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A RESEARCH STUDY TO ASSESS THE METABOLIC SYNDROME AND ITS CORRELATION WITH MALE AND FEMALE GENDER

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Abstract:
Objective: The objective of the study was to evaluate the metabolic syndrome as well as its association with gender in those cases having an acute ischemic non-embolic stroke.
Material and Methods: The research was performed at Services Hospital, Lahore from April 2017 to August 2018. The number of patients having a stroke with infarction diagnosis through CT scan was two-hundred and eighty-eight (hypodense area on CT scan) and all those patients fulfilling the required prerequisite of research was enrolled for research. The researcher obtained data concerning demographic facts such as gender and age, former recognized hazardous aspects and record of presenting illnesses, additionally measured patients' physical parameter such as measurement of waist and BP. The researcher also takes a venous specimen for triglycerides, HDL cholesterol and fasting plasma glucose after eight hours of overnight fasting as well as performed MRI and CT scan with the objective of finding infraction. The researcher also performed ECG, Carotid Doppler Angiography and Echocardiography to examine embolus source and recorded entire concerning data on Performa.
Results: In our research, the percentage of male and female was (57.3% & 42.7%) respectively and the average age of male was (56 ± 7) years and female was (54 ± 7) years. Moreover (43.63% & 65.04%) was the frequency of metabolic syndrome found in male and females respectively.
Conclusion: Present research obviously presented the metabolic syndrome as an essential hazardous component for acute ischemic non-embolic stroke. It boosted the potentiality for defensive efforts in individuals with the huge hazard of ischemic stroke.
Keywords: *Transient ischemic attacks (TIA), National Cholesterol Education Program (NCEP), Adult Treatment Panel (ATP), Atherosclerosis Risk in Communities (ARIC).*

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INTRODUCTION:

Stoke is included in major four developing factors of morbidity and mortality in the entire world [1]. Stroke is considered a severely harming agent of vascular origin. For epidemiological studies, it is so vital to consider the exact meaning of stroke. Global disruption of cerebral function as defined by the World Health Organization without any cause of vascular origin and may cause death with indications appearing for a day [2]. This explains the cause of stroke due to haemorrhage and cerebral infarction. By relating this concept of TIA, an exclusion criterion includes those who suffered from signs of subdural haemorrhage, cancer, affected by poison and shock. A condition in which haemorrhage occur to some part of the brain or to some blood vessels, all these comprised of cerebrovascular diseases. Cerebral infarction, cerebral haemorrhage and subarachnoid haemorrhage were also covered under a broad term called stroke [3].

Ischemic and hemorrhagic are two types of stroke. Ischemic stroke occurs due to blockage of blood to some specific areas of the brain and eighty-five percent of strokes accounts for this type while fifteen percent occurs because of haemorrhage and this is due to the fact when ruptured blood vessel starts bleeding in region of brain parenchyma. Other causes of ischemic strokes include due to artery thrombosis (small or large) that accounts forty-five percent and also because of some embolic source and this accounts for twenty percent [4]. At the sides of wounded blood vessels, plaque appears and intima seems scratched, it makes extracranial and intracranial arteries to produce thrombosis. The wound of endothelial injury (roughening) allows platelets to stick and aggregate because thrombus grows at the position of plague where clotting occurs. Collateral circulation retains its role and flow of blood lessens along with the system of cranial nerves. The decrease in cell death occurs due to the stoppage of the compensatory process of collateral circulation and perfusion is conceded.

A clot moves from a distant source and places in cerebral vessels by the time of embolic stroke. In the region of carotid artery microemboli distant it from sclerosis plaque or make a cardiac basis like atrial fibrillation or a hypokinetic left ventricle [4]. Causes of ischemic stroke contain dissection of carotid and coagulopathies occurrence, like due to antiphospholipid antibodies or caused due to arteritis, drug abuse and due to carotid [5, 6].

