

Prevalence of Hypertension and Cardiovascular Risk Factors in N'Djamena (Chad)

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Abstract

Objectives: The aim of this work was to determine the prevalence of hypertension and other cardiovascular risk factors in the city of Ndjamena.

Materials and patients: Descriptive cross-sectional study over two (02) days from April 7 to 8, 2023. This study population consisted of the population of the city of Ndjamena. Participants were recruited consecutively from four (04) screening sites in the city of N'Djamena. The variables studied were socio-demographic characteristics, cardiovascular risk factors and clinico-biological characteristics.

Results: The authors screened 2278 people. The mean age was 37.7 ± 14.3 years, and the sex ratio was 3.99. The cardiovascular risk factors identified were arterial hypertension 30.2%, diabetes 26.9%, obesity 30%, alcoholism 18.8%, smoking 24.9%, positive proteinuria 11.2%.

Conclusion: Hypertension and other cardiovascular risk factors constitute a real public health problem. Their prevalence in the city of N'djamena is increasing and requires regular monitoring to enable concrete action to be taken.

Keywords: Hypertension; Diabetes; Cardiovascular risk factors; Regular monitoring; World health organization.

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Introduction

Arterial hypertension (AH) and diabetes are classified in the group of non-communicable and systemic diseases that constitute a genuine global public health problem [1]. They are deemed to be more frequent, earlier-onset and more severe in populations originating from Sub-Saharan Africa [2,3]. Early detection and management are prognostic factors, helping to avoid progression to organic complications [4-6]. According to the World Health Organization (WHO), hypertension has been defined as systolic blood pressure ≥ 140 mm Hg and/or diastolic blood pressure ≥ 90 mm Hg [7]. Diabetes is defined as fasting venous glucose ≥ 1.26 g/l [8].

More often than not, these cardiovascular risk factors are aggregated. This increases the patient's overall cardiovascular risk, making management more difficult. Chad, like other developing countries that continue to pay a heavy price for infectious diseases, must also face up to the emergence of hypertension and other cardiovascular risk factors, sources of significant and worrying morbidity and mortality. In 2019, WHO estimated the prevalence of age-standardized hypertension in adults aged 30 to 79 in Chad at 38% (35% for men and 41% for women) [9].

According to Naibe, it is not only frequent, but also affects Chadians at young age, and is complicated from the outset at the time of diagnosis [10]. Despite the magnitude of this condition, few population-based data on hypertension and cardiovascular risk factors are available. In order to better propose strategies for controlling hypertension and other cardiovascular risk factors, it is essential to determine the extent of this phenomenon

in the population, which is why it is so important to know how many people are affected.

Patient and methods

Study framework

The city of N'Djamena is located in west-central Chad, at the intersection of two rivers, between 12 °6'24.19" north latitude and 15 °02'24" east longitude. It covers an area of 104 km², with an estimated population of 1,092,066 in 2012. The population growth rate was 3.2% in 2012. The commune of N'Djamena comprises 10 arrondissements with 75 districts [11].

Type and period of study

This was a cross-sectional, descriptive and analytical study. Data collection was spread over two days, from April 07 to 08, 2023.

Study population

This study concerned the population of the city of N'Djamena. The authors recruited all participants who were deemed eligible. Participation in the screening campaign was voluntary and included all subjects who presented fasting at the various screening sites between 7 A.M. and 2 P.M. during the day. Pregnant women were not included in the study.

Study variable and data collection technique

In practice, screening was organized over two consecutive days in the city of N'Djamena. The four (04) screening sites selected were: Central market, Dembé market, Diguel market and Central City Hall. These screening days, which were the first of their kind in the city, were preceded by two weeks

of information campaigns to mobilize the population, using advertising spots, banners, interactive radio broadcasts with the population and television broadcast by the National Audiovisual Media Office. Information was given in French and translated into local Chadian Arabic. Data on each patient was collected using a pre-established form. Information on sex, age, occupation, marital status, personal and family history of diabetes and hypertension was collected during individual interviews. Body mass index (BMI) and abdominal circumference were used to clinically assess weight status and nutritional status. WHO criteria were used to categorize participants' weight status. Abdominal obesity was defined according to NCEP-ATP III by a waist circumference ≥ 102 cm in men and ≥ 88 cm in women [12].

