COMPARATIVE STUDY OF CAROTID-FEMORAL PULSE WAVE VELOCITY AND CAROTID INTIMA -MEDIA THICKNESS WITH AGE & GENDER IN CEREBROVASCULAR ACCIDENT (CVA) PATIENTS AND HEALTHY CONTROL INDIVIDUAL

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Abstract: The objective is to compare the carotid-femoral pulse wave velocity and carotid intima -media thickness with age & gender in Cerebro Vascular Accident patients and healthy control individuals. Both C-F PWV and CIMT were higher in CVA patients as compare to healthy control and more in males as compared to females in both groups and were statistically significant. Increase in carotid-femoral pulse wave velocity (C-F PWV) and carotid intima-media thickness (CIMT) in CVA patients indicate the risk of atherosclerosis with increasing age and in male gender as compared to females.

Keywords: Cerebro Vascular Accident (CVA), Carotid-femoral pulse wave velocity (C-F PWV), carotid intima-media thickness (CIMT), atherosclerosis

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INTRODUCTION

Cerebrovascular accident (CVA) is the medical term for a stroke. A stroke is when blood flow to a part of your brain is stopped either by a blockage (ischemic) or the rupture of a blood vessel (hemorrhagic). Stroke was the second most frequent cause of death worldwide in 2011, accounting for 6.2 million deaths (~11% of the total). [1] Overall, two-thirds of strokes occurred in those over 65 years old.[2]

The World Health Organization defined stroke as a "neurological deficit of cerebrovascular cause that persists beyond 24 hours or is interrupted by death within 24 hours",[3] The main risk factor for stroke is high blood pressure. Other risk factors include tobacco smoking, obesity, high blood cholesterol, diabetes mellitus, previous TIA, and atrial fibrillation.[4][5]

Atherosclerosis may disrupt the blood supply by narrowing the lumen of blood vessels leading to a reduction of blood flow, by causing the formation of blood clots within the vessel, or by releasing showers of small emboli through the disintegration of atherosclerotic plaques.[6]

High blood pressure accounts for 35–50% of stroke risk.[7] Blood pressure reduction of 10 mmHg systolic or 5 mmHg diastolic reduces the risk of stroke by ~40%.[8] Lowering blood pressure has been conclusively shown to prevent both ischemic and hemorrhagic strokes.[9][10] It is equally important in secondary prevention.[11]

The causes of stroke: An artery to the brain may be blocked by a clot (thrombosis) which typically occurs in a blood vessel that has previously been narrowed due to atherosclerosis ("hardening of the artery").

When a blood clot or a piece of an atherosclerotic plaque (a cholesterol and calcium deposit on the wall of the artery) breaks loose, it can travel through the circulation and lodge in an artery of the brain, plugging it up and stopping the flow of blood; this is referred to as an embolic stroke.

Stroke symptoms typically start suddenly, over seconds to minutes, and in most cases do not progress further. The symptoms depend on the area of the brain affected. The more extensive the area of the brain affected, the more functions that are likely to be lost. Some forms of stroke can cause additional symptoms.

MATERIAL AND METHOD

Present study was conducted in the department of physiology in colobration with department of medicine, Dr. S.N. Medical College, Jodhpur. Participants after understanding the study protocol and procedure were asked to give their written

consents for the study. Patients attending outdoor and indoor will be invited to participate in study.

INCLUSION CRITERIA

1. Patients of CVA confirmed by CAT scan while the age, sex matched control group of normal healthy individuals with no atherosclerotic risk factors.
2. .Men and women of age greater than or equal to 40 years.

NUMBER OF CASES STUDIED

100, out of which 50 healthy individuals and 50 CVA patients.

DATA EVALUATION

In study observational cohort study, the data will be analyzed by Epi Info statistical and multivariate analysis method used.

EVALUATION ON A PREFORMED PROFORMA HISTORY

Complete clinical examination Anthropometric measurement including BMI, WHR routine biochemical analysis, CAT scan and Pulse wave velocity and Arterial stiffness index measurement markers of atherosclerosis.

METHOD

Pulse wave velocity will be determined by Periscope (M/S Genesis Medical Systems, Hyderabad, India) in an 8-channel real-time PC-based simultaneous acquisition and analysis system. It has dedicated hardware module connected to 4 ECG electrodes and 4 blood pressure measuring cuffs. The report contains 8-second traces of Lead I and II ECG, all pressure pulse waveforms and all calculated results. PWV will be determined by a non-invasive pulse wave analyzing device. Participants will be asked to refrain from smoking and drinking caffeine-containing beverages 12 h before the test. They will also be advised not to take their morning dose of medicine on the day of procedure, before completing the test. Procedure will be performed in the morning hours between 8 and 10 a.m. with subject resting in supine position at least for 10 min before the recording. CIMT was measured from outside the body, in larger arteries relatively close to the skin by ultrasound. The IMT is measured in three tracts: in the common carotid, at one or two cms from the flow divider, at the bifurcation and in the internal carotid artery and track is selected on those regions with the greatest thickness, i.e. greatest disease burden.

