Can low anthropometric features contribute to the non-screening for hypertension among adults in Burkina Faso: Results from the secondary analysis using the database of the 2013 WHO STEPS survey

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Abstract

Background

This paper compared the anthropometric and blood pressure features between the adults who have ever and never been screened for hypertension prior to the first WHO' Stepwise approach to Surveillance (STEPS) survey in Burkina Faso and assessed the associated factors with the uptake of the hypertension screening.

Methods

This was a secondary analysis using primary data from a cross-sectional study which were obtained from the 2013 STEPS survey conducted in Burkina Faso. We included 3831 men and women aged 25–64 years. Descriptive and analytical analyses were performed using Student's t, and chi-square tests and logistic regression models respectively.

Results

Before the survey, 41.6% of participants have never been screened for hypertension, and comparatively to those who have ever been screened, they had significant lower means of weight, waist circumference and body mass index and lower prevalences of overweight/obesity and abdominal obesity. The prevalence of prehypertension was similar between in the two groups (41.6% in those who have never been screened vs 39.5%; p=0.19) whereas that of hypertension was lower in those who have never been screened (17.3% vs 20.8%; p=0.007). In addition to the important socio-demographic correlates in the logistic regression, the presence of both overweight/obesity (aOR=1.3; p=0.03) and abdominal obesity (aOR=1.3; p=0.002) were significantly associated with the uptake of hypertension screening.

Conclusion

Prehypertension and hypertension were also frequent in adults who had never been screened for hypertension and they usually had a slim-looking build, while the overweight/obesity and abdominal obesity status may motivate for the uptake of the hypertension screening.

Background

In 2019, It was estimated that 1.28 billon of people in worldwide live with hypertension and 82% of them live in low- and middle-income countries (LMICs) [1]. Over the long term, hypertension leads to risk for cardiovascular events, such as heart disease, stroke, kidney failure, disability, and premature mortality [2]. The challenge in reducing the burden of cardiovascular diseases, particularly in LMICs, includes efforts to improve diagnosis and ensure adequate treatment for hypertensive patients [3–5].

In the recent decades, LMICs have been witnessing a significant shift toward both raised blood pressure (BP) [6–8] and weight gain (i.e., increased in the body mass index, BMI for short) [9, 10] and the excess of weight was a consistent determinant for hypertension in Sub-Saharan Africa (SSA) [11]. Screening for hypertension is public health challenge and the rate of hypertensive people who were unaware of their condition (because they were never diagnosed) was the highest in LMICs [1, 12]. Studies on the social epidemiology of hypertension in LMICs supported that overweight/obese status was associated with a lower risk of remaining undiagnosed for hypertension [13–15], and thus, it can be hypothesized that barriers could also be connected with the self-perceived of its anthropometric features. Highlighting the specific barriers to the screening for hypertension potentially helps to specify and improve the effectiveness of the public health interventions [2, 16]. The first Stepwise approach to surveillance (STEPS) survey in Burkina Faso, included question on the attendance of screening for hypertension and the real-time measurements of anthropometric and BP characteristics. Our study compared the anthropometric features and BP values between the adults who have ever and never been screened for hypertension prior to the date of the 2013 STEPS survey in Burkina Faso, and also assessed the associated factors with the practice of hypertension screening.

Methods

Study design

A secondary cross-sectional analysis was performed using data from the WHO STEPS [17] survey conducted in Burkina Faso in 2013. This study is a recommended tool for surveillance of chronic diseases and their risk factors in WHO member countries. The survey is a standardized method to collect, analyse and disseminate data. It is a sequential process that starts with gathering key information about risk factors with a questionnaire; subsequently and simple physical measurements and are collected. The WHO STEPS includes a representative sample of the study population, which allows the results to be generalizable to the entire population [18].

Study population

The study population was adults of both sexes aged between 25 and 64 years who had been living in Burkina Faso for at least six months on the day of the survey.

Sample size and data collection

The total sample size calculation and the data collection process throughout the country have been described by Soubeiga et al. in previous publication in BMC Public Health [19]. The calculation was based on the prevalence of hypertension as primary outcome, and was estimated at 29.6% (IC95%: 27.3-31.9). The nationally-representative sample size, based on 20% non-response, was estimated as 4785 (rounded up to 4800) adults aged 25–64 years.

Since the national adult rate of those who ever been screened for hypertension was previously unknown, if it the approximative LMICs' rate was assumed (at about 1/3) [12], the sample size would roughly be identical.

