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Prevalence and Associated Risk Factors of Hypertension: A Cross-Sectional Study in Aguelhok

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ABSTRACT

Hypertension doubles the risk of cardiovascular diseases, including coronary heart disease (CHD), congestive heart failure (CHF), ischemic and hemorrhagic stroke, renal failure, and peripheral arterial disease.1 Objectives of this study is to estimate hypertension prevalence and its risk factors in Aguelhok. A community based cross-sectional study was carried out among the people aged 20 to 99 years living in Aguelhok area. The prevalence of hypertension in the present study (31.11%). Occupation, smoking and obesity have strong correlation with hypertension in this study. Women develop hypertension predominantly around the age of menopause; men who develop hypertension at early age are predominantly systolic hypertension. Hypertensive cases were predominantly among married individual. Increasing age is proved to be an independent risk factor for hypertension.

Keywords: Hypertension, Coronary heart disease, congestive heart failure, Obesity.

INTRODUCTION

Hypertension is one of the leading causes of the global burden of disease. Approximately 7.6 million deaths (13–15% of the total) and 92 million disability-adjusted life years worldwide were attributable to high blood pressure in 2001. Hypertension doubles the risk of cardiovascular diseases, including coronary heart disease (CHD), congestive heart failure (CHF), ischemic and hemorrhagic stroke, renal failure, and peripheral arterial disease.1 Systemic BP rises with age, and the incidence of cardiovascular disease (particularly stroke and coronary artery disease) is closely related to average BP at all ages, even when BP readings are within the so-called 'normal range'. Thus a practical definition of hypertension is 'the level of BP at which the benefits of treatment outweigh the costs and hazards'.[2]

In the United States, average systolic blood pressure is higher for men than for women during early adulthood, although among older individuals the age-related rate of rise is steeper for women. Consequently, among individuals age 60 and older, systolic blood pressures of women are higher than those of men. Among adults, diastolic blood pressure also increases progressively with age until ~55 years, after which it tends to decrease. The consequence is a widening of pulse pressure (the difference between systolic and diastolic blood pressure) beyond

age 60. Obesity and weight gain are strong, independent risk factors for hypertension. It has been estimated that 60% of Hypertensive are >20% overweight.[1]

Hypertension or high blood pressure is defined as abnormally high arterial blood pressure. According to the Joint National Committee 7 (JNC7), normal blood pressure is a systolic BP < 120 mmHg and diastolic BP < 80 mm Hg. Hypertension is defined as systolic BP level of ≥140 mmHg and/or diastolic BP level ≥ 90 mmHg. The grey area falling between 120–139 mmHg systolic BP and 80–89 mmHg diastolic BP is defined as "prehypertension".[15,16]

Hypertension, otherwise known as high blood pressure, is a leading cause of cardiovascular disease (CVD) worldwide.[5] Traditionally in Africa, communicable diseases and maternal, perinatal and nutritional causes of morbidity and mortality accounted for the greatest burden of morbidity and mortality[6]. This burden is fast shifting towards chronic non-communicable diseases, and by extension CVDs. This phenomenon is what is being termed as a "double burden of disease".[7] Many factors have been described as associated with HTN.[8,9] High blood pressure was almost non-existent in African societies in the first half of the twentieth century, estimates now show that in some settings in Africa more than 40 percent of adults have hypertension.[10]

The prevalence of hypertension has increased significantly over the past two to three decades.[11] It has been suggested that the prevalence of cardiovascular disease and hypertension is increasing rapidly in Sub-Saharan Africa (SSA).[13] There were approximately 80 million adults with hypertension in sub-Saharan Africa in 2000 and projections based on current epidemiological data suggest that this figure will rise to 150 million by 2025.[12] Our study aims to estimate hypertension prevalence and its risk factors in Aguelhok.

2. MATERIALS AND METHODS

A literature search of the Science direct, Google, using the Medical subject headings "hypertension," "blood pressure," and "journal of western Africa on hypertension" was conducted. No language restrictions were applied and publications in other languages were translated to English. We conducted a cross-sectional population-based study; this approach has been described by the World Health Organization (WHO).[14]

2.1. STUDY AREA

Aguelhok or Adjelhoc (the official name) is a rural commune and village in the Kidal Region of eastern Mali in the Tessalit Cercle. In the census of 2009 the commune had a population of 8,080.[17] Adjelhoc is situated in the north of the Tilemsi Valley. Located in the sandstone massif of the Adrar des Ifoghas, Adjelhoc lies 430 km north of Gao and 150 km south of the Algerian border, in open desert.[18] The area of the commune is approximately 22,000 km2, that is to say the equivalent of Belize.[1]

2.2. STUDY DESIGN AND SAMPLE SIZE

A community based cross-sectional study was carried out among the people aged 20 to 99 years living in Aguelhok area. The sample size for the present study was calculated by taking most probable prevalence of hypertension as 50% and permissible error as 5% with 95% confidence interval. Fixing the permissible error as 50%, the minimum sample size was calculated as. Since sampling procedure was multistage, hence considering the design effect, the sample size was further increased by one and half times. Considering the nonresponsive rate of 10% the final sample size in study was fixed as 45. Prior written informed consent was taken by the participants.

