CEREBROVASCULAR ACCIDENT AND ITS ASSOCIATION WITH DURATION OF HYPERTENSION AND DIABETES MELLITUS

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ABSTRACT

BACKGROUND

Cerebrovascular Accident (CVA) or Stroke is encountered everyday in clinical practices. Almost all patients with CVA have antecedents of hypertension or diabetes. Identifying a risk factor for the development of CVA is of much importance in preventing the incidence of stroke. Proper management of hypertension and diabetes reduce the risk of CVA.

MATERIALS AND METHODS

A descriptive study was conducted among 150 CVA patients admitted to the Department of General Medicine and Neurology, MES Medical College Hospital, Malappuram and age and sex matched people without CVA were selected from the community.

RESULTS

It is found that out of 150 patients considered 80% were hypertensive, 54% had history of type 2 diabetes mellitus and 45.33% had history of both hypertension and diabetes. From this study, it was found that the duration of hypertension ($p < 0.001$) and duration of diabetes mellitus ($p < 0.001$) holds a significant association in development of CVA.

CONCLUSION

It is very clear that hypertension and diabetes mellitus are related to CVA. The longer the duration of these conditions, the higher the risk for CVA. So it is advisable to take necessary steps in controlling hypertension and diabetes, and to make them aware of the early signs and symptoms of CVA.

KEYWORDS

CVA- Cerebrovascular Accident, Hypertension, Diabetes Mellitus.

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BACKGROUND

According to WHO, Cerebrovascular accident is the second most dreaded disease after myocardial infarction in the world. It is the third most common cause of death in high-income countries after cancer and ischaemic heart disease. It is the most common cause of several physical disability.^[1] It is also the most prevalent neurologic disorder in terms of both morbidity and mortality. Stroke is the most common clinical manifestation of cerebrovascular disease. Stroke, a highly prevalent condition exacts a substantial societal toll in the form of the "Dreaded-D's," which are the leading cause of chronic disability, the second leading cause of dementia and the fourth leading cause of death in the United States (US).^[2]

Before the CT era, two population-based studies on CVA were undertaken in India. The first study was a population-based study conducted in Vellore, Tamilnadu, South India covering 258,576 people during the late 1960s and early 1970s.^[3] This study revealed an incidence of 13/100,000 person-years and a point prevalence of 42/100,000. The second study was conducted at Rohtak, Haryana, North India

(1971 - 1974). Eighty-two cases of stroke were recorded yielding an annual incidence of 33/100,000 person-years. Unfortunately, no incidence study was reported from India over the next 2 decades.^[4]

Identifying a risk factor for the development of CVA is of much importance in preventing the incidence of stroke. There is need for a study that could depict the hypertensive status and its association to CVA among the local population. About 33% urban and 25% rural Indians are hypertensive. Of these, 25% rural and 42% urban Indians are aware of their hypertensive status. Only 25% rural and 38% of urban Indians are being treated for hypertension. One-tenth of rural and one-fifth of urban Indian hypertensive population have their BP under control.^[5]

Similar is the picture of diabetes mellitus. According to Wild et al,^[6] the prevalence of diabetes is predicted to double globally from 171 million in 2000 to 366 million in 2030 with a maximum increase in India. Worryingly, diabetes is now being shown to be associated with a spectrum of complications and to be occurring at a relatively younger age within the country. The level of morbidity and mortality due to diabetes and its potential complications are enormous and pose significant healthcare burdens on both families and society. There is now the demand for urgent research and intervention at regional and national levels - to try to mitigate the potentially catastrophic increase in diabetes that is predicted for the upcoming years.^[7]

Being this the scenario prevalent in the Indian population, there finds the relevance of this study aimed to find whether any relation exists between the duration of hypertension,

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diabetes mellitus and the onset of cerebrovascular accident in our community.

MATERIALS AND METHODS

This study was undertaken after obtaining ethical and scientific approval from the Institutional Ethics and Scientific committee of MES Medical College, Perinthalmanna. Study design approved was of a descriptive study. Using the formula $4pq/d^2$, the prevalence of hypertension among CVA patients as 69% according to a study done by Zeenat Qureshi Stroke Research Centre⁸ and 10% absolute error the sample was calculated.

The study was conducted among patients admitted with CVA to the Department of General Medicine and to the Department of Neuromedicine, MES Medical College Hospital. Patient's details and history were collected as per a predesigned proforma. Different methods were adopted in collecting the requisite data. Data was collected directly from patients and their bystanders by means of history taking and necessary clinical examinations. In some cases case, files were collected on demand from the Medical Records Department and those recorded data were made use of. In some other cases, discharge summary of patients with cerebrovascular accident were collected and the required information were sorted out.

