**Original Article**

**CLINICO-EPIDEMILOGICAL FEATURES OF HYPERTENSIVE SUBJECTS IN KASSALA TOWN, EASTERN SUDAN**

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**Objectives:** To study the clinico-epidemiological profile of hypertension in a series of hypertensive patients in a town in Eastern Sudan.

**Methods:** A sample of 242 hypertensive patients was studied using a structured questionnaire including the clinico-epidemiological features associated with hypertension.

**Results:** Two thirds of the sample were females, 73.6% of whom were in the 35-64 year age-range; three-quarters of them had a low level of education. Significant risk factors for hypertension included positive family history of hypertension, and being from the Northern Sudan. Significantly more patients from the eastern and western regions had coronary heart disease (P<0.001). Also, significantly more patients from Western Sudan had left ventricular failure (P<0.02) and congestive heart failure (p<0.0001), while significantly more patients from Southern Sudan had nephropathy (P<0.007).

**Conclusions:** The study reveals some clinico-epidemiological characteristics in a series of hypertensive patients in Eastern Sudan. It suggests a low rate of blood pressure control as well as ethnic variation of blood pressure control and complications.

**Key Words:** Hypertension, Ethnic variation, Kassala Town

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**INTRODUCTION**

Hypertension is a common problem. A recent estimate suggests that approximately one billion adults have hypertension (333 million in the developed and 639 million in developing countries) with the highest prevalence in Eastern Europe and the Latin America and the Caribbean.¹
National surveys also indicate that both the average level of blood pressure and prevalence of hypertension in children and adolescents increased between 1988-2000. The disease, and its complications, is causing considerable morbidity and mortality. Furthermore, there are numerous management problems regarding early diagnosis, clinical assessment, and proper management.

In Sub-Saharan Africa, hypertension is a common problem, especially in urban areas. Very few studies have been done in Sudan on this common problem. The people of Sudan are composed of a mix of African and Arabic ethnic groups. The Africans have their own languages, traditions, and belong to various religions, such as Islam, Christianity and others. On the other hand, those of Arabic ethnic background are Arabic speaking, and muslim. This differentiation may be a source of variation of the problem of hypertension as well as other chronic diseases. The ethnic groups in Sudan are distributed geographically, but the population of most towns in the country is made up of people from all over the country.

The aim of this study is to describe some clinico-epidemiological aspects of the disease, in relation to ethnicity, in the form of geographical distribution of population using a series of outpatient clinic-based hypertensive patients, in Kassala town, in eastern Sudan.

METHODOLOGY
The study was carried out in Kassala teaching hospital, Kassala town, Eastern Sudan between 2003 and 2004. A series of 242 hypertensive subjects was studied. The study's parameters were classified as blood pressure (BP) levels, risk factors for hypertension, and complications of hypertension. The variables related to those parameters were the geographical origin of subjects (classified as central, eastern, western, northern and southern), and as indicated by their tribal label, gender, age; and level of education (classified as low which included illiterate persons, as well as those who had no more than the intermediate level of education; average where subjects had high secondary school education, and high for those who had university degrees or more); family history of hypertension, body mass index (BMI), waste-hip ratio (W/H ratio) and presence of diabetes mellitus in the form of a diagnosis label with on-going treatment. The complications of hypertension were defined as the presence of coronary artery disease confirmed by electrocardiographic findings, left ventricular failure, congestive cardiac failure, stroke (which are all confirmed clinically, retinopathy (confirmed by ophthalmoscopic examination and defined as the presence of signs of hypertensive retinopathy), and nephropathy as confirmed by abnormal urea and creatinine levels and presence of albuminuria.

Each patient was weighed and had his/her height recorded to the nearest half kilogram and centimeter; respectively. The waist and hip circumferences were measured and recorded to the nearest one centimeter. The BMI was calculated as the weight in kilograms divided by the square of the height in meters. The W/H ratio was calculated as the waist circumference divided by the hip circumference. A W/H ratio of more than one was considered as abnormal while a BMI of more than 25 kg/ht² and a W/H ratio was considered as high. The BP was measured using a standard mercury sphygmomanometer with the patient in a sitting position, using a cuff of suitable size. The systolic blood pressure (SBP) and diastolic blood pressure (DBP) were determined by first hearing of the Korsakoff's sound and their muffling; respectively. Blood pressure readings were classified as controlled or not controlled if the systolic and diastolic blood pressure were equal to or more than 140 and 80 mm Hg, respectively.

Data were entered and analyzed using an IBM compatible computer incorporating the Statistical Package for Social Sciences (SPSS Version 11). Frequency distribution tables were generated. Chi-squared test was used to assess the significance between categories. A p-value of 0.05 or less was considered as indicative of statistical significance.

RESULTS
Females formed two thirds of the sample of 242 subjects studied. Most patients (73.6%) were aged between 35 and 64 years, and almost three quarters of them had a low level of education. Subjects from the Northern and Western parts of the Sudan constituted about two-thirds of the sample (Table 1).

The distribution of risk factors for hypertension revealed a significantly higher proportion of subjects, with a positive family history of hypertension, and origins from the northern region of Sudan (p<0.001). Of the remaining risk factors there were no statistically
significant differences among the geographical regions (Table 2).

Less than one-fifth of the sample had controlled blood pressure. There was significant variation between patients from different geographical areas of the country, the highest proportion of patients with controlled blood pressure were from Central Sudan (p<0.000) (Table 3).