Ischemic stroke interrupts the blood supply to the brain and which in turn deprive of sugar and oxygen due to which disturbance occur in the functioning of the brain. Brain tissues are deprived of blood due to emboli and clotting at the cellular level, called ischemic cascade. Usual hazardous factors of stroke include one is modifiable and other is non-modifiable. Smoking, alcoholism, diabetes mellitus, dyslipidemia, physical inactivity, obesity hypertension, and cocaine abuse are modifiable ones and non-modifiable risk issues were gender, increasing age, race and prior stroke. One other reason for stroke is metabolic syndrome. Metabolic syndrome cause obesity, hypertriglyceridemia, low HDL cholesterol, hyperglycemia and hypertension given by NCEP/ATP II and International Diabetes Federation [7]. Pakistanis are at high occurrence rate for stroke. One out of three adults of age above forty-five and nineteen percent of the general population age above fourteen are at supreme risk of stroke due to hypertension [8]. Thirty-five percent of the population above forty-five are diagnosed with diabetes mellitus claimed by National Health Survey of Pakistan. Twenty-eight percent obesity occur in women and twenty-two percent in men [9]. Use of tobacco is found in men as forty percent and in women, the ratio is twelve percent [10]. In Pakistan, metabolic syndrome occurrence ranges from eighteen to forty-six percent, which is so high [11].

Metabolic syndrome should be deliberated as a major goal for defensive medications. In order to decrease the threat of cerebrovascular and heart illnesses, the foremost aim should be taken for metabolic syndrome which can be done by changing treatment style and routine of daily life.

According to the population across world, Pakistan ranked at 6th position with one-hundred million populations [12]. Among that population, Pakistan contributes forty-one percent for Non-contagious diseases like stroke [13]. Approximately (4.8%) of the population is suffering from a stroke in this populated country Pakistan [14]; this explained to 7.2 million people, matched to 700,000 yearly in the US.

The occurrence and transience of stroke differ mostly among diverse populations and has failed in some foreign reports. According to one survey, ninety-four percent of deaths occur in South Asian because of stroke among seventy years of people as compared to other countries which account only six percent in this loss with well-known economies receiving more loss in the disability-adjusted life years [15]. The stroke prevalence in Pakistan disable persons in their crucial stage of life may cause burden on family and social circle, economic and social way so action should be taken to prevent the cerebrovascular disease because

it's not only ''prevention is better than cure'' but also beneficial for us in another economic form.

MATERIAL AND METHODS:

The research was performed at Services Hospital, Lahore from April 2017 to August 2018. The number of patients having a stroke with infarction diagnosis through CT scan was two-hundred and eighty-eight (hypodense area on CT scan) and all those patients fulfilling the required prerequisite of research was enrolled for research, out of which six were taken as from hypodense area on CT scan. In this study patients having age above fourteen years, either male or female was taken and who were diagnosed with severe neurological with the hypodense area on CT scan and under echocardiography brain should not have any emboli (valvular heart disease, intracardiac thrombus and vegetations) and carotid Doppler (narrowing of carotids).

Patients in this study should possess certain emboli like atrial fibrillation, valvular heart disease, infective endocarditis etc, and on their brain, no recognized CT scan, Patients having acute myocardial infarction. Exclusion criteria include patients like who regularly have TIAs and CRF, CCF, and CLD like lasting diseases.

Other factors like age gender and history of previous and present illness were included. Blood pressure reading was also included under bodily inspection. By the help of elastic resilient tape, at the center between the lower side of last palpable rib and the top of iliac crest waist perimeter was measured, after an overnight fast, at the end of usual cessation. After eight hours overnight fasting, a blood sample was taken for HDL cholesterol, triglycerides and fasting plasma glucose. To get surety for infarction CT scan was used. ECG, echocardiography and carotid Doppler angiography were also done for checking embolus. On given Performa, the whole report was written.