2.3. SAMPLING METHODOLOGY

The study was conducted on purposive simple random sampling. At first we select the study area. Then we announce in the locality that we will go to Aguelhok hospital on study date then randomly we select first 45 people who fulfilled the aged matched inclusion criteria.

2.4. SELECTION OF STUDY SUBJECTS

2.4.1. INCLUSION CRITERIA

Individuals aged 20–99 years in the selected study area who gave consent for participation were considered.

2.4.2. EXCLUSION CRITERIA

Individuals who are unable to give response due to serious physical or mental illness and with whom anthropometry measurements cannot be performed were excluded from the study.

2.5. TOOLS OF THE STUDY

Interview schedule [modified and pretested WHO stepwise approach to chronic disease risk factor surveillance (STEPS)] stethoscope, sphygmomanometer, torch, weight machine, measuring tape etc were the tools of this study.

2.6. TECHNIQUES OF THE STUDY

In all study participants, a structured and pretested interview schedule was administered to obtain data on sociodemographic parameters.

2.6.1. BLOOD PRESSURE MEASUREMENT

Blood pressure was measured two times on the right arm at sitting position of the selected subject using sphygmomanometer. The average of two readings was used.

2.6.2. ANTHROPOMETRIC MEASUREMENTS

All the anthropometric measurements were done by the following standardized technique. Weight was measured by Digital weighing machine and height was measured by using a steel anthropometry tape. Body Mass Index was calculated using the following formula: BMI = weight (kg)/height (m)2. Based on BMI obtained, the subjects were classified into different categories according to the WHO global classification.[19] Waist circumference (in cm) was measured using a nonstretchable measuring tape. Waist circumference was measured at the smallest horizontal girth between the costal margins and the iliac crest at the end of expiration. Hip circumference (in cm) was measured at the broadest part of the hips by using nonstretchable measuring tape. Waist-to-hip circumference (WHR) was calculated by dividing waist circumference by hip circumference.[20]

2.7. ETHICAL CONSIDERATION

Prior written consent was taken from the subjects who volunteered to participate in the study. Identified hypertensive subjects were treated and critical cases were referred to higher center for further treatment.

2.8. DEFINATION USED

The British Hypertension Society Define hypertension as, Optimal BP, Systolic BP < 120 (mmHg) and Diastolic BP < 80 (mmHg); Normal BP, Systolic BP < 130 (mmHg) and Diastolic BP 85 (mmHg); High normal BP, Systolic BP 130–139 (mmHg) and Diastolic BP 85–89 (mmHg); Hypertension Grade 1 (mild), Systolic BP 140–159 (mmHg) and Diastolic BP 90–99 (mmHg);

Hypertension Grade 2 (moderate), Systolic BP 160–179 (mmHg) and Diastolic BP 100–109 (mmHg); Hypertension Grade 3 (severe), Systolic BP ≥ 180 (mmHg) and Diastolic BP > 110 (mmHg); Isolated systolic hypertension Grade 1 Systolic BP 140–159(mmHg) and Diastolic BP < 90(mmHg); Grade 2 Systolic BP ≥160 (mmHg) and Diastolic BP < 90 (mmHg) and this defination is consistent with those defined by the European Society of Hypertension and the World Health Organization–International Society of Hypertension.[2]

Severity of obesity can be quantified using the BMI. Reference range BMI (kg/m2)= 8.5–24.9; Risk of obesity co morbidity Negligible, Overweight BMI (kg/m2)= 25.0–29.9; Risk of obesity co morbidity Mildly increased, Obese Class I BMI (kg/m2)= 30.0–34.9; Risk of obesity co morbidity Moderate, Obese Class II BMI (kg/m2)= 35.0–39.9; Risk of obesity co morbidity Severe, , Obese Class III BMI (kg/m2)= > 40.0; Risk of obesity co morbidity Very severe. *Classification of the WHO and International Obesity Task Force. The Western Pacific Region Office of WHO recommends that, amongst Asians, BMI > 23.0 is overweight and > 25.0 is obese.[21]

2.9. DATA PROCESSING

The information obtained from the survey was entered into a database developed for the study, using SPSS 20 program. Descriptive statistics (mean and standard deviation) were calculated for continuous variables and frequencies and percentages were calculated to summarize qualitative data.