After collecting the data few information like hypertensive status, diabetic history, duration of being hypertensive or diabetic, age and gender of the patient, etc. were emphasised and separately highlighted. This helped to prioritise the vital information and a measure to compare data collected. The criteria used for data collection focuses mainly on cerebrovascular accident, hypertension and diabetes mellitus. The diagnostic criteria used for cerebrovascular accident^[9] was-

- Unilateral or bilateral motor impairment (including discoordination).
- Unilateral or bilateral sensory impairment.
- Aphesis/ dysphasic (non-fluent speech).
- Hemianopia (half-sided impairment of visual fields).
- Diplopia.
- Forced gaze (conjugate deviation).
- Dysphagia of acute onset.
- Apraxia of acute onset.
- Ataxia of acute onset.
- Perception deficit of acute onset.

The Diagnostic Criteria used for Hypertension^[10] was-

According to the Joint National Committee 7 (JNC 7), hypertension is defined as physician office systolic BP level of ≥ 140 mmHg and diastolic BP of ≥ 90 mmHg. The JNC 7 defines normal BP as a systolic BP < 120 mmHg and diastolic BP < 80 mmHg. The gray area between systolic BP of 120-139 mmHg and diastolic BP of 80-89 mmHg is defined as "prehypertension."

The Diagnostic Criteria used for Diabetes Mellitus^[11] was-

1. HbA1c $\geq 6.5\%$. The test should be performed in a laboratory using a method that is NGSP certified and standardised to the DCCT assay.*

OR

2. FPG ≥ 126 mg/dL (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 hours.*

OR

3. 2-h plasma glucose ≥ 200 mg/dL (11.1 mmol/L) during an OGTT. The test should be performed as described by the World Health Organisation using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*

OR

4. In a patient with classic symptoms of hyperglycaemia or hyperglycaemic crisis, a random plasma glucose ≥ 200 mg/dL (11.1 mmol/L).

*In the absence of unequivocal hyperglycaemia, criteria 1-3 should be confirmed by repeat testing.

These are the core ideas by which the data requisite of the study was fulfilled.

Data collection was extended by including the control population. 150 case controls were considered in analysing the data and in finding association between CVA and duration of hypertension and diabetes mellitus. Control population data was collected successfully by conducting a medical camp in a Panchayat (Vangad) near by the hospital. Control population for the study was sorted out according to the age and gender match criterion. Minimum cut-off age limit was 30 years. Collected data was entered in Microsoft Excel and analysed using IBM-compatible Statistical Package for Social Sciences (SPSS) version 20.0. Statistical analyses was done using the Chi-square test: p value of < 0.05 was considered significant and at < 0.001 was considered highly significant and a 'p' value > 0.05 was considered not significant.

RESULTS

This study considered a total of 150 patients, all 150 patients were diagnosed with Cerebrovascular accident and was admitted to the MES Medical College Hospital.

In these 150 cases 84 patients were male, that is 56% of the total and only 44% that is 66 patients were females. This is depicted in Graph No. 1.

Graph 1. Gender Distribution of Case and Control Population

N- (CVA Negative), P- (CVA Positive)

	Case (n=150)	Control (n=150)	Total (n=300)
Range	31-88	30-84	30-88
Mean (Standard Deviation)	62.39 (10.599)	59.25 (12.614)	60.82 (11.736)

Table 1. Descriptive Statistics of Age Distribution among Case and Control Populations

Considering the age distribution of these patients, it is found that the youngest patient was of 31 years old and it was a male patient. Then youngest female patient was of 32 years old. Graph No. 2 shows this age distribution of all 150 patients.

Graph 2. Age Distribution of Male and Female CVA Patients

Table number 2a shows the duration or time period of CVA patients and control populations, since they have been diagnosed to have hypertension. Table 2b shows the duration or time period since they have been diagnosed to have diabetes mellitus. Only few of them were aware of their previous hypertensive or diabetic history. Among these few, only a very few patients were on regular medication. To be exact only 36 hypertensive patients and 27 diabetic patients among the case population were aware of their disease history, whereas among the control population much more were aware of their disease history and were on regular medication. Previous studies also support this picture prevalent among the Indian population.^[5]

This study facilitated in drawing a clear picture regarding Cerebrovascular accident and its association with duration of hypertension and diabetes mellitus. The study result is depicted in Table No. 2a and 2b and it was analysed using the IBM SPSS version 20.0 using the Chi-square test. From this analysis, it was found that the duration of hypertension and CVA holds a highly significant association ($p=0.000001$). It is proven that duration of diabetes mellitus also has a significant association with the incidence of CVA ($p=0.000025$).

