ORIGINAL ARTICLE

Correlates of undiagnosed hypertension among health care workers in a secondary health care facility in north central nigeria

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Abstract

Background: Hypertension is a major risk factor for cardiovascular disease, yet many health care workers rarely check their blood pressure. The detection of hypertension among health care workers is key to prevention of hypertension, its attendant complications in the community and a strategy for health care workers retention.
Objective: To determine the prevalence and correlates of undiagnosed hypertension among health care workers in a secondary health care facility.
Methods: Using a structured questionnaire, socio-demographic variables and risk factors for hypertension were obtained. Measurements of blood pressure, weight, height and waist circumference were carried out and body mass index calculated.
Results: The prevalence of hypertension was 41.9%. The prevalence of undiagnosed hypertension was 35.1%. Multivariate analysis showed that age greater than 42 years (OR=0.24; 95%CI: 0.10-0.72) is a significant correlate of undiagnosed hypertension. Those who self-reported that they

had been diagnosed to have hypertension were 15.5% of the study population. Among those who had self-reported hypertension, 79.1% were found to have hypertension by the researchers while among those who had no history of hypertension, 35.1% were hypertensive. When a history of hypertension is used as a screening test for the diagnosis of hypertension, it gave a sensitivity of 29.2%, a specificity of 94.4%, a positive predictive value of 79.1%, a negative predictive value of 64.9% and an accuracy of 67.1%.
Conclusion: One in three persons had undiagnosed hypertension and those who were over 42 years are at risk for undiagnosed hypertension. This calls for urgent workplace strategies to create more awareness as a prevention and control strategy for the facility and the general population.

Introduction

More than a quarter of the world's adult population (about one billion) had hypertension in 2000, and this proportion is projected to increase by 29% in 2025.[1] Hypertension is the principal global risk factor for mortality worldwide, responsible for 13% of global deaths, and is the third ranked cause of disability-adjusted life years.[2,3] Hypertension is a risk factor for cardiovascular disease, including ischemic heart disease, atherosclerosis, myocardial infarction, stroke and renal failure.[4] Risk factors for hypertension included age, sex, central obesity, alcohol consumption, family history of hypertension, dyslipidemia, education level and type of work.[5]

Whereas 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% of adults have hypertension.[6] There were approximately 80 million

adults with hypertension in sub-Saharan Africa (SSA) in 2000 and projections based on current epidemiological data suggest that this figure will rise to 150 million by 2025 making it the number one risk factor for cardiovascular disease in Africa.[6] This shift coincides with ongoing socio-economic changes and the 'nutrition transition' associated with poverty alleviation.[7] In addition to the existing burden of morbidity and mortality from communicable diseases, maternal, perinatal and nutritional diseases in Africa, the increasing burden from CVDs thus constitutes a "double burden of disease".[3,6] In comparison to white patients, black patients are more predisposed to hypertension, have poorer blood pressure (BP) control and earlier development of hypertension with associated target organ damage.[8]

Hypertension prevalence varies widely is SSA from 15.0% - 70.0%, and of those that had hypertension, between 7.0% and 56.0% were aware of their hypertension status.[9] A cross sectional study reported highest prevalence among nurses 25.8%, followed by school teachers 23.2%, peri-urban residents 20.5% and lowest among rural residents 8.7%.[10] Among workers in West Africa, the prevalence of hypertension was found to range from 12.0% among automobile garage workers to 68.9% among traditional chiefs.[11] Typically sedentary

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workers such as traders, bank workers, civil servants, and chiefs were at high risk. Among health care workers, the prevalence ranged from 17.5 to 37.5%. The prevalence increased with age and was higher among males and workers with higher socio-economic status.[11]

Screening to identify diseases in asymptomatic individuals creates the opportunity for education, early detection of disease, the prevention of serious illness or disability and improved survival.[12,13] For a population where many live below 2 USD a day, the cost of hypertension treatment per person per month averages 10 USD apart from other direct costs so early recognition and treatment of hypertension is a cost effective measure in preventing CVD-associated mortality and morbidity.[14,15] Health care organizations are expected to raise public awareness about blood pressure. This can be done through surveillance studies and awareness campaigns.[16]