As regards complications of hypertension, significantly more subjects from the eastern and western regions had coronary artery disease (p<0.001). Also, significantly more subjects from the western region had left ventricular failure (p < 0.02) and congestive cardiac failure (p < 0.0001) than subjects from the other regions. Nephropathy was significantly more among subjects from the southern region (p<0.007) (Table 4).

### Table 1: Demographic variables

| Variable       | No. (%) |
|----------------|---------|
| Gender:        |         |
| Males          | 77 (31.8) |
| Females        | 165 (68.2) |
| Age distribution (years): |         |
| >35            | 31 (12.8) |
| 35-64          | 178 (73.6) |
| 65+            | 33 (13.6) |
| Education level: |         |
| Low            | 188 (77.7) |
| Average        | 30 (12.4) |
| High           | 24 (9.9) |
| Geographical origin: |         |
| Central Sudan  | 25 (10.3) |
| Eastern Sudan  | 31 (12.8) |
| Western Sudan  | 89 (36.8) |
| Northern Sudan | 87 (36.0) |
| Southern Sudan | 10 (4.1) |

### Table 2: Risk factors of hypertension according to geographical origin distribution

| Risk factor        | Eastern   | Northern | Western | Central | Southern | Total   |
|--------------------|-----------|----------|---------|---------|----------|---------|
| Family history*    | 6 (19.4)  | 53 (60.9) | 34 (38.2)| 10 (40.0)| 5 (50.0) | 134 (100.0) |
| Diabetes mellitus  | 10 (32.3) | 21 (24.1) | 23 (25.8)| 9 (36.0) | 3 (33.3) | 66 (100.0) |
| High BMI           | 14 (45.2) | 42 (48.3) | 41 (46.1)| 8 (32.0) | 6 (60.0) | 111 (100.0) |
| High WH ratio      | 10 (32.3) | 39 (44.8) | 30 (33.7)| 5 (20.0) | 4 (40.0) | 88 (100.0) |
* p<0.001

### Table 3: Blood pressure control according to geographical origin distribution

| Geographical distribution | Controlled | Uncontrolled | Total |
|----------------------------|------------|--------------|-------|
| Eastern Sudan              | 7 (22.6)   | 24 (77.4)    | 31 (100.0) |
| Northern Sudan             | 16 (18.4)  | 71 (81.6)    | 87 (100.0) |
| Western Sudan              | 9 (10.1)   | 80 (89.9)    | 89 (100.0) |
| Central Sudan              | 12 (48.0)  | 13 (52.0)    | 25 (100.0) |
| Southern Sudan             | 3 (30.0)   | 7 (70.0)     | 10 (100.0) |
| Total                      | 47 (19.4)  | 195 (80.6)   | 242 (100.0) |

### Table 4: Complications of hypertension according to geographical origin distribution

| Complication               | Eastern | Northern | Western | Central | Southern | Total   |
|----------------------------|---------|----------|---------|---------|----------|---------|
| Coronary artery disease*   | 13 (41.9)| 24 (27.6)| 44 (49.4)| 3 (12.0)| 1 (10.0)| 85 (35.1)|
| Left ventricular failure† | 6 (19.4)| 3 (3.4)  | 17 (19.1)| 3 (12.0)| 1 (10.0)| 30 (12.4)|
| Congestive heart failure‡ | 0       | 3 (3.4)  | 18 (20.2)| 1 (4.0) | 2 (20.0)| 24 (9.9) |
| Stroke                     | 0       | 0        | 5 (5.6)  | 1 (4.0) | 0        | 6 (2.5)  |
| Retinopathy§               | 3 (9.7) | 12 (13.8)| 9 (10.1)| 6 (24.0)| 5 (50.0)| 35 (14.5)|
| Nephropathy                | 8 (25.8)| 23 (26.4)| 21 (23.6)| 3 (12.0)| 5 (50.0)| 60 (24.8)|

p<0.001, †p<0.02, ‡p<0.0001, §p<0.007

**DISCUSSION**

Since there are no symptoms in this condition, known as 'the silent killer', awareness of hypertension comes with an appropriate application of diagnostic criteria and a clear communication of the findings and relevant instructions by a member of the health care delivery team. The best means of increasing awareness of hypertension is an improvement in detection, and communication during routine clinical encounters. Effective mass screening programmes must be linked effectively to the settings of the health care provider where the diagnosis can be rapidly confirmed or refuted and treatment promptly initiated.
Factors that influenced rates of awareness, treatment and control of hypertension include the extent to which individuals came in contact with the health care providers, the presence or absence of co-morbidities, the individual socioeconomic status, the integrity of social support network; and the extent to which the treatment and control of hypertension is a priority for the community; and the accessibility and affordability of health care.

Hypertension is a major health problem worldwide and the Sudan is not an exception. In other communities. 9-11 Moreover, the study revealed some clinico-epidemiological variations of those characteristics.

This study revealed some clinico-epidemiological characteristics in hypertensive patients in Eastern Sudan. It also revealed a low rate of blood pressure control as well as suggestions of ethnic variations of those characteristics.

CONCLUSION
This study revealed some clinico-epidemiological characteristics in hypertensive patients in Eastern Sudan. It also revealed a low rate of blood pressure control as well as suggestions of ethnic variations of those characteristics.

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