Data collection was conducted from 3 September to 24 October 2013 and household sociodemographic information was recorded via face-to-face interviews in the language spoken by the participant after BP and anthropometric measurements were collected.

Variables of interest extracted from the STEPS survey database

The participants' demographic variables included gender, residence (rural, urban), age (25–64 years), marital status (grouped into i) married or cohabitating, ii) single), education level (grouped into i) no formal schooling, ii) primary school and iii) secondary or higher), and occupation (grouped into i) public or private formal employment, ii) employment without or with uncertain income, such as students, housekeepers or unemployed).

The STEPS questionnaire included the yes/no question on being ever screened for hypertension, and was: "Did a doctor or other health professional ever measure your BP?".

Physical measurements: Anthropometric characteristics were weight (kg), height (m), BMI (weigh/height², kg/m²) and waist circumference (WC in cm). Height was measured to the nearest 0.1 cm using a stadiometer (SECA 214) on a subject without shoes while weight was measured to the nearest 0.1 kg with a personal scale (SECA 813) on a lightly clothed subject without shoes. Waist circumference was measured to the nearest 0.1 cm (as per WHO recommendations) with a measuring tape (SECA 203) at the midpoint between the last rib and the iliac crest, with the subjects standing upright and breathing normally. The BMI was used to characterize underweight (BMI<18.5 kg/m²), normal (BMI=18.5 – 24.9 kg/m²) overweight (BMI=25 – 29.9 kg/m²) and global obesity (BMI ≥30 kg/m²) states, and thus, BMI≥25 kg/m² defined overweight/obesity [20]. The WC was used to characterize abdominal obesity. Recently, the African Partnership for Chronic Disease Research (APCDR) specifically recommends the cut-offs of 81.2/81.0 cm for detecting abdominal obesity in men/women in SSA [21], while the cut-offs of 94/80 cm for men/women were previously recommended by the International Diabetes Federation (IDF) [22].

Systolic blood pressure (SBP in mmHg), and diastolic blood pressure (DBP in mmHg) values were measured three times using a mobile device (CardioChek™ 1708 PA, Indiana, United States of America), with their mean value being used in the analysis. Individuals with mean values of SBP/DBP <120/80 mmHg were considered normotensive, those with SBP between 120 – 139 mmHg and/or DBP between 80–89 mmHg were considered prehypertensive, while those with SBP/DBP≥140/90 mmHg and/or medication as hypertensive [23].

All measurement devices were provided by the WHO and were carried out on the same day.

Participants included in the analyses

After data collection, 105 individuals were not eligible or had invalid data regarding sex, 10 had missing data on marital status or education level, 649 did not provide response to the yes/no question on “ever being or not screened for hypertension” while 61 and 144 participants did not have valid data on BP and anthropometric parameters respectively. In total, 3831 participants were included in the analyses.

Statistical analyses

StataCorp™ Stata Statistical Software for Windows (Version 14.0, College Station, Texas, United States of America) was used to analyse the data. The quantitative variables are expressed as the means±standard deviations, and the qualitative variables are expressed as percentages (%) with 95% confidence intervals (CIs). Student’s t test was used to compare quantitative variables, and the chi-square test was used to compare categorical variables. We used the both cut-offs of APCDR and IDF to describe and compare abdominal obesity. Logistic regression analysis was performed using “ever been screened for hypertension” (from the binary item, yes/no response) as the outcome, while the overweight/obesity state and abdominal obesity (according to the APCDR cut-offs) were explanatory variables, and all the six sociodemographic factors were the variables for adjustment. We proceeded by a progressive elimination of factors by decreasing the order of significance, i.e., with high level of the p-value. For all analyses, a p-value less than 5% was considered significant.

Ethical considerations

All methods were performed in accordance with the relevant guidelines and regulations and the protocol of the STEPS survey was approved by the Ethics Committee for Health Research of the Ministry of Health (deliberation No: 2012-12092; December 05, 2012). All participants provided written informed consent to participate and were made aware of their possibility to voluntarily terminate their participation at any time.

Results

The sample was made up of 2009 (52.4%) females and the mean age was 38.5 ± 11.1 years. The participants were predominantly rural residents (78.8%), illiterates (75.9%) and married/cohabiting (85.8%) (Table 1).