3. RESULTS

Total 45 study subjects were interviewed in this study. The highest age of this series was 99 years and lowest was 20 years. The maximum no of patients belonged to the group 30-39 years and next one is 40-49 years. Total male subjects were 40% and female 60% which was higher than male (Table-1).Median age of hypertension was 70years for male and 50 years for female. The prevalence of hypertension in the present study (31.11%). Five male were hypertensive among 18 male subjects which comprise 27% and nine female were hypertensive among 27 which comprise 33.33%. Most hypertensive female cases were found among age group 40-59, total number 6 out of 9 hypertensive cases comprise 66.67%. Most male hypertensive cases were found beyond 70 years 3 out of 5 comprise 60% (Table-2). Among 5 male hypertensive cases 3 were suffering both systolic and diastolic hypertension and all are beyond 70 years but 2 were found isolated systolic hypertensive comprise (40%) and all were under 30 years age group (Table-3).

Among nine female hypertensive cases 6 were found both systolic and diastolic hypertensive comprise 66.67% and 02 (22.22%) were found isolated systolic hypertension and 01 (11.11%) was found isolated diastolic hypertension. Isolated systolic or diastolic hypertension did not found any correlation with ages (Table-4). Most of the hypertensive was found married 92.85% and unmarried were only7.14 % (Table-5). Most hypertensive cases were businessman 42.85%, house wife 35.71% and farmer 21.42 % (Table-6). Most of the hypertensive cases were Muslim 92.85% and remaining were Christian 7.14%(Table-7). 35.71% hypertensive cases were smoker none of them found alcoholic or other substance use (Table-8). According to Body Mass Index (BMI), more than 50% of the study subjects were obese (Table-9).

4. DISCUSSION

Mali faces numerous health challenges related to poverty, malnutrition, and inadequate hygiene and sanitation. Medical facilities in Mali are very limited, and medicines are in short supply. Malaria and other arthropod-borne diseases are prevalent in Mali, as are a number of infectious diseases such as cholera and tuberculosis. Mali's population also suffers from a high rate of child malnutrition and a low rate of immunization. An estimated 1.9 percent of the adult and children population was afflicted with HIV/AIDS that year, among the lowest rates in Sub-Saharan Africa[29]

The prevalence of hypertension in the present study (31.11%) which was consistent with the study Addo J, Smeeth L, Leon DA. Hypertension in sub-saharan Africa: a systematic review. Hypertension. 2007 Dec;50(6):1012-8, and in the study R. R. Dhungana, A. R. Pandey, B. Bista, S. Joshi, and S. Devkota, "Prevalence and associated factors of hypertension: a community-based cross-sectional study in municipalities of Kathmandu, Nepal," International Journal of Hypertension, vol. 2016, Article ID 1656938, 2016. But higher than found in study done at Mali was 15% in 2007.28 The prevalence of hypertension among men and women was 27% and 33.33% respectively in present study which is consistent with World Health Organization (2015), the overall prevalence of hypertension in India was 23.5% and gender specific prevalence was 24.2% and 22.7% among the men and women, respectively[23]

The slight difference of prevalence observed between the present study and other studies with respect to hypertension could be due to social and cultural differences, dietary and lifestyle factors, and also the age span as well as the research methodology used. Women exhibit higher prevalence of hypertension than male counterparts (F: 60.0% and M: 40.9%) but other studies shows higher percentage of hypertension in men than women.[24] One of the possible explanations for this gender disparity in hypertension prevalence could be partially due to biological sex difference and partially due to behavioral risk factors like less physical activity and small sample size. Another possibility of increased prevalence among female was neglected health care and lack of awareness regarding hypertension.

In this study most hypertensive female cases were found among age group 40-59 (66.67%) and male hypertensive cases were found beyond 70 years (60%). Age was found to be an important risk factor for hypertension. As the age was advancing so did the prevalence of hypertension among both the sexes. Similar findings were reported by few other studies also where advancing age was positively related to hypertension.[24,25,26,27] In the present study, marital status, occupation, BMI, tobacco use, and physical activity were significantly associated with the hypertension. This study showed that overweight and obesity measured by BMI was major modifiable risk factors to develop hypertension. There was positive relation observed between increasing BMI and increasing rate of hypertension, which was consistent with other studies[22,25]

5. CONCLUSSION & RECOMMENDATION

From the results of this study, it can be concluded that the prevalence of hypertension is high at Aguelhok. This makes the people of this area vulnerable to several chronic diseases. Both men and women are at risk though women are more vulnerable than men. Women develop hypertension predominantly around the age of menopause; men who develop hypertension at early age are predominantly systolic hypertension. Hypertensive cases were predominantly among married individual. Increasing age is proved to be an independent risk factor for hypertension. Occupation, smoking and obesity have strong correlation with hypertension in this study. Programs are needed to improve the surveillance systems and implementation of community based screening programs for early detection of hypertension. Interventions like weight management, increased physical activity and reduction in tobacco are recommended.