Blood pressure was measured using a standardized protocol, using a validated automatic blood pressure meter [13].

The mean of two measurements taken at least three minutes apart was used. Participants were considered hypertensive if already receiving treatment for hypertension or if systolic blood pressure was ≥ 140 mmHg and/or diastolic blood pressure was ≥ 90 mmHg, regardless of gender. Fasting blood glucose ≥ 1.26 g/l (≥ 7 mmol/l) after two checks 48 hours apart defined diabetes. Blood glucose was measured with a self-monitoring device using CodeFree brand test strips. Subjects were classified into three groups according to international diagnostic standards [8]:

- Non-diabetic patients with fasting capillary glucose levels below 1.10 g/l;

- Patients with moderate fasting hyperglycemia, i.e. capillary blood glucose between 1.10 g/l and 1.26 g/l;
- Diabetic patients with fasting glucose levels ≥ 1.26 g/l.

The urine dipstick was used to check proteinuria. Proteinuria was considered positive if at least two crosses were observed on the urine dipstick. All measurements were carried out by trained medical staff.

Data processing and analysis

Data collected was entered on a microcomputer using Kobo Collect software and analyzed using SPSS.21 software. Quantitative parameters were presented as mean $\pm$ standard deviation, and qualitative parameters as percentages. Pearson's χ^2 test was used to compare proportions.

When application conditions were not observed, Fisher's exact test was used. The Student's T-test was used to compare two means. The threshold of statistical significance was $p < 0.05$.

Socio-demographic characteristics

During the study period, 2278 people were screened. The numbers ranged from 384 participants (16.9%) at the Central city hall site to 806 participants (35.4%) at the Dembe market site. Numbers of participants per day and per screening site are shown in Figure 1.

The average age of this population ranged from 12 to 94, with an average of 37.7 ± 14 years old, and was predominantly male (65%). The most represented age groups were 20-40 and 40-60, with 56.8% and 29.1% respectively. The socio-demographic characteristics of the participants are summarized in Table 1.

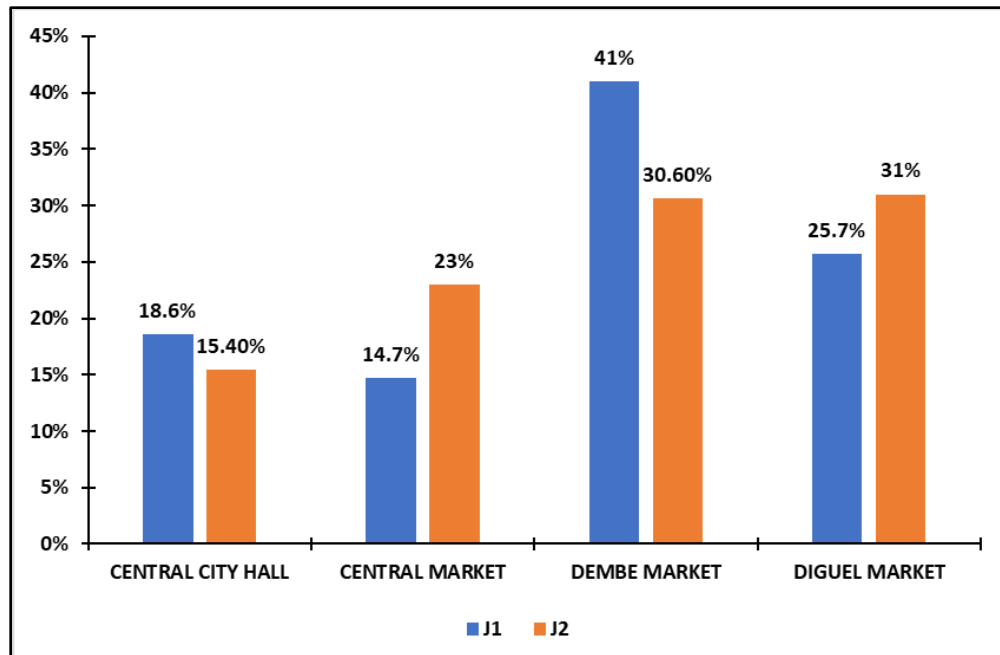


Figure 1: Breakdown of participants by day and site.