Duration	Diabetes	
	CVA	Controls
<1 Years	1	4
1-5 Years	9	9
6-10 Years	12	20
>10 Years	5	29
Total (n)	27	62
Chi-square	26.547 ^a	
p	<0.001	

Table 2a. Association between Duration of Hypertension and CVA

Duration	Hypertension	
	CVA	Controls
<1 Years	6	8
1-5 Years	17	29
6-10 Years	9	22
>10 Years	4	23
Total (n)	36	122
Chi-square	33.865 ^a	
P	<0.001	

Table 2b. Association between Duration of Diabetes Mellitus and CVA

From this study, it is found that the 80% of CVA patients had history of prevalence of hypertension (120 patients of 150), 54% of the patients had history of prevalence of diabetes mellitus (81 patients of 150). It is also noted that 45.33% of them had history of both hypertension and type 2 diabetes mellitus. This data is depicted in Graph No. 3a and the Graph No. 3b represents the prevalence of hypertension and diabetes among control population.

Graph 3a. Prevalence of Hypertension and t2dm among CVA Patients

Graph 3b. Prevalence of Hypertension and T2DM among Control Population

The prevalence of hypertension and diabetes among females and males were separately considered and found that 43.3% of males and 36.6% of females had history of hypertension, 29.3% of males and 24.6% of females had

history of type 2 diabetes mellitus. Table no. 3 depicts this prevalence of hypertension and diabetes mellitus among 150 CVA patients.

Variables	Males		Females		Total	
	No.	%	No.	%	No.	%
Hypertension	65	43.3%	55	36.6%	120	80%
Diabetes Mellitus	44	29.3%	37	24.6%	81	54%
Both	36	24%	32	21.3%	68	45.33%

Table 3. Prevalence of Hypertension and t2dm among Male and Female CVA Patients

DISCUSSION

From Table No. 3, it is evident that prevalence of hypertension among CVA patients is remarkably high. As per this study, 80% of the CVA patients were hypertensive that include hypertension detecting for the first time on this presentation and previously diagnosed cases. Majority of the cases had previous history of hypertension, but only a very few were under regular medication. Among this 80% and 43.3% were males and 36.6% were only females, whilst it is worth mentioning that overall incidence of CVA shows a male predominance from this study, of the 150 CVA patients 84 (56%) were males and only 66 (44%) were females (Graph no. 1a).

Prevalence of diabetes among CVA patients is also a significant figure, more than 50%, to be exact 54% of the CVA patients were found to be diabetic. There were cases of uncontrolled diabetes and only few were on regular medication. Diabetic history of CVA patients were comparable among males and females. Among the 54% of diabetes cases, 29.3% were males and 24.6% were females.

One of the important fact that needs to be mentioned here is that even though the case control population also had hypertensive and diabetic history, almost all of them were aware about their disease status and were on regular medication for the same.

From Table No. 2 which depicts the time period since diagnosed with hypertension or diabetes, it is found that more incidences of CVA is being reported within the first five years of detecting hypertension followed by more frequency within a time period of six to ten years, but it is worth mentioning that since only a few were aware of their hypertensive status, among the 120 hypertensive CVA patients information about time period since diagnosed with hypertension was provided by only 36 patients. This result is indicative or evident of the fact that duration of being hypertensive or diabetic does not hold a direct proportionality with the incidence of hypertension, so preventive and therapeutic measures in controlling hypertension and diabetes must be taken right from the initial period to prevent the possible risk of incidence of CVA.

CONCLUSION

It is very clear that there is a high prevalence of hypertension among CVA patients and more than fifty percentage were found to have prevalence of type 2 diabetes mellitus. This study could thus very well depict the scenario prevalent among the local population of Malappuram district and these results may be indicative of the fact that uncontrolled high blood pressure increases a person's risk for stroke. Uncontrolled Diabetes mellitus also has a significant role in increasing a person's risk of stroke. So, it is advisable to take necessary steps in controlling hypertension and diabetes, and to make them aware of the early signs and symptoms of CVA. Also, it is mandatory to begin the control and preventive strategies from the initial period of diagnosing with hypertension or diabetes.

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