High prevalence of hypertension among an ethnic group in Sudan: implications for prevention

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ABSTRACT

Objective Hypertension is an emerging non-communicable disease in developing countries. Due to its silent nature and serious complications, active screening is essential in order to prevent complications. For instance, premature mortality from cardiovascular diseases could be prevented by the effective control of hypertension. The aim of this study was to determine the prevalence of undiagnosed hypertension among Nuba ethnic group living in Atbara city, north Sudan and to identify the associated risk factors. Subject and methods All consenting 500 adults from Nuba tribe who live in El Wihda District, Atbara were included. Blood pressure (BP) and body mass index were measured. Standard interviewing procedures were used to record medical history, sociodemographic data, and lifestyle characteristics. Results Among the 500 participants, females were 364 (72.8%) and males were 136 (27.2%). The overall prevalence of undiagnosed hypertension was 49.4% (30.8% stage 1 hypertension and 18.6% stage 2 hypertension). In addition, 41% of the population was having prehypertension. The significant risk factors for high BP were: male sex, age above 45 years, overweight, illiteracy, and alcohol consumption. Conclusion Undiagnosed high BP is very common among Nuba ethnic group; therefore, active screening and early management are recommended to prevent complications.

Introduction

Hypertension is a major health problem worldwide and constitutes a public health epidemic, with an increasing global prevalence, especially in low and middle-income countries.1–3 A recent estimate suggests that approximately 1 billion adults have hypertension, 333 million in the developed and 639 million in developing countries.4 The highest prevalence is reported from Eastern Europe and the Latin America and the Caribbean.4 Nonetheless, in sub-Saharan Africa, the prevalence of hypertensive disease is rising steadily,5,6 with a reported prevalence between 15% and 70% in different countries.7

In Sudan, the situation is not different, as the burden of hypertension is also rising.8–10 In 2012, the National Medical Information Centre/Federal Ministry of Health declared the registered number of hypertension cases to be about 9.9% of the total population.

Hypertension is well recognized to be associated with low socioeconomic status, high alcohol consumption, and low level of education. This increasing prevalence of hypertension is attributed to many factors, but mainly to population growth, aging, unhealthy diet, increasing body weight, sedentary lifestyle, and the escalating life pressures.2 Ethnicity as a risk factor for hypertension has been a focus for many studies.11,12

The aim of this study was to determine the prevalence of undiagnosed hypertension among Nuba tribe individuals living in Atbara River Nile State (RNS) and to find out the risk factors associated with the development of hypertension. Nuba is a term used for people who live in Nuba Mountains in the southern part of Sudan, known as South Kordofan State. Some individuals of Nuba race have moved and settled in north Sudan. This ethnic group was intentionally targeted so as to verify the findings of a previous preliminary study; conducted at another geographical area with a smaller sample size that reported a higher blood pressure (BP) among this particular ethnic group in comparison to other fair-skinned ethnic groups in RNS.13
Patients and methods

Study design

A descriptive cross-sectional community-based study was conducted as a house-to-house survey in the period from July to December 2013.

Settings

Al Wihda district lies in the eastern part of Atbara, RNS, where most Nuba tribe people live, most of them are internally displaced from South Kordofan State, where war and instability have been ongoing for the last two decades. There is about 4000 population in this district, mostly children and young adults.

Study population, sampling technique, and sample size

All adults inhabiting Al Wihda District, in a house-to-house basis, who volunteered to participate, were included. The total number of participants was 500. This sample size ought to represent the estimated 4000 total population with a confidence level of 95% and confidence interval of 5%.

Exclusion criteria

Individuals below 18 years, those previously diagnosed as having hypertension or currently taking anti-hypertension medications and pregnant ladies were excluded in this survey.

Data collection

The stepwise approach for non-communicable diseases surveillance of the World Health Organization was used for data collection. A standardized structured questionnaire was used to gather demographic and behavioral information. Each participant was questioned for demographic data, past medical history, risk factors, and family history of hypertension. Data was collected through an interviewer-administered pre-tested questionnaire. Furthermore, body weight and height were measured to calculate the body mass index (BMI). BP was measured using the standardized technique described below.

Anthropometric measurements

Anthropometric measurements were taken using standardized technique and calibrated equipment. BMI was calculated by the formula: weight in kilograms divided by height in meter squared. BMI-defined as underweight, 18.5–24.9 kg/m² normal, 25–29.9 kg/m² overweight, and >30 kg/m² as obesity.

Blood pressure measurement

BP was measured on the sitting position using a calibrated portable mercury sphygmomanometer, with appropriate cuff size. The average of three readings each taken after 15 min rest was recorded. BP levels were classified according to the Criteria of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure.

Definitions of the BP recordings were as follows:

- Normal BP is a systolic BP less than 120 mmHg and a diastolic BP less than 80 mmHg.
- Prehypertension is a systolic BP between 120 and 139 mmHg and a diastolic BP between 80 and 89 mmHg.
- Stage one hypertension: is a systolic of 140–159 mmHg, and/or a diastolic of 90–99 mmHg.
- Stage two hypertension: is a systolic of 160 mmHg or more, and/or a diastolic of 100 mmHg or more.

Quality assurance

House-to-house data collection was performed by trained field workers. The field study team was composed of native volunteers to facilitate communication, medical students, and physicians. All study team was trained by the principal investigator for 3 d on the study procedures. The sphygmomanometers were calibrated twice daily during the survey period.