Socio-demographic characteristics	Number (n)	Percentage (%)
Average age(years)	37.7 ± 13.6(12-94)	
Age range		
<20 years	174	7.6
(20-40)	1292	56.8
(40-60)	664	29.1
≥ 60 years	148	6.5
Gender		
Male	1479	65
Female	799	35
Profession		
Civil servant	453	19.9
Retired	39	1.7
Private-sector employee	226	9.9
Unemployed	395	17.3
Informal sector	1165	51.1
Education level		
Literate	369	16.2
No schooling	700	30.7
Primary	248	10.9
Secondary	498	21.9
Superior	463	20.3

Table 1: Socio-demographic characteristics.

Cardiovascular risk factors

Hypertension was found in 688 participants (30.2%), of whom 96 (4.21%) were known hypertensives. In the hypertensive group, 430 (62.5%) were male and 292 (42.4%) were diabetic, with an average age of 43.73 ± 14.1 years.

Diabetes was noted in 614 (26.9%) of whom 171 (7.5%) were already known diabetics. In this group of diabetics, 363 (62.5%) were male and 292 (47.6%) were hypertensive, with an average age of 43.96 ± 13.9 years. Obesity was present in 693 (30.4%). Other associated cardiovascular risk factors are shown in Table 2.

Cardiovascular risk factors	Total n (%)	Male n (%)	Female n (%)	p-value
Hypertension	688 (30.2)	430 (62.5)	281 (37.5)	0.003
Smoking	568 (24.93)	528 (93)	40 (7)	0.001
Alcoholism	428 (18.78)	263 (61.4)	165 (38.6)	0.276
Diabetes	614 (26.95)	389 (63.3)	225 (36.7)	0.643
Obesity	693 (30)	268 (38.7)	425 (61.3)	0.004
Sedentary lifestyle	534 (23.44)	248 (46.4)	286 (53.6)	0.452
Positive proteinuria	256 (11.3)	179 (67)	77 (30)	0.846

Table 2: Cardiovascular risk factors.

Clinico-biological characteristics

Mean systolic blood pressure (SBP) was 142.8 ± 21.4 mmHg (180; 260 mmHg). Mean diastolic blood pressure (DBP) was 89.5 ± 13.6 mmHg (58; 152 mmHg). Grade II hypertension was more frequently found in those screened. The classification of patients by grade of hypertension is shown in Table 3. Mean BMI was 23.2 ± 5.6 kg/m² (13; 42 kg/m²).

Mean waist circumference was 82.7 ± 13.7 cm (22; 120 cm). Two hundred and seventy-one (271) women (33.9%) had a waist circumference greater than 80 cm. In men, the waist circumference was greater than 94 cm in 374 cases (25.8%). Mean capillary blood glucose was 1.25 ± 0.56 g/L (0.5; 6 g/L). Urine dipstick tests were performed for all of patients and proteinuria was positive for 256 patients (11.2%).

HTA grades	Total n (%)	Male n (%)	Female n (%)	P-value
HTA grade I	198 (28.8)	117 (59)	81 (41)	0.264
HTA grade II	342 (49.7)	248 (72.5)	94 (27.5)	0.001
HTA grade III	148 (21.5)	92 (62.2)	56 (37.8)	0.351

Table 3: Classification of hypertension in patients.

Discussion

Two thousand two hundred and seventy-eight (2278) people participated voluntarily in this campaign. Despite its small size compared with the general population of the ten districts, this sample highlighted the existence of several associated cardiovascular risk factors in the city of N'Djamena.

Age

This study population was young, with a mean age of 37.7 years. This young age of the population had also been noted in certain African series, notably Panda in Congo, who found a mean age of 38.6 years [14]. This result may reflect the distribution of the Chadian population, which is predominantly young [11].

Gender

This study population was predominantly male, with 65% of cases. The M/F sex ratio was 1:9. The results are identical to those of Cumber, who found 58% male subjects in his series. Omezzine, Tougouma and Yayehd found a predominance of females in the series, respectively 69.9%, 64% and 55% [5,15,16].

