

## Is metabolic syndrome common in cerebrovascular accident cases ?

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### ABSTRACT

**Background:** The metabolic syndrome, a clustering of disturbed glucose and insulin metabolism, obesity and abdominal fat distribution, dyslipidemia, and hypertension is associated with cardiovascular diseases.

**Objective:** To determine the prevalence of metabolic syndrome in CVA patients hospitalized in a tertiary care hospital of West Bengal.

**Methods:** Study included 50 consecutive CVA patients divided into two groups. Group I comprised of 30 patients aged > 40 years and Group II comprised of 20 patients aged < 40 years. MS was diagnosed according to Adult Treatment Panel III (ATP III) of National Cholesterol Education Program (NCEP) criteria.

**Results:** In both age groups, combined systolic (SBP) and diastolic blood pressure (DBP) (BP>130/85 mm of Hg) was much more common than isolated SBP & DBP. High FBS was observed in 60% and 50% of Group I and II respectively. Prevalence of MS was 70% and 65% in Group I, and Group II cases respectively. In male, MS was 68% in combined Group I & Group II cases and was statistically significant; but in individual groups, although MS (68.75% and 58.3% respectively) was much higher but not statistically significant. In female, MS was 72.7%, 71.4% and 75% in combined Group I & II, Group I and Group II cases respectively. Prevalence of MS was slightly higher in infarction cases (52.4%) in Group I, whereas in Group II, it was higher in haemorrhagic patient (61.5%).

**Conclusions:** The present study indicates a strong association of MS with CVA patients in different age groups & in both genders.

**Key Words:** metabolic syndrome, cerebrovascular accident, Adult Treatment Panel III

### INTRODUCTION

Cerebrovascular accident (CVA) is the 3rd commonest cause of death in the west after heart disease and cancer. The term stroke is applied to acute severe manifestations of CVA. WHO defines stroke as "rapidly developed clinical signs of focal (or global) disturbances of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin". Main risk factor for stroke is hypertension. Others recognized as risk factors being diabetes, dyslipidemia, obesity, smoking, cardiac abnormalities, blood clotting, hyper viscosity, OCP, and higher levels of cholesterol, TG and LDL. Classically, stroke has a predilection for the elderly population. However, there is no data regarding the upper age limit for younger population. The major cause of stroke in young is cardiovascular and haematological.

Metabolic syndrome (MS) is a group of disorder comprising of disturbances in glucose and insulin

metabolism, overweight and abdominal obesity, hypertension and dyslipidemia. It is closely related development of coronary heart disease, type II diabetes mellitus and other diseases related to plaque buildups in arterial wall like stroke and peripheral vascular disease.

The ATP III of NCEP<sup>1</sup> has proposed a definition of MS which helps in identification of individuals at risk for both type II DM, strokes and cardiovascular disease so that proper prophylactic measures can be taken to reduce the disease burden in our community. Present study is an attempt to analyze the different parameters of metabolic syndrome in CVA patients and in normal individuals and to find out relationship between MS and CVA.

### MATERIAL AND METHODS

The study was conducted at Calcutta National Medical College, Kolkata in between Jan 2011 to Jan 2012. The study population consisted of 50 consecutive CVA patients, out of which 30 patients

were of more than 40 years of age (Group I) and 20 patients of less than 40 years age (Group II). Subarachnoid haemorrhage (SAH), Transient cerebral ischaemia (TIA) cases were excluded. 60 patients were taken for control (age and sex matched) of which 30 patients of more than 40 years and 30 patients of less than 40 years of age.

Detailed history and thorough clinical examination with special emphasis on central nervous system was conducted in each case. In drowsy, disoriented, comatose patients, history was taken from patients' relatives.

Control subjects were selected from health volunteers, relatives of patients and other disease controls. Both cases and controls were divided in Group I and Group II series according to age.

## RESULTS

Group I consisted of 30 cases (15 cerebral haemorrhage and 15 cerebral infarction) and Group II was of 20 cases (11 haemorrhage and 9 infarction). Maximum number of cases (37%) in Group I occurred in 6th decade, while in Group II, it was in 4th decade (70%). M: F distribution was 53.33% and 46.66%; and 60% and 40% in Group I and Group II respectively.

The Prevalence of high BP (isolated SBP or isolated DBP or combined SBP & DBP) in CVA patients (96.7% in Group I & 85% in Group II) was significantly higher ( $P < 0.0002$  &  $P < 0.027$ ) in comparison to controls in both groups (46.7%). Prevalence of high waist circumference in CVA patients has no statistically significant difference ( $P < 0.72$  &  $p < 0.95$ ) compared to control individuals. Prevalence of high TG level in CVA patients was significantly higher ( $P < 0.04$  &  $P < 0.01$ ) in comparison to control individual. The Prevalence of low HDL level in CVA patients was significantly higher ( $P < 0.02$  &  $P < 0.03$ ) in comparison to control individuals. The Prevalence of high FBS in CVA patients was significantly higher ( $P < 0.03$ ) in comparison to control individuals of Group I; whereas, in Group II it was not statistically significant ( $P=0.1$ ). Table-1.