Statistical analysis

The data generated was coded, validated, and analyzed using Statistical Package for Social Sciences (SPSS) version 20 (IBM Statistics, SPSS Inc., Chicago, IL). Pearson chi-squared test was used to test for significance between proportions. p Values below 0.05 was considered statistically significant. The main variables analyzed were: age, sex, BMI, BP, history of diabetes, and a family history of hypertension.

Ethical approval

Verbal consent was obtained from each participant prior to enrollment. The following information was given during data collection to ensure they had the information needed to make the informed consent: that participation was optional; there would be no penalty for refusal. A complete description of the aims and
procedures of the study was clarified; potential benefits and risks were explained, and assurance of confidentiality of any information was guaranteed. Any other additional information requested by participants was provided during data collection. All individuals found to have a high BP, or any other medical condition was referred, according to their will, to a physician for further management. All information obtained was kept confidential. All patients attended the physicians clinic at the time of the study were offered free of charge investigations and medications, no additional financial burdens were added to participants. An ethical clearance of the research was obtained from the Ethical Committee of the Faculty of Medicine – Nile Valley University.

Results

Socio-demographic variables

In this study, 500 individuals were included, 364 (72.8%) were females, with a male to female ratio of 1:2.7.

A higher proportion of the study participants were young adults (18–30) years of age 291 (58.2%). Education profile of participants showed that a large proportion of the participants (38.5%) were illiterate. Table 1 shows the socio-demographic characteristics of study population.

The prevalence of undiagnosed hypertension was 49.4%; moreover, only 48 (9.6%) of participants were having normal BP (Table 2).

The statistically significant risk factors for having a high BP were increasing age, male sex, low educational level, alcohol consumption, having a high BMI, and a positive family history of hypertension (Table 3).

Discussion

The findings of this study indicate the high prevalence of undiagnosed hypertension among Nuba ethnic group living in RNS, i.e., almost half of them were affected. This is comparable to that reported in certain ethnic groups in India, South Africa (49.8%), and Cameroon (47.5%). This finding confirms our earlier observation about the high prevalence of hypertension among this ethnic group.

This high prevalence may be attributed to the increasing life stresses, dietary, or other environmental factors. However, due to similar exposure of all other ethnic groups in RNS to these mentioned factors, the possibility of some genetic contribution seems valid.

Ethnicity as a risk factor for hypertension has been extensively studied. For instance, a study in India found remarkable variation in prevalence of hypertension among different ethnic groups ranging from 7.0% to 54.4%. This particular point necessitates screening other ethnic groups in Sudan for hypertension as well as other diseases in which genetics may play a role.

Several studies have shown significant association of hypertension with age and male gender. In this study, we obtained a similar result. This study showed that illiterate individuals have the highest prevalence of undiagnosed hypertension. This may be attributed, in part, to the lack of awareness and reduced health seeking behavior. Illiteracy is also likely to be related to levels of poverty and deprivation.

Furthermore, there are some studies indicating that educated individuals are less likely to have hypertension.

Table 1. Socio-demographic characteristics of Nuba tribe participants in Atbara, Sudan 2013 (n = 500).

| Parameter     | Variable | n (%) |
|---------------|----------|-------|
| Age           | 18–30    | 291 (58.2) |
|               | 31–45    | 123 (24.6) |
|               | 46–60    | 41 (8.2) |
|               | >60      | 45 (9.0) |
| Gender        | Male     | 136 (27.2) |
|               | Female   | 364 (72.8) |
| Education     | Illiterate | 194 (38.8) |
|               | <10 years | 161 (32.2) |
|               | >10 years | 95 (19.0) |
| Social status | Single   | 193 (38.6) |
|               | Married  | 287 (57.4) |
|               | Divorced | 5 (1.0) |
|               | Widow    | 15 (3.0) |

Table 2. Categories of blood pressure recordings among Nuba tribe participants in Atbara, Sudan 2013 (n = 500).

| Blood pressure category | n | % |
|------------------------|---|---|
| Normal blood pressure  | 48 | 9.6 |
| Prehypertension        | 205 | 41.0 |
| Stage one hypertension | 154 | 30.8 |
| Stage two hypertension | 93  | 18.6 |

Other significant risk factors for hypertension, recognized in this study, were obesity and a positive family history of hypertension. The association obesity and high BP is well documented in the literature. Despite the well-documented association between diabetes and hypertension in literature, diabetes was not found to be associated with hypertension in this particular study. This may be attributed, in part, to the low prevalence of diabetes among participants; a fact that in turn be explained by the significant physical activity observed in individuals of this tribe. This finding may also suggest the need to study the prevalence of diabetes among Nuba tribe. Alcohol has been identified as a risk factor for global burden of disease, attributing to an increased risk of cardiovascular problems, such as hypertension. In this study, alcohol was found to be a significant risk
factor for hypertension; this is similar to the finding of other studies.28

This study is not without limitations. The cross-sectional design may not allow for generalization of the results to the whole population. The role of diet and physical activity on the prevalence of undiagnosed hypertension were not investigated. Despite these limitations, this study is novel, important, and pioneer in drawing the attention of health workers and health policy makers to consider ethnicity in future health plans.

Conclusion

Undiagnosed hypertension is very common among Nuba ethnic group living in Atbara, north of Sudan, therefore, active screening and early management are recommended to prevent complications.

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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