In a study among Pharmacists in Jos, Nigeria, no respondent had checked blood pressure within the previous six months, 31.0% last checked within 6-12 months, 59.0% last checked 1-4 years previously, while 10.0% had never checked their blood pressure.[17] Similarly among staff of a tertiary hospital in Jos, 58.5% rarely check their blood pressure except when sick.[18] This pattern of hardly checking BP except when ill had been reported among workers in West Africa, who are hypertensive, including health workers.[11]

Health care workers with hypertension can be categorized into; those who are aware that they have hypertension and are receiving treatment (uncontrolled); those who are aware but are not receiving treatment (untreated), and those who are unaware and therefore untreated (unaware).[19] Finding individuals with undiagnosed hypertension is therefore key to preventing heart attacks and strokes.[19]

The aim of this study was to determine the prevalence and correlates of undiagnosed hypertension among health care workers as a means of drawing up workplace strategies to improve the diagnosis of hypertension among health care workers.

Methodology

This was a cross sectional study conducted at Vom Christian Hospital, in January 2015 amongst health care workers (HCW). Data was obtained from a routine medical check-up as part of health promotion activities. Vom Christian Hospital, situated in Jos South local government area of Plateau state, is a faith based hospital that provides secondary health care services to the local government and surrounding communities.

Using stratified random sampling technique, hospital staff were recruited into the study. Ethical clearance was obtained from the Research and Ethics

Committee of the Jos University Teaching Hospital, Jos. Written informed consent was obtained from the staff after explaining the nature and purpose of the study. Data was obtained using a structured questionnaire where participant's bio-data, blood pressure, body mass index, waist circumference and fasting blood pressure were obtained.

Anthropometric measurements were recorded using a bathroom scale (Hanson) for body weight in kilograms and a stadiometer for height in meters. Body mass index (BMI) was then calculated as: BMI = weight (kg) / height (m) X height (m). Weight was taken by having the participant stand erect with feet slightly apart on the weighing scale without foot wear and any external material that may increase the body weight of the participant. Height was measured with the participant in an upright standing position without shoes. With the back of the participant against the height meter, measurement entailed standing erect with the neck held upright, eyes looking forward, hip in neutral position and knee extended with feet slightly apart, measurement was read off by standing in front of the participant and noting the corresponding level of the vertex of the head on the height meter. BMI was classified according to WHO guidelines.[20] Waist circumference was measured using a flexible tape on a horizontal plane at the midpoint between the inferior margin of the last rib and the crest of the anterior superior iliac crest without compression of the skin. The blood pressure was taken using an aneroid sphygmomanometer on the left arm after 5-minute rest in the sitting position. The first and fifth phases of Korotkoff sounds were taken as systolic and diastolic pressure respectively. The diagnosis of hypertension was based on a systolic blood pressure > 140mmHg and/or a diastolic blood pressure > 90mmHg.[21] Undiagnosed hypertension was defined as hypertension in an individual who was neither aware of their hypertension nor taking antihypertensive medications.[19,22] So in determining the prevalence of undiagnosed hypertension, the denominator was the total number of persons who were not aware that they had hypertension. Data was analyzed using Epi info 3.5.3 statistical software (CDC, Atlanta GA) and represented as frequencies and percentages. Chi square test was used to test association between bio-psychosocial demographic parameters and hypertension. A contingency table was used to determine the relationship between a history of a previous diagnosis of hypertension and being hypertensive. Logistic regression was used to ascertain correlates of undiagnosed hypertension. Variables with bivariate relationship values of $p < .25$ were included in the model. Probability values of $p < .05$ were considered significant.