**Table- 1.** Different components of Metabolic Syndrome

	Group I (n=30)	Group I Control (n=30)	P.Value	Group (n=20)	Group I Control (n=30)	P. Value
Blood Pr (BP)	29	14	0.0001	17	14(46.7%)	0.027
Waist Circum- ference (WC)	9 (30%)	6 (20%)	0.92 (NS)	5 (25%)	6 (20%)	0.95 (NS)
Trigly- ceride (TG)	23	14	0.04	12	4(13.3%)	0.01
HDL	20 (66.7%)	8 (26.7%)	0.02	15 (75%)	12 (40%)	0.03
Fasting Blood Glucose (FBS)	(60%)	(26.7%)	0.03	(50%)	(20%)	0.1(NS)

Prevalence of MS was slightly higher in infarction patient (52.4%) than haemorrhagic patient (47.6%) in Group I; whereas in Group II haemorrhagic patient has higher prevalence (61.5%). In total, MS has slightly higher Prevalence in haemorrhagic patients (52.9%) than infarction patients (47.1%) in combined Group I & Group II cases. MS was present in 21 cases (70%) as compared to 8 control individuals (26.7%) in Group I series (table 2) which was significantly high ( $P= 0.014$ ); whereas in Group II series, it was present in 65% of cases compared to 20% of controls which was also statistically significantly ( $P=0.021$ ). Overall MS was diagnosed in 68% of cases as compared to 23.3% of controls, statistically highly significant ( $P= 0.0002$ ).

In males, prevalence of MS was higher in combined Group I and Group II cases compared to controls ( $P=0.049$ ). But in individual age groups, it was although higher as compare to controls, it was statistically not significant ( $P < 0.09$  for Group I; and  $P=0.15$  Group II). In females, it was 72.7% in Group I & II ( $P=0.0030$ ); 71.4% in Group I ( $P=0.037$ ); and 75% in Group II ( $P= 0.031$ ).

## DISCUSSION

In this study, the prevalence of high BP in CVA patient was significantly higher in comparison to

**Table- 2.** Prevalence of Metabolic Syndrome in Cases Vs Control

	MS - Present	MS - Absent	Chi square
Group I Cases (n = 30)	21 (70%)	9 (30%)	P. Value < 0.014
Control (n = 30)	8 (26.7%)	22 (73.3%)	
Group II Cases (n = 20)	13 (65%)	7 (35%)	P. Value < 0.021
Control (n = 30)	6 (20%)	24 (80%)	
Group I & Group II Cases (n = 50)	34 (68%)	16 (32%)	P. Value < 0.0002
Control (n = 60)	14 (23.3%)	46 (76.7%)	

control individuals of both age groups. Regarding high FBS level, it was statistically significant in elder age group (Group I) but in younger age group (Group II) it was not significantly high as compare to control individuals in this study. Several studies had found correlation between impaired FBS level and hypertension with MS and stroke in middle and elder age groups.<sup>2,3,4,5,6</sup> Recently waist circumference is gaining due consideration due to its strong correlation with MS.<sup>7</sup> However, we failed to get any significant association between WC and MS similar to previous studies.<sup>3,8</sup> Previous studies<sup>3,6,8,9</sup> have established strong correlation of high TG level & low HDL level in causation of MS and has been reaffirmed in our study.

Prevalence of MS was slightly higher in infarction patient than haemorrhagic patient in Group I cases, whereas in Group II cases haemorrhagic patient were more. Many studies have found significant correlation between ischaemic stroke with MS<sup>3,10</sup>

but only few studies correlated haemorrhagic stroke with MS.<sup>11</sup>

In our study, Prevalence of MS was 68%, 70% and 65% in combined Group I & II, Group I and Group II cases respectively which was significantly higher than control individuals, which is significantly higher compared to other similar studies.<sup>12,13</sup> The prevalence of MS in general population in India varies from 13-41%.<sup>14</sup>

## CONCLUSION

The present study indicates a strong relationship of metabolic syndrome with hospitalized CVA patients in different age groups irrespective of gender, which is much higher as compare to national and international standard. Prevention of the metabolic syndrome presents a great challenge for clinicians with respect to CVA. High rates of stroke associated with MS reveal the necessity of preventive approaches.

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