ADDITIONAL POINTS

This study suffers from few of the following limitations. (i) One of the main limitations of this study was the cross-sectional design of the study which restricts examining causal associations. (ii) There was security threat to conduct the study; Stress is a major risk factor for hypertension. It could also be considered in the present study for better results. (iii) Language barrier was

challenging and I had to take help of interpreter to collect information from participants.

TABLE -1 Age structure of the study subjects (n=45).

Age groups (years)	No of male patients	No of female patients
20-29	3	3
30-39	5	7
40-49	2	6
50-59	2	5
60-69	1	1
70-79	3	3
80-89	1	2
90-99	1	
percentages	18(40%)	27(60%)

The highest age of this series was 99 years and minimum was 20 years. The maximum no of patients belonged to the group 30-39 years and next one is 40-49 years. Total male subjects were 40% and female 60% which was higher than male.

TABLE -2 Hypertension distribution among study subjects (n=45).

Age groups (years)	No of male patients	No of female patients
20-29	2	-
30-39	-	1
40-49	-	3
50-59	-	3
60-69	-	-
70-79	1	2
80-89	1	-
90-99	1	-
Total	5	9

Median age of hypertension was 70years for male and 50 years for female. Total 31.11% patients were hypertensive. Fourteen (14) hypertensive subjects were found out of 45 study subjects which comprise 31.11%. Five (5) male were hypertensive among 18 male subjects which comprise 27% and nine female were hypertensive among 27 which comprise 33.33%. Most hypertensive female cases were found among age group 40-59, total number 6 out of 9 hypertensive cases comprise 66.67%. Most male hypertensive cases were found beyond 70 years 3 out of 5 comprise 60%.

TABLE -3 Hypertension distribution among male subjects (n=5).

Age groups (years)	Systolic hypertension	Diastolic hypertension
20-29	2	
30-39		
40-49		
50-59		
60-69		
70-79	1	1
80-89	1	1
90-99	1	1
Total	5	3

Among 5 male hypertensive cases 3 were suffering both systolic and diastolic hypertension and all are beyond 70 years but 2 were found isolated systolic hypertensive comprises (40%) and all were below 30 years age group.

TABLE -4 Hypertension distribution among female subjects (n=9).

Age groups (years)	Systolic hypertension	Diastolic hypertension
20-29		
30-39		1
40-49	3	2
50-59	3	3
60-69		
70-79	2	1
80-89		
90-99		
Total	8	7

Among nine female hypertensive cases 6 were found both systolic and diastolic hypertensive comprise 66.67% and 02 (22.22%) were found isolated systolic hypertension and 01 (11.11%) was found isolated diastolic hypertension. Isolated systolic or diastolic hypertension did not found any correlation with ages.

TABLE -5 Age and Marital status distribution of hypertensive subjects (n=14).

Age groups (years)	Married	Unmarried
20-29	1	1
30-39	1	
40-49	3	
50-59	3	
60-69		
70-79	3	
80-89	1	
90-99	1	
Total		

Most of the hypertensive were found married 92.85% and unmarried were only 7.14%.

TABLE -6 Distribution of Occupation among hypertensive subjects (n=14).

Occupation	Hypertensive subject
Businessman	6
Govt employee	-
Farmer	3
House wife	5

Most hypertensive cases were businessman 42.85%, house wife 35.71% and farmer 21.42%.

TABLE -7 Distribution of Religion among hypertensive subjects (n=14).

Religion	Hypertensive subject
Islam	13
Christian	1

Most of the hypertensive cases were muslim 92.85% and remaining were christian 7.14%.

TABLE -8 Distribution of Substance abuse among hypertensive subjects (n=14).

Substance abuse	Hypertensive subject
Smoker	5
Alcoholic	-
betel nut	-
Heroine intake	-

35.71% hypertensive cases were smoker none of them found alcoholic or other substance use.

TABLE -9 Distribution of Past medical history among hypertensive subjects (n=14).

Past medical history	Hypertensive subject
DM	1
Hypertension	5
Obesity(BMI>30)	7
IHD	1
Stroke	-

Most of the hypertensive cases found obes 50% and history of hypertension was 35.71%.

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