparesis ranged between 15-20%. Another study by Kaul S et al[14] found that, Pure motor hemiparesis was the presenting syndrome in 45% patients. Ataxic hemiparesis and sensorimotor stroke accounted for 18% each and dysarthria-clumsy hand syndrome for 14%. MRI or CT brain of the study subjects shown that, most of the lacunar infarcts as Small vessel ischemic changes in 24 (63.15%) followed by Chronic Infarct 19(50%), Acute Infarct in Anterior circulation 17(44.73%), Acute Infarct in Posterior circulation 10 (26.31%) and Cerebral Micro bleed in 2 (5.26%) respectively**.** A study by Nair N et al[13] shown that, Small vessel ischemic changes were present in 100 (75.8%), and cerebral micro-bleeds in 10 (7.6%) patients which is comparable with our study.

Out of 38 cases of lacunar stroke, in hospital complications were seen 22 cases (57.89%) cases. Most common complication was Physical Disability contributing 9 (23.68%) followed by Urinary Tract Infection 4 (10.52%), Deep Venous Thrombosis 4 (10.52%), Aspiration Pneumonia 3(7.89%) and Decubits Ulcer in 2 (5.26%) respectively. A comparable findings were seen in study by Gore A et al.[16] It was concluded that, accumulated lacunar infarcts can lead to other disease-related complications due to physical disability, including, but not limited to, aspiration pneumonia, deep vein thrombosis, pulmonary embolism, urinary tract infection, depression, and decubitus ulcers. There was no statistical significant association between age and gender among cases of lacunar infarcts ($p>0.05$). However, proportion of cases of lacunar infarcts was comparatively high among males more than 50 years of age (47.36%) than males ≤50 years of age. A statistical significant association was seen between smoking, obesity, DM, Physical Inactivity, Alcohol consumption, Prior TIA or stroke and gender in present study($p<0.05$). Proportion of cases of lacunar infarcts were significantly high among males as compared to females. A study by You R et al[7] shown that, significantly increasing the risk of lacunar stroke were hypertension (with an odds ratio of 8.9 [95% confidence intervals 4.2, 18.8]), current smoking (6.6 [2.9, 14.8]), and diabetes (2.3 [1.0, 5.5]), whereas frequent physical exercise was associated with a significantly decreased risk (0.3 [0.1, 0.7]). There was no risk of lacunar stroke associated with heart disease (odds ratio 1.0 [0.5, 1.9])

Conclusion

Most of the study subjects with lacunar stoke were from 6 th decade of life. Hypertension was most common risk factor followed by smoking, obesity, alcohol consumption, dyslipidemia DM and h/o prior TIA or stroke. Pure motor was most common clinical lacunar infarct syndrome followed by Ataxic Hemiparesis , Mixed Sensory Motor, Dysarthia and clumsy hand and Pure Sensory respectively. Physical disability was most common complication of lacunar stroke followed by Urinary Tract Infection, Deep Venous Thrombosis, Aspiration Pneumonia and Decubits Ulcer. Thus to conclude, the alarming lacunar stroke can be prevented by controlling or avoiding these modifiable risk factor.

References

1. Longo DL, Kasper DL, Kauser SL, Hauser, Jameson, Loscalzo. Harrison's principle of internal medicine.2011; Edisi ke-18.

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2. Murray CJ, Lopez AD. Mortality by cause for eight regions of the world: global burden of disease study. Lancet 1997 May 3;349(9061):1269-1276. doi: 10.1016/S0140-6736(96)07493-4.
3. Fisher CM. Lacunes: small, deep cerebral infarcts. Neurology 2011;77(24):2104. doi: 10.1212/01.wnl.0000410087.34228.7d.
4. Shoamanesh A, Pearce LA, Bazan C, et al. Micro bleeds in the Secondary Prevention of Small Subcortical Strokes Trial: Stroke, mortality, and treatment interactions. Ann Neurol 2017; 82:196-207.
5. Macdonald RL, Kowalczuk A, Johns L. Emboli enter penetrating arteries of monkey brain in relation to their size. Stroke 1995; 26:1247-51.
6. Fisher CM. Lacunar strokes and infarcts: a review. Neurology 1982;32: 871-6.
7. You R, McNeil JJ, O'Malley HM, Davis SM, Donnan GA . Risk factors for lacunar infarction syndromes. Neurology 1995;45: 1483-7.
8. Inzitari D. Leukoaraiosis. An independent risk factor for stroke? Stroke2003;34: 2067-71.
9. Schmidt R, Enzinger C, Ropele S, Schmidt H, Fazekas F. Progression of cerebral white matter lesions: 6-year results of the Austrian Stroke Prevention Study. Lancet 2003;361: 2046-8.
10. Singh H, Mohan G. To Study the Incidence of Lacunar Infarcts in Patients with Acute Ischemic Stroke and its Correlation with Carotid Artery Stenosis. Curr Trends Diagn. Treat 2018;2(2):88-91.
11. Fisher CM, Curry HB. Pure motor hemiplegia of vascular origin. Arch Neurol 1965;13(1):30-44.
12. Marie P. Des foyers lacunaires de desintegration et de differents autres etats cavitaires du cerveau. Rev. Med. (Paris).1901; 21, 281–298
13. Nair R, Gandeti R, Chatterjee A, Chandran V, Gorthi SP, Gautham Puppala G et al. Clinical, radiological and risk factor profiles of acute lacunar stroke in a developing country. Neurology Asia 2021; 26(1): 41 — 47.
14. Kaul S, Venketswamy P, Meena AK, Sahay R, Murthy JM. Frequency, clinical features and risk factors of lacunar infarction (data from a stroke registry in South India). Neurol India. 2000 Jun;48(2):116-9. PMID: 10878773.
15. Donnan GA, Tress BM, Bladin PF. A prospective study of lacunar infarction using computerized tomography. Neurology 1982; 32:49-56.
16. Gore M, Bansal K, Khan Suheb MZ, et al. Lacunar Stroke. [Updated 2022 Nov 30]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan.