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FREQUENCY OF METABOLIC SYNDROME IN PATIENTS OF STROKE IN TERTIARY CARE HOSPITAL LARKANA

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ABSTRACT:

Objectives: To determine the frequency of metabolic syndrome in patients of stroke, to prevent or minimize the morbidity and mortality of stroke, cardiovascular disease and diabetes mellitus type 2.
Study Design: This was a cross-sectional study
Place and Duration: This study was conducted in Medical unit one of Chandka Medical College Teaching Hospital Larkana, over a period of one year from March 2009 to March 2010.
Method and Material: In this study, 131 cases of proved stroke of either sex from age of 20 to 85 year were included after getting verbal and written consent for assessment of metabolic syndrome by revised ATP III criteria.
Results: Out of 131 cases of stroke patients male were 76 (58.0%) and female were 55 (42.0%). Minimum and maximum age of patients was 28 and 85 years respectively, while mean age was 55.49 + 12.149. Out of 131 cases, 87(66.4%) were of ischemic type and 44(33.6%) were of hemorrhagic type. Out of 87 cases of ischemic stroke 51 and 36 were male and female, accounting 58.6% and 41.4%. Out of 44 cases of hemorrhagic stroke 25(56.8%) were male, and 19 (43.2%) were female.
Metabolic syndrome was present in 49 (37.4%) cases out of 131, and out of 49 cases of metabolic syndrome 34(69.4%) cases were found in ischemic stroke type, and 15 (30.6%) were in hemorrhagic stroke type. Metabolic syndrome was found in 32.9% of all male stroke patients and 43.6% of all female stroke patients (p= 0.210).
Conclusion: In our study, quite high (37.4%) frequency of metabolic syndrome was found in patients of stroke, affecting mainly middle age group, with no significant difference of gender and stroke types.

Key Words: Types of Stroke, Metabolic Syndrome.

INTRODUCTION

Stroke is a clinical condition characterized by sudden onset of focal neurological deficit of vascular in origin. It can cause permanent neurological damage and death, after a stroke the risk of developing another stroke is 5 to 10 % in first week, 15% in first year and 5% per year after first year.[1]

Worldwide about 15 million people suffer a stroke, of these 5 million die and another 5 million are left permanently disabled, placing a burden on family and community. Annual incidence is between 180 and 300 per 100000, and about one-fifth of patients with an acute stroke will die within a month of the event, and at least half of those who survive will be left with physical disability. Though the incidence is falling in western countries, but is rising in south Asian countries (India, Pakistan, Bangladesh and Sirilanka), and is postulated that number of stoke and related deaths will be doubled till year

2030.[2]

Stroke is classified in to Transient ischemic attack (TIA), Progressing stroke (or stroke in evolution) and complete stroke, each may be Ischemic or hemorrhagic type. Hemorrhagic stroke accounts for 15 – 20 % of all stroke, while ischemic stroke accounts for about 80 to 85%. The risk factors for stroke include advanced age, high blood pressure, heart disease (atrial fibrillation, heart failure, endocarditis), diabetes mellitus, hyperlipidemia, smoking, excess alcohol consumption, polycythemia, elevated serum homocysteine level, Oral contraceptives, pregnancy, infections, and vasculitis are important etiological factors in young stroke patients.

Metabolic syndrome is a collection of interrelated vascular risk factors of metabolic origin for production and promotion of atherosclerosis resulting to coronary heart disease and stroke. This syndrome is also being known by other names i.e. Visceral fat syndrome, Syndrome X, Deadly quartet and Insulin resistance syndrome.

Metabolic syndrome as a whole is said to be the predictor of future ischemic stroke, more over its individual components are also increasing the risk, and probability of stroke occurrence rises with the number and severity of vascular risk factors. It is evident from 37 studies that this condition accounts for doubling the risk of coronary artery disease, also increases risk of stroke, fatty liver disease, diabetes and cancer. [3]

These risk factors mainly include increased abdominal (central) obesity, increased insulin resistance, raised blood pressure, atherogenic dyslipidemia and hyperglycemia. Ford ES et al observed that prevalence of metabolic syndrome among USA adult increases with age, from 6.7% to 43.5% among individuals of 20 to 29 and 60 to 69 years respectively. [4]

To define metabolic syndrome several expert groups proposed criteria i.e. WHO criteria, European Group for Study of Insulin Resistance, American Association of Clinical Endocrinologists, International Diabetics Foundations (IDF), National Cholesterol Education Program (NCEP) Adult Treatment Panel III, and American Heart Association.

Now a day the revised NCEP ATPIII,[5] and IDF[6] criteria are the two broadly recognized definitions in use.

Though the exact pathogenesis of metabolic syndrome is not yet known, but it is said that metabolic syndrome is a proinflamatory condition, and multiple factors play to form this syndrome, they include obesity (especially abdominal obesity), physical inactivity, insulin resistance, aging, and genetics.

Insulin resistance is the fundamental phenomenon in developmental of metabolic syndrome, which leads to compensatory hyperinsulinemia and many studies have proved that there is significant association between stroke risk and insulin resistance. [7, 8, 9]

Abdominal obesity causes significant increased risk of stroke, and reduction of 10% weight with controlling of diabetes mellitus, hyperlipidemia and hypertension results reduction of stroke risk up to 13 per 1000 people.[10] Hyperglycemia (duration and Hb A1c level) and hypertension individually and alone causes increased risk of stroke.[11]

This syndrome is highly prevalent worldwide, and is expected to substantially increase in the future alongside the growing obesity epidemic; several studies have suggested that individuals with the metabolic syndrome are at high risk for experiencing first and recurrent stroke. Therefore it is essential to know the profile of the vascular risk factors, to initiate lifestyle modification and, if necessary, drug treatment to prevent or minimize the morbidity and mortality of stroke and coronary heart disease.

MATERIAL AND METHOD

This cross sectional study was conducted in medical unit of Chandka Medical College Hospital Larkana in one year period, from March 2009 to February 2010. After approval of ethical committee of hospital, 131 indoor patients of proved stroke (clinically and by computerized tomography scan of brain) of either sex of age more than 12 years were included after getting their informed written consent.

On the first visit, the patient's detailed history was taken; particularly smoking habits, hypertension or antihypertensive drugs, diabetes mellitus or anti-diabetic drugs, ischemic or valvular heart disease. Thorough interrogation was made about symptoms (weakness of limbs, speech difficulty, and sudden impaired vision, altered level of consciousness, ataxia, vertigo, vomiting, fits and fever).

A detailed general and systemic examination was carried out with special regard to pulse, blood pressure, waist measurement, xanthoma, xanthelasmia. Central nervous system was specially looked for optic fundus, and other cranial nerves, weakness of limbs. Cardiovascular system was examined for arrhythmia and valvular lesion. All the findings were entered in self-designed Performa.

After history and examination, investigation were carried out specially triglyceride, HDL cholesterol, fasting blood sugar level, random blood sugar level, doppler study for carotids, chest x-ray, echocardiography, and brain computerized tomography. The revised NCEP ATP III (Third Report of the National Cholesterol Education Program Adult Treatment Panel) criterion was used for diagnosis of metabolic syndrome.

Following patients were excluded from study, Patients having Transient ischemic attack, Syncopal attack, Presumptive diagnosis of stroke with equivocal neurological deficits but no lesion on CT scan brain, patients not willing for brain CT (computerized tomography) scan, neurological deficits secondary to epilepsy, head injury, an infective, and metastatic etiology.

Data analysis: The data collected was entered and analyzed using SPSS software version 19, categorical response variable as gender, normal or abnormal triglyceride, HDL cholesterol, systolic and diastolic blood pressure, waist circumference and presence or absence of metabolic syndrome was presented in frequencies and percentages, numerical variable as age was presented by mean and + SD (standard deviation) for data presentation. Stoke types and gender difference in relation to metabolic syndrome was assessed by chi squire test.

RESULTS

Out of 131 cases of stroke patients male were 76 (58.0%) and female were 55 (42.0%) Table 1. Minimum and maximum age of patients was 28 and 85 years respectively, while mean age was 55.49 and std deviation 12.149.

Out of 131 cases, 87(66.4%) were of ischemic type and 44(33.6%) were of hemorrhagic type. Table 2. Out of 87 cases of ischemic stroke 51 and 36 were male and female, accounting 58.6% and 41.4%. Table 2. Out of 44 cases of hemorrhagic stroke 25(56.8%) were male, and 19 (43.2%) were female. Table 2.