OBSERVATION

TABLE 1 - AGE-SEX WISE DISTRIBUTION OF C-F PWV IN CVA PATIENTS AND CONTROL GROUP

AGE-GROUP	Male	Female	Av C-F PWV CVA Male	Av C-F PWV CVA Female	Av C-F PWV healthy Male	Av C-F PWV healthy Female
40-49	2	1	1426.4 ± 125.2	1311.2 ± 487.1	616.5 ± 75.4	598.2 ± 60.2
50-59	9	3	1539.5 ± 117.2	1335.6 ± 107.9	1127.3 ± 68.3	997.3 ± 72.7
60-69	15	5	1685.1 ± 139.2	1387.5 ± 154.6	1159.6 ± 88.4	1114.7 ±78.2
≥70	8	7	1789.4 ± 179.3	1422.1 ± 105.7	1379.2 ± 105.3	1256.1 ± 81.9
Total 50	34	16	1610.1 ±140.2	1364.1 ± 213.7	1070.6 ± 84.3	991.5 ± 73.2

Table1 - Shows average C-F PWV according to age- sex in CVA patients and control group. C-F PWV were higher in CVA patients as compare to healthy control and more in males as compared to females. It was statistically significant (p<.0.001).

TABLE 2 - AGE-SEX WISE DISTRIBUTION OF CIMT IN CVA PATIENTS AND CONTROL GROUP

AGE-GROUP	Male	Female	Av CIMT	Av CIMT	Av CIMT	Av CIMT

			CVA Male	CVA Female	healthy Male	healthy Female
40-49	**2**	**1**	**1.12 ± 0.38**	**0.74 ± 0.14**	**0.62 ± 0.05**	**0.54 ± 0.02**
50-59	**9**	**3**	**1.22 ± 0.44**	**1.00 ± 0.18**	**0.76 ± 0.02**	**0.65 ± 0.05**
60-69	**15**	**5**	**1.52 ± 0.24**	**1.12 ± 0.15**	**0.87 ± 0.08**	**0.73 ± 0.07**
≥70	**8**	**7**	**1.66 ± 0.48**	**1.22 ± 0.17**	**0.89 ± 0.04**	**0.86 ± 0.03**
Total 50	**34**	**16**	**1.38 ± 0.36**	**1.02 ± 0.16**	**0.78 ± 0.04**	**0.69 ± 0.04**

Table2 - Shows average CIMT according to age-sex in CVA patients and healthy individuals. CIMT were higher in CVA patients as compare to healthy control and more in males as compared to females. It was statistically significant (p<.0.001).

DISCUSSION

Carotid IMT is a marker of structural aspect of atherosclerosis; PWV reflects its functional consequences. Arterial disease does not begin with the first clinical event but develops long before without symptom, supporting the idea to extrapolate the high prognostic performance of clinical arterial disease to sub clinical disease and motivating much biotechnological medical research.[1-3] and to predict CVA risk for asymptomatic persons and thus enable to provide better medical care with parallel reductions in modifying risk factor.

The present study comprised of 50 patients clinically and CT scan proved cases of CVA who were attended medical department of Dr S. N. Medical collage, Jodhpur and attached hospital.

Age related arterial changes are responsible for increase in PWV and CIMT. This is supported by study of Danxia Zheng [12], et al.

The incidence of stroke significantly increases with age; approximately 75% to 89% of stroke incidence occurs in individuals 65 years and over [13].

The literature regarding gender-specific aspects of cerebrovascular diseases is quite sparse. It is well-documented that the incidence of stroke is higher in men than in women in all age classes, and women are, on average, several years older than men when they suffer their first stroke. The prevalence of stroke is higher among men up to the age of approximately 80 years, after which it becomes higher in women. A majority of studies indicate that the case-fatality rate is higher in female than in male stroke patients; there is also some evidence, albeit relatively weak, indicating a better functional outcome in men. Gender differences in risk factor profile and treatment response appear to be weak. The burden of providing informal care to stroke patients seems to constitute a threat to the mental health of the caregivers, who are predominantly women. [14].

Stroke has a greater effect on women than men because women have more events and are less likely to recover. Age-specific stroke rates are higher in men, but, because of their longer life expectancy and much higher incidence at older ages, women have more stroke events than men. [15].

Evidences are accumulating that age and gender have great impact on the distribution of stroke risk factors. Such data are lacking in Chinese population. 1027 patients with first-ever ischemic stroke (IS) were recruited and divided into young adult (<50 years), middle-aged (50~80 years), and very old (>80 years) groups according to stroke onset ages. Vascular risk factors were collected and compared among groups. Female patients were globally older than male patients at stroke onset**.** [16]

SUMMARY AND CONCLUSION

Both C-F PWV and CIMT were higher in CVA patients as compare to healthy control and more in males as compared to females in both groups indicate the risk of atherosclerosis with increasing age and in male gender and were statistically significant.

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