Globally, 41.6% (95% CI: 40.0-43.1) of the participants have never been screened for hypertension before the time of the 2013 STEPS survey and compared to those who have ever been screened, they had a lower mean of weight, WC and BMI (Table 2). There was a high proportion of participants with normal weight among those who have never been screened while that for overweight and obese status was lower. Using the IDF or APCDR cut-offs, there was a significant lower prevalence of abdominal obesity among the participants who have never been screened. Between never and ever screened for hypertension groups, the mean value of the SBP was identical, as well as frequencies of normal BP or prehypertension. Prevalence of hypertension was slightly and significantly lower in never screened group compared to their counterparts (17.3% vs 20.8%, p=0.007).

Table 3 summarizes results from logistic regression and shows both the presence of overweight/obesity (aOR=1.3; 95% CI: 1.1-1.5; p=0.03) and abdominal obesity (aOR=1.3; 95% CI: 1.1-1.6; p=0.002) were significantly associated with the uptake of hypertension screening (Table 3). Moreover, favourable sociodemographic correlates were urban residency, female gender, older age (55–64 years), being educated, employees with formalized income, and married/cohabiting.

Discussion

The adults who have never been screened for hypertension before the 2013 WHO STEPS survey in Burkina Faso usually had a slim-looking build, and the rates of prehypertension and hypertension were also significant among them.

Un-screened adults in Burkina Faso: Proportion of Burkinabè adults who have never been screened for hypertension (41.6%) before this first national survey was significant. Screening is the step leading to the diagnostic and treatment and the evidence of the high burden of undiagnosed hypertension in SSA was reported in a systematic review [4]. The appropriate strategies for hypertension screening in the Burkinabè societies are needed.

BP features among participants who ever or never been screened at the times of the 2013 STEPS Survey in Burkina Faso: Since the mean in the SBP was identical (Table 2), it suggests that public health challenge may have a similar trend among the two groups. Indeed, there was a similarity in the prevalences of normotensive or prehypertensive individuals between the two groups (Table 2). Since the 11-year hypertension risk in prehypertensive Mauritius was of 3.4 (CI: 2.7 - 4.3) [24], the high prevalence of prehypertension (even in the group of hose who have never been screened) should be considered as a major public health concern in Burkina Faso where population is primarily young (30,7% of adult people aged ≥ 25-64years [25], mean was 38.5 ± 11.1 years in our study). Although the prevalence of hypertension (17%) was statistically lower never been screened participants, this rate of unknown hypertension is a substantial public concern as they may benefit from earlier antihypertensives therapy to reduce the burden of potential complications. Especially, this was crucial as first line management of essential hypertension [26] with diuretics per disability-adjusted life-year avoided ($179, in 2017) represented 4% of gross national income in Ghana, a country with hypertension similar profile [27]. Besides, never screened people could not be respectful with the healthy lifestyle behaviours [28], such as the practice of physical activity, fruit and vegetables consumption, abstention to the alcohol/tobacco use, etc. It can be hypothesized that this level of unknown hypertension may contribute to the high number of surprising cardiocerebrovascular events recorded in Burkina Faso hospital setting: in 58%; 66%; 76% and 86% of patients with respectively acute coronary syndromes [29] cardioembolic disorders [30] stroke [31] and non-valvular atrial fibrillation [32], hypertension was reported.

Low anthropometric characteristics in participants who had never been screened: Authors reported that body sizes were significantly correlated with body image perceptions and BP [33] and increased BMI was independently associated with a lower risk of being screened for pre-diabetes or diabetes [34] . In our

study, the higher height while the lower weight, BMI and WC (Table 2) may confer a specific perception of body image to the participants, such as a subjective appearance of slim-looking build, with the misleading belief of being free, or at low risk of cardiovascular diseases. About 64% of Tanzanian individuals and 43% of Nigerian women perceived connections between excess of weight and hypertension or cardiovascular diseases [35, 36] as well as the overweight/obesity was frequently linked to the occurrence of the cardiovascular event (stroke) by Beninese people [37]. The frequent absence of both overweight/obesity and abdominal obesity among participants who have never been screened (Table 2) may potentially lead to the high degree of body image satisfaction [38] and limit their engagement to the screening. The finding that the presence of the both overweight/obesity and abdominal obesity were associated with the practice of screening in a multivariable analysis (Table 3) reinforces our view that weight gain modifying the body image perception potentially drives to screening uptake. Perhaps the popularized and disseminated public health message or the invitation to be screened for hypertension was unclear or more selective, targeting only overweight/obese individuals, or those who subjectively consider themselves to be overweight/obese. Thus, there should be a need of the incitive messages for all adults regardless of their considerations of body sizes. Nevertheless, more investigations including qualitative studies are needed for the accurate assessment of the effect of self-perceived body sizes or image with regards to the misconceptions and compliance [39] for hypertension screening. The results should help to specific public health messages targeting misconceptions of the "apparently healthy body sizes" potential barriers to the hypertension screening.