Metabolic syndrome was present in 49 (37.4%) cases out of 131,

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TABLE I

Variables	Number of cases (frequency)	Percentage
Gender		
Male Female	7655	58.042.0
Stroke types		
Ischemic Hemorrhagic	8744	66.433.6
Age group in years		
20 – 40 41 – 60 61 – 80>80	1670405	12.253.530.53.8
Metabolic syndrome		
Absent Present	8249	62.637.4
Waist circumference		
Normal High	8843	67.232.8
Systolic BP		
NormalHigh	6962	52.747.3
Diastolic BP		
Normal High	7952	60.339.7
Fasting blood sugar		
Normal High	11021	84.016.0
Triglyceride		
Normal High	7655	58.042.0
HDL		
NormalLow	6467	48.951.1

TABLE 2.
TYPES OF STROKE * GENDER CROSSTABULATION

			Gender		Total
			Male	Female	
Types of stroke	Ischemic	Count	51	36	87
		% within Types of stroke	58.6%	41.4%	100.0%
		% within Gender	67.1%	65.5%	66.4%
		% of Total	38.9%	27.5%	66.4%
	Hemorrhagic	Count	25	19	44
		% within Types of stroke	56.8%	43.2%	100.0%
		% within Gender	32.9%	34.5%	33.6%
		% of Total	19.1%	14.5%	33.6%
Total		Count	76	55	131
		% within Types of stroke	58.0%	42.0%	100.0%
		% within Gender	100.0%	100.0%	100.0%
		% of Total	58.0%	42.0%	100.0%

and out of 49 cases of metabolic syndrome 34(69.4%) cases were found in ischemic stroke type, and 15 (30.6%) were in hemorrhagic stroke type. Types of stroke were analyzed with metabolic syndrome, we found no significant correlation among them (p=0.577). Table 3

Out of 76 male stroke patients 25 (32.9%) had metabolic syndrome, and out of 55 female stroke patients 24 (43.6%) had metabolic syndrome and statically it was not significant (p=0.210). Table 4.

The majority of cases were above the age of 40 years, 70 cases (53.5%) were of age group 41 to 60 years, and 5 cases (3.8%) were of more than 80 years of age group. Table 1. The waist circumference was high in 32.8% of cases, and fasting blood sugar was high in 16% of cases while high triglyceride and low HDL were found in 42.0% and 51.1% of cases. Table 1.

DISCUSSION:

It is estimated that around 20 to 25 per cent of the world's adult population have the metabolic syndrome, and in USA around 47 million peoples are having this syndrome. The incidence of the

TABLE 3.
TYPES OF STROKE * METABOLIC SYNDROME CROSSTABULATION

			Metabolic syndrome		
			Absent	**Present**	**Total**
Types of stroke	Ischemic	Count	53	34	87
		% within Types of stroke	60.9%	39.1%	100.0%
		% within Metabolic syndrome	64.6%	69.4%	66.4%
		% of Total	40.5%	26.0%	66.4%
	Hemorrhagic	Count	29	15	44
		% within Types of stroke	65.9%	34.1%	100.0%
		% within Metabolic syndrome	35.4%	30.6%	33.6%
		% of Total	22.1%	11.5%	33.6%
Total		Count	82	49	131
		% within Types of stroke	62.6%	37.4%	100.0%
		% within Metabolic syndrome	100.0%	100.0%	100.0%
		% of Total	62.6%	37.4%	100.0%

Chi-square = 0.311, df = 1, p=0.577

TABLE 4.
METABOLIC SYNYNDROME * GENDER CROSSTABULATION

			Gender		
			Male	**Female**	**Total**
Metabolic_syn	Absent	Count	51	31	82
		% within Metabolic syndrome	62.2%	37.8%	100.0%
		% within Gender	67.1%	56.4%	62.6%
		% of Total	38.9%	23.7%	62.6%
	Present	Count	25	24	49
		% within Metabolic syndrome	51.0%	49.0%	100.0%
		% within Gender	32.9%	43.6%	37.4%
		% of Total	19.1%	18.3%	37.4%
Total		Count	76	55	131
		% within Metabolic syndrome	58.0%	42.0%	100.0%
		% within Gender	100.0%	100.0%	100.0%
		% of Total	58.0%	42.0%	100.0%

(p=0.210)

metabolic syndrome is rising worldwide; this is partly due to a significant increase in the prevalence of obesity. The increasing trained of use excessive soft drinks, refined and meat containing products, less exercise has increased prevalence of obesity, metabolic syndrome and diabetes mellitus type 2 worldwide and also in Pakistan.[12]

Stroke is a one of major cause of morbidity and social dependence, by year 2020 is projected that stoke will be the main cause of worldwide morbidity and mortality. So its incidence can be reduced by identifications of its preventable risk factors and atherosclerosis. In metabolic syndrome there is increased prevalence carotid intima-media thickening and asymptomatic carotid atherosclerotic plaques,[13] which poses major risk for cardiovascular diseases and stroke. Individuals of metabolic syndrome are twice as likely to die from and three times as likely to have a heart attack or stroke in comparison to people without the syndrome,[14] and are at fivefold greater risk of developing type 2 diabetes.[15] So its early diagnosis and proper treatment is an essential step in preventing the above dreadful conditions.

Prevalence of metabolic syndrome is wide variable in countries, United States of America 21-24 %, [16] but by using NCEP and IDF definition unadjusted prevalence was 34.5+ 0.9% and 39.0 + 1.1%.[36] Now a day's almost one quarter of US population has the metabolic syndrome. In Italy 22%, [17] in Mediterranean region of Turkey 34.6%,[18] in Asian Indians 32%,[19] in urban south Indian population prevalence is 25%, 18.3% and 25.8% by WHO, ATP

III and IDF criteria.[20]

Omanis have prevalence of 21%.[21] an Iranian study showed prevalence of metabolic syndrome that was 34.7%, 37.4% and 41.6% by definition of ATP III, IDF and ATP III/AHA/NHLBI.[22] Study in Japan by Shimamoto prevalence 25.4% is reported.[23] while in UK study of Pakistani cohort show prevalence of 53% by IDF and 44% by NCEP criteria.[24]

In Pakistan it varies from 18% to 46%, [25] and in our study prevalence of metabolic syndrome is 37.4% which is almost similar to study of Jhan F et al in Karachi outdoor patient had prevalence of metabolic syndrome in 35.2% of cases.[26] While study of Hydrie MZ et al in Karachi prevalence was 34.8% and 49% by IDF and modified ATP III criteria respectively.[27]

This variability may be due to selection of different criteria as shown in various studies, [24, 27] Which may also be because of selection of specific groups of peoples as metabolic syndrome in diabetic peoples was 79.7%,[28] in cardiovascular disease group Wierzbicki AS et al [24] shows 53% by IDF criteria, in medical community 14.95%,[29] so as variability in stroke patients is expected. Prevalence of metabolic syndrome rises as age advances, in our study metabolic syndrome was identified in 70% of patients above the age 40 years in stroke patients. In United States prevalence increases with age and it reaches to 43.5% at 60 to 69 years of age.[4]

Individual component of this syndrome also exerts its risk for stroke and coronary heart disease, as low HDL is associated with increased risk of ischemic stroke. Khan NI et al in their study observed that patients of ischemic stroke had hypertension in 65% of cases, diabetes mellitus in 36.6%, obesity in 18% and dyslipidemia in 32.7% of cases.[30]

In our study waist circumference was high in 32.8% of patients, fasting blood sugar and triglyceride levels were raised in 16.0% and 58.0%. HDL was low in very significant numbers of patients (51.1%) which we were not expecting because in this tertiary care hospital mostly indoor patients are belonging to rural areas, where usual physical work is more than urban people.

The abdominal obesity and insulin resistance have strong correlation,[5] and around 50% of stroke patients have insulin resistance,[31] several studies show correlation between insulin resistance, carotid atherosclerosis and stroke risk, and reduction of insulin resistance in diabetes mellitus type 2 reduces the carotid atherosclerosis and stroke.

Impact of metabolic syndrome on acute stroke prognosis has not been evaluated yet, but some metabolic abnormalities and risk factors that intenerated the metabolic syndrome have been associated with worsening of stroke outcomes. Moreover ongoing modern changes in human environment, behavior, and life style caused increase frequency of metabolic syndrome and subsequently increased future risk of cardiovascular disease and diabetes mellitus type 2 with great threat of morbidity and mortality.

Therefore clinicians and patients must work together to identify and provide the best prevention and treatment strategies for patients who are overweight and obese, and to modify other risk factors also.

CONCLUSION:

In our study, quite high percentage of metabolic syndrome was found in patients of stoke, affecting the middle age group (earning source) of people despite of their significant physical work, as prevalence of this syndrome is increasingly affecting the people of Pakistan which needs to pay more attention and starting mass awareness program at all levels in order to minimize the risk of stroke, cardiovascular disease and diabetes mellitus type 2.

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