Data were entered into SPSS and analysis was done. Arithmetic variables and occurrences &ratios were computed for the mean and SD of the categorical sample. For assessing the association between various variables Chi-square was used. If P-value is <0.05, then it will be expressive.
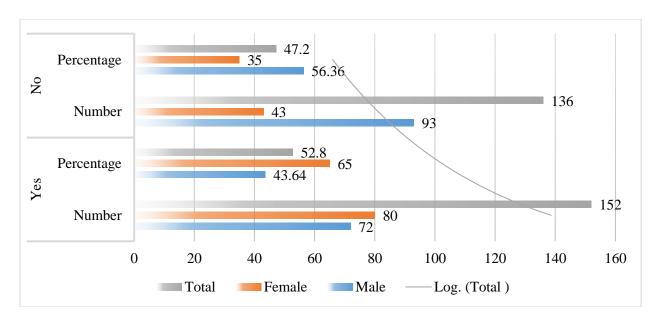
RESULTS:

This research includes two-hundred and eighty-eight patients with average age 55.13 ± 7.6 out of which (52.7%) patients were with metabolic disease. In male population, one hundred and sixty-five (57.29%) metabolic syndrome was found in seventy-two (43.64%) patients were with metabolic syndrome and among female population one-hundred and twenty-three (42.71%) metabolic syndrome was discovered in eighty (65%) patients. Gender and metabolic syndrome have a strong relationship. P-value was 0.005. The average waist area was 100.27 ± 11.799 cm (extending from 80 to 128 centimetres) and systolic blood pressure having mean of 137.92 ± 16.801 mm of Hg (ranges 110 to 182 mm of Hg) then diastolic blood pressure contains mean 85.53 ± 16.801 mm of Hg (ranges from 64 to 102 mm of Hg). The mean value of triglycerides level was 150.26 ± 17.948 mg/dl (ranging from 112 to 188 mg/dl). The mean value of HDL level was 44.64 ± 5.832 mg/dl (ranging from 35 to 55 mg/dl) and fasting blood glucose level having mean 117.60 ± 38.271 mg/dl (ranging from 70 to 235 mg/dl). The least occurring factor was waist circumference and in 131 patients (45.48%) it was found to be positive. Hypertension and low HDL were most occurring factors and were positive in 167 patients (57.98%) with one-hundred and thirty-five patients (46.87%) were having diabetes and high triglycerides level.

Out of the whole sample, patients possessing five factors of metabolic syndrome were only four seven patients were devoid of any factor of metabolic syndrome.

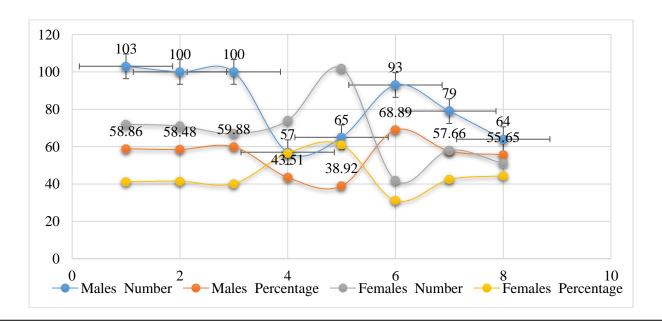**Table – I:** Gender Wise Metabolic Syndrome Stratification

Metabolic Syndrome	Yes		No	
	Number	Percentage	Number	Percentage
Male	72	43.64	93	56.36
Female	80	65	43	35
Total	152	52.8	136	47.2

Table – II: Gender Wise Variables Analysis

Variables	Males		Females	
	Number	Percentage	Number	Percentage
Systolic BP ≥130	103	58.86	72	41.14
Diastolic BP ≥85	100	58.48	71	41.52
Hypertension BP ≥ 130/85	100	59.88	67	40.12
Waist Circumference Males: ≥102 cm, Females ≥ 88 cm	57	43.51	74	56.49
HDL Level Males: ≤ 40 mg/dl and Females: ≤ 50 mg/dl	65	38.92	102	61.08
Triglycerides ≥ 150 mg/dl	93	68.89	42	31.11
Fasting Blood Glucose ≥ 100 mg/dl	79	57.66	58	42.34
Diabetes Fasting Blood Glucose ≥ 126 mg/dl	64	55.65	51	44.35

DISCUSSION:

In the whole world, this is a common disorder (acute ischemic stroke) and considered as the most prevalent cause of death. Ischemic stroke comprises high percentage up to (85%) of all type of strokes. Threat factors for stroke involve ischemic heart disease, hypertension, diabetes mellitus, obesity and dyslipidemia. Along with age, the occurrence of cerebrovascular diseases also increases.

Metabolic syndrome (Mets) is achieving concern, in spite of other factors. "Metabolic syndrome" is a name used where metabolic abnormalities form a group that increase the chances of cardiovascular diseases and stroke. Some of the chief characteristics of metabolic syndrome were obesity, hypertriglyceridemia, low HDL cholesterol, hyperglycemia and hypertension discussed by NCEP/ ATP III and IDF (International Diabetes Federation). Any of the above factor may cause an ischemic stroke. This article explained that under acute ischemic non-embolic stroke patient's occurrence of metabolic syndrome (according to NCEP/ATP III and IDF 2005) was (52.8%) (One-hundred & fifty-two out of two-hundred & eighty-eight). Gorter et al were found to be with a similar concept that metabolic syndrome was discovered in (40% to 50%) of patients with several cerebrovascular diseases [16]. Koren-Morag et al have somehow similar observation that it is present in (56%) of patients with ischemic stroke [17]. Whereas De Silva noted that metabolic syndrome is present in 61percent of patients in South Asia, who were diagnosed with ischemic stroke [18]. Metabolic syndrome was discovered to be a crucial risk factor for ischemic stroke than diabetes mellitus according to offspring study done by Framingham [19]. Patients with metabolic syndrome have a greater risk of incident stroke offered the metabolic syndrome comprises either with high blood pressure or high fasting blood sugar under the report of ARIC (Atherosclerosis Risk in Communities) [20]. Throughout the world, many types of research showed the same occurrence of metabolic syndrome in ischemic stroke patients.

Within (65.04%) of females, metabolic syndrome was found in our study as compared to (43.63%) males. Women were at high threat of stroke with metabolic syndrome as compared to men in the report of Northern Manhattan study with Hispanic, African-American, and Caucasian subjects [21]. A study conducted by Koren-Morag et al also emphasize that metabolic syndrome without diabetes mellitus was an important threat factor for ischemic stroke in men and women, but its effect was found to be more in women [17]. Understanding all of the above studies it may be concluded that females are at higher risk for metabolic syndrome which may lead to ischemic stroke.

Dyslipidemia is always been taken as a symbol of the metabolic syndrome with an elevated level of triglycerides and low HDL level. There is a strong relationship found between dyslipidemia and ischemic stroke and triglyceride levels ≥150 mg /dl was present in one hundred and thirty-six (46.87%) patients and HDL levels ≤50 mg/dl was present in one-hundred and sixty-seven patients (57.98%). 1.0 mmol/l (39 mg/dl) rise in HDL level cause reduction in (47%) in ischemic stroke in a study done by Copenhagen City Heart [22]. Milionis et al are also with the same concept that high TG level and low HDL levels have an association with ischemic stroke [23]. Under a prospective study of 16.8 years done by British regional heart centre on 7735 men showed an important relationship between the level of HDL and ischemic stroke [24].

Abdominal obesity that shows an increase in waist circumference has a strong relation with stroke in our study. Abdominal obesity more than 102 cm is found in men and female possess 88 cm found in one-hundred and thirty-one patients. Isomma et al observed that obesity is in (76%) patients who have normal tolerance of glucose level and (92%) of diabetics with ischemic stroke [25].

One of the crucial constituents of metabolic syndrome is high blood pressure in our one-hundred and sixty-seven patients (57.98%) had blood pressure ≥130/85 mm of Hg. In a study of Wang Y et al, (70%) occurrence in patients of ischemic stroke was hypertension [26]. In a study done by McNeill et al, high blood pressure was discovered to increase the chance of occurring ischemic stroke by 1.5-2 times in patients of metabolic syndrome [27].

In this study, stroke has a strong connection with damage in fasting glucose and diabetes because one-hundred & thirty-seven (47.56%) patients were with fasting blood sugar more than 100 mg/dl. Results support the study of Basharat et al, which showed that hypertension is mostly occurring threat factor of stroke in (86.8%) that followed (59.8%) by diabetes mellitus, (59.1%) by dyslipidemia and (18.1%) by smoking. For ischemic stroke low level of HDL was found to be the most prevalent threat factor by the same study [28].

Now our study is in correlation with the previous studies that proved the fact that throughout world metabolic syndrome has the same risk of ischemic stroke. Components of metabolic syndrome were responsible for ischemic stroke but not simply metabolic syndrome. We can reduce the risk of ischemic stroke by early diagnosis and treatment. For care of patients with metabolic syndrome, physicians must be active and for reduction of the occurrence of ischemic stroke actions must be taken. Risk factors for ischemic stroke also include age, sex, smoking and LDL cholesterol levels but not only metabolic syndrome.

CONCLUSION:

It is concluded that crucial risk factor for the presence of acute ischemic non-embolic stroke is metabolic syndrome with more frequency in female patients than males. Our study also shows that most frequent factors of metabolic syndrome were hypertension and low level of HDL. So, we can say that metabolic syndrome as an important and beneficial tool to diagnose ischemic stroke patients and it also supports the potential for defensive efforts.

REFERENCES:

1. Milionis HJ, Rizos E, Goudevenos J, Seferiadis K, Mikhailidis DP, Elisaf MS. Components of the metabolic syndrome and risk for first-ever acute ischemic nonembolic stroke in elderly subjects. Stroke. 2005;36(7):1372-6.
2. Wannamethee SG, Shaper AG, Ebrahim S. HDL-Cholesterol, total cholesterol, and the risk of stroke in middle-aged British men. Stroke. 2000;31(8):1882-8.
3. Isomaa B, Almgren P, Tuomi T, Forsén B, Lahti K, Nissén M, et al. Cardiovascular morbidity and mortality associated with the metabolic syndrome. Diabetes Care.
4. 2001;24(4):683-9.
5. Wang Y, Xu J, Zhao X, Wang D, Wang C, Liu L, et al. Association of Hypertension with Stroke Recurrence Depends on Ischemic Stroke Subtype. Stroke. 2013 Feb 26.
6. McNeill AM, Katz R, Girman CJ, Rosamond WD, Wagenknecht LE, Barzilay JI, et al. Metabolic syndrome and cardiovascular disease in older people: The cardiovascular health study. J Am Geriatr Soc. 2006;54(9):1317-24.
7. Basharat Z, Mumtaz S, Rashid F, Rashid S, Mallam SA, Diljan A, et al. Prevalence of risk factors of ischemic stroke in a local Pakistani population. High-density lipoproteins, an emerging risk factor. Neurosciences (Riyadh). 2012;17(4):357-62.
8. Blank-Reid C. How to have a stroke at an early age: The effects of crack, cocaine and other illicit drugs. Journal of Neuroscience Nursing. 1996;28(1):19–27.
9. Eckel RH. Metabolic Syndrome. In: Fauci, Braunwald, Kasper, Hauser, Longo, Jameson, editor, et al. Harrison's Principles of Internal Medicine. New York: McGraw-Hill; 2008. P. 1509-13.
10. Jafar TH. The growing burden of chronic kidney disease in Pakistan. N Engl J Med. 2006;35(4):995- 997.
11. Jafar TH, Chaturvedi N, Pappas G. Prevalence of overweight and obesity and their association with hypertension and diabetes mellitus in an Indo-Asian population. Cmaj. 2006;17(5):1071-1077.
12. Nasir K, Rehan N. Epidemiology of cigarette smoking in Pakistan. Addiction. 2001;9(6):1847-1854.
13. Basit A, Shera AS. Prevalence of metabolic syndrome in Pakistan. Metab Syndr Relat Disord. 2008;6(3):171-5.
14. Alam AY, Iqbal A, Mohamud KB, Laporte RE, Ahmed A, Nishtar S, et al. Investigating socio-economic-demographic determinants of tobacco use in Rawalpindi, Pakistan. BMC Public Health. 2008; 8:50.
15. Nishtar S. The national action plan for the prevention and control of non-communicable diseases and health promotion in Pakistan-prelude and finale. J Pak Med Assoc. 2004;5(4): S1-8.
16. Jafar TH. Blood pressure, diabetes and increased dietary salt associated with stroke results from a community-based study in Pakistan. J Hum Hypertens. 2006;20(1):83-85.
17. Strong K, Mathers C, Bonita R. Preventing stroke: Saving lives around the world. Lancet Neurol. 2007;6(2):182-187.
18. Gorter PM, Olijhoek JK, van-der-Graaf Y, Algra A, Rabelink TJ, Visseren FL. Prevalence of the metabolic syndrome in patients with coronary heart disease, cerebrovascular disease, peripheral arterial disease or abdominal aortic aneurysm. Atherosclerosis. 2004;173(2):363-9.
19. Koren-Morag N, Goldbourt U, Tanne D. Relation between the metabolic syndrome and ischemic stroke or transient ischemic attack: a prospective cohort study in patients with atherosclerotic cardiovascular disease. Stroke. 2005;36(7):1366-71.
20. De Silva DA, Woon FP, Xie XY, Li Hsian Chen C, Chang HM, Wong MC. Metabolic syndrome among ethnic South Asian patients with ischemic stroke and comparison with ethnic Chinese