This difference can be explained by cultural differences between countries. In Chad, women are still under the weight of certain beliefs and traditions, obliging the patients to take care only of household chores, and thus to be absent from all areas of social life.

HTA

The prevalence of hypertension was 30.2%. Hypertension grade II was most prevalent in 51.7% of cases. This prevalence is close to

those of the WHO global report on hypertension in Chad in 2019, which found 38% [9]. This high prevalence of hypertension reflects the particular epidemiological transition that Chad, like most developing countries, is undergoing. It is marked by the persistence of infectious diseases and the explosion of cardiovascular diseases, linked to galloping urbanization and changing dietary habits. In the present study, only 4.21% of the hypertensive patients were aware of the status. A significant number of hypertensive patients are still undiagnosed, and it is unfortunately the dreaded complications (cardiac, cerebral, ocular and renal) that are the telltale signs in this context. This is why the authors need to increase the number of patients screened, thus facilitating early management.

Diabetes and obesity

The overall prevalence of diabetes in this study population was 26.9%. The author's prevalence is significantly higher than that found by Diallo, Panda and Séré, who found 3.7%, 6.8% and 5.7% respectively [14,17,18]. This increase can be explained by the transformation of the population's lifestyle, marked by high consumption of sugar and fat, exposing to the onset of chronic non-communicable diseases, including diabetes. Changing lifestyle combined with physical inactivity are factors conducive to the accumulation of fat and weight. At the same time, the authors found a 30% obesity rate.

The results are higher than those of Dionadji M, et al. [19], who found an obesity rate of 8.7%. This large difference can be explained by the change in lifestyle. The gender breakdown showed the author that women

were more obese than men, in a proportion of 61.3% versus 38.7% ($p=0.004$). This predominance was also found by many other African series [20,21]. This suggests the existence of a cultural factor, so women are more obese because obesity is a sign of affluence in the culture. Thus, obesity, due to changes in the population's lifestyle in recent years, is the breeding ground for diabetes and dyslipidemia.

Alcoholism

In this series, the rate of patients who consumed alcohol was 18.8%. This value was close to that found by Yayehd K, et al. [16] of 34.5% in Lomé. But in Ombé's study, a rural area of Cameroon, with a population made up mainly of peasants, Cumber SN, et al. [24], found 63% alcoholics, mainly drinking local beer [22]. This difference in results clearly shows the difficulty of assessing the daily quantity of alcohol ingested.

Smoking

Tobacco consumption accounted for 24.93% of the population, with a significant male predominance ($p=0.001$). This male predominance has also been found in some African series [2,23-25]. It could be explained by cultural reasons, since in the African societies, smoking by women is frowned upon, but also by galloping urbanization, unemployment and idleness, which expose young people to smoking and other vicious attitudes. The sale of cheap tobacco could also explain the high rates observed in this study and in other developing countries.

Proteinuria

In this study, proteinuria test was positive for 256 patients (11.2%). In recent years,

proteinuria has emerged as one of the main risk factors for the progression of both kidney disease and cardiovascular mortality. Different factors contribute to this situation in Chad: the high prevalence of high blood pressure, diabetes and urinary tract infections, the use of prohibited medicines and traditional decoctions [26]. This high prevalence of proteinuria in the population calls for the promotion of nephroprotection measures.

Conclusion

This study shows that hypertension and other cardiovascular risk factors are highly prevalent in the city of N'Djamena, and more often than not unrecognized. They are more frequent in men, with the exception of obesity. Risk factor associations are the most frequent. A national survey would enable the doctors to better assess the prevalence of these risk factors in the general Chadian population. However, strategies to prevent and manage these factors can already be put in place for later complications.

Ethical considerations

The survey was approved by the National Ethics Committee of the Chadian Ministry of Public Health, and the results will be used to plan future interventions to combat the hypertension epidemic. Data confidentiality was guaranteed. All participants gave written informed consent.

All participants received medical advice, and those who were diagnosed as diabetic, hypertensive and had a positive dipstick during the survey were referred for appropriate management in the nearest health facilities.

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