Favourable sociodemographic factors for being screened for hypertension: Most of the sociodemographic parameters had corelations with the practice of hypertension screening (Table 3) and were respectful to the common sociodemographic or socioeconomic corelates with the inequalities in undiagnosed hypertension in LMICs [14, 15, 40–42]. Urban participants may benefit from the geographical proximity with the healthcare facilities, enhanced education on hypertension, and regular invitations to the screening. The employees, due to their high-income level may frequently undertake screening. Education leads to a better understanding of hypertension issues. Even the attendance to the first level of the national education system was helpful (aOR=1.3, p=0.009) and thus, health literacy focused on cardiovascular health education and adapted for the general population should be implemented [43]. Female gender was more affected by overweight/obesity especially in urban area [44], prompting to the uptake of screening. This attitude should place women in the key role of the family-based approaches to cardiovascular health promotion or risk reduction [45, 46]. This is quite fitting, since being in group e.g., married/cohabiting was also associated with the practice of hypertension screening (aOR=1.4, p=0.001). The older adults (55 – 64 years) may benefit from their general lifelong experience. Indeed, the mean age of 58–60 years was reported in patients with cardiocerebrovascular events admitted in the country referral hospitals [47, 48] and hypertension was found in most of the cases [29–32]. The older adults may know parents, siblings, colleagues, etc. who have ever experienced the adverse consequences of these events.

Limitations

The analysis did not compare levels of unhealthy lifestyle behaviours between the two groups. We only used height, weight, BMI and WC, while the skinfolds, assessing the body fat should provide supplemental information. This study was not doubled with a qualitative study which should explore how the anthropometric sizes could influence the self-perceived body image dis/satisfaction in relation with the attitude and practice towards screening for hypertension. While these first nationally-representative data from 2013 may no longer reflect the current situation, they provide a baseline that can be compared with future WHO STEPS survey data.

Conclusion

Although the sociodemographic features were important when analysing factors for the uptake of hypertension screening among Burkinabè adults, our study also suggests to consider the self-perceived body sizes. Being slim-looking build/appearance, may be one of the barriers to the practice of hypertension screening. Further investigations including qualitative studies, should highlight this hypothesis, helping to specify the public health interventions.

Abbreviations

aOR
Adjusted odds ratios
APCDR
African Partnership for Chronic Disease Research
BMI
Body mass index
BP
Blood pressure
CIs
Confidence intervals
cm
centimetre
cOR
Crude odds ratio
DBP
Diastolic blood pressure
EAs
enumeration areas
IDF
International diabetes federation
INSD
Institut National de la Statistique et de la Démographie

kg
kilogram
kg/m²
kilogram per meter
LMICs
Low- and middle-income countries
mmHg
Millimetre per mercury
NCDs
Non-communicable diseases
OR
Odds ratio
SBP
Systolic blood pressure
SSA
Sub-Saharan-African
STEPS
Stepwise approach to Surveillance
WC
waist circumference
WHO
World Health Organization.

Declarations

Ethics approval and consent to participate: All methods were performed in accordance with the relevant guidelines and regulations and the protocol of the STEPS survey was approved by the Ethics Committee for Health Research of the Ministry of Health (deliberation No: 2012-12092; December 05, 2012). All participants provided written informed consent to participate and were made aware of their possibility to voluntarily terminate their participation at any time.

Consent for publication: Non applicable.

Availability of data: The database of the STEPS survey used for this secondary analysis is available at the Ministry of Health of Burkina Faso. It can be requested directed to Dr. Brice Bicaba bicababrico78@gmail.com.

Competing interests: The authors declare that they have no competing interests.

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Authors' contributions: JD, TR and JK contributed to drafting the manuscript; JD, TR and JK performed the statistical analysis; JD, ANZ, HT, AM, SO and SK interpreted the results. All authors read and approved the final manuscript.

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Tables

Tables 1-3 are in the supplementary files section.

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