patients: the Singapore General Hospital experience. J Stroke Cerebrovasc Dis. 2007;16(3):119-21.

21. Najarian RM, Sullivan LM, Kannel WB, Wilson PW, D'Agostino RB, Wolf PA. Metabolic syndrome compared with type 2 diabetes mellitus as a risk factor for stroke: the Framingham Offspring Study. Arch Intern Med. 2006;166(1):106-11.

22. Rodriguez-Colon SM, Mo J, Duan Y, Liu J, Caulfield JE, Jin X, Liao D. Metabolic syndrome clusters and the risk of incident stroke: the atherosclerosis risk in communities (ARIC) study. Stroke. 2009;40(1):200-5.

23. Rincon F, Sacco RL, Kranwinkel G, Xu Q, Paik MC, Boden-Albala B, Elkind MS. Incidence and risk factors of intracranial atherosclerotic stroke: the Northern Manhattan Stroke Study. Cerebrovasc Dis. 2009;28(1):65-71.

24. Lindenstrøm E, Boysen G, Nyboe J. Influence of total cholesterol, high-density lipoprotein cholesterol, and triglycerides on the risk of cerebrovascular disease: the Copenhagen City Heart Study. BMJ. 1994;309(6946):11-5.

25. Khan J, Attique-ur-Rehman, Shah AA, Jelani A. Frequency of hypertension in stroke patients presenting at Ayub Teaching Hospital. J Ayub Med Coll Abbott. 2006;18(1):59-61.

26. The World Health Organization MONICA Project (monitoring trends and determinants in cardiovascular disease): a major international collaboration. WHO MONICA Project Principal Investigators. J Clin Epidemiol. 1988;41(2):105-14.

27. Strong K, Mathers C, Bonita R. Preventing stroke: saving lives around the world.Lancet Neurol 2007;6(2):182-7.

28. Adams HP, Adams R, Brott T, Zoppo GJ, Furlan AJ, Goldstein LB, et al. Guidelines for the early management of patients with ischemic stroke. 2003;34(4):1056–1083.

29. Levine SR, Brey RL, Tilley BC, Thompson JL, Sacco RL, Sciacca RR, et al; APASS Investigators. Antiphospholipid antibodies and subsequent thrombo-occlusive events in patients with ischemic stroke. JAMA. 2004;291(5):576-84.