Results

Description of study population

The study had 155 persons (87%) enrolled out of the 178 hospital workers. Most (58.1%) were female, with a mean age of 42.3±11 years. Majority of the participants (72.3%) were married or had been married before and about half, (51.0%) had a secondary school education or less. The participants' work cadre was as follows: Health service providers (HSP) made up of Doctors, lab scientists/technicians, nurses, other clinical staff and pharmacist/pharmacy technicians (41.3%), while health management support workers (HMSW), made up of Attendants and 'support staff' were (58.7%). The study population had (54.2%) who had practiced for not more than 10 years. Other baseline study characteristics are shown in Table 1.

Table 1: Socio-demographic characteristics of study population

Variables	Frequency	Percentage
Age (Years)		
20 - 29	24	15.5
30 - 39	41	26.5
40 - 49	43	27.7
50 - 59	34	21.9
60 - 69	13	8.4
Sex		
Male	65	41.9
Female	90	58.1
Educational Qualification		
Primary	53	34.2
Secondary	26	16.8
Tertiary	76	49.0
Marital Status		
Married	112	72.3
Separated	5	3.2
Single	22	14.2
Widow/Widower	16	10.3
Work Cadre		
Attendants	47	30.3
Doctors	5	3.2
Laboratory staff	10	6.5
Nurses	35	22.6
Other clinical staff	7	4.5
Pharmacy staff	7	4.5
Support staff	44	28.4
Years in practice		
0 - 9	77	49.7
10 - 19	32	20.6
20 - 29	16	10.3
> 30	30	19.4

Table 2: Socio-demographic and clinical characteristics of patients who were not known to have hypertension (undiagnosed hypertension)

Variable	N (%)	Undiagnosed Hypertension
Age (Years)		
20 - 29	24 (18.3)	3 (12.5)
30 - 39	38 (29.0)	9 (23.7)
40 - 49	36 (27.5)	16 (44.4)
50 - 59	29 (22.1)	16 (55.2)
60 - 69	4 (3.1)	2 (50.0)
Sex		
Male	58 (44.3)	23 (39.7)
Female	73 (55.7)	23 (31.5)
Marital Status		
Married	92 (70.2)	36 (39.1)
Separated	5 (3.8)	1 (20.0)
Single	22 (16.8)	4 (18.2)
Widow/Widower	12 (9.2)	5 (41.7)
Marital Status		
Not presently married	39 (29.8)	10 (25.6)
Married	92 (70.2)	36 (39.1)
Educational Qualification		
<Secondary school education	68 (51.9)	30 (44.1)
>Secondary school education	63 (48.1)	16 (25.4)
Work Cadre		
Health Management Support	79 (60.3)	30 (38.0)
Health Service Provider	52 (39.7)	16 (30.8)
No. of years in practice		
< 10 years	76 (58.0)	18 (23.7)
> 10 years	55 (42.0)	28 (50.9)
Do you exercise		
No	66 (50.4)	22 (33.3)
Yes	65 (49.6)	24 (52.2)
BMI (Kg/M2)		
Underweight/Normal	66 (50.4)	19 (28.8)
Overweight/Obese	65 (49.6)	27 (41.5)
Waist Circumference		
50 - 87 cm (Normal)	54 (41.2)	15 (27.8)
88 - 130 cm (High)	77 (58.8)	31 (40.3)
Aerobic exercise		
No	121 (92.4)	41 (33.9)
Yes	10 (7.6)	5 (50.0)
Diabetic (FBS > 126mg/dL)		
No	125 (95.4)	43 (34.4)
Yes	6 (4.6)	3 (50.0)
Average Sleep > 8 Hours/day		
No	64 (48.9)	24 (37.5)
Yes	67 (51.1)	22 (32.8)
Adequate water intake		
No	118 (90.1)	42 (35.6)
Yes	13 (9.9)	4 (30.8)
Pre DM/DM (FBS >100mg/dL)		
No	77 (58.8)	20 (26.0)
Yes	54 (41.2)	26 (48.1)
Sexually active		
No	36 (27.5)	10 (27.8)
Yes	95 (72.5)	36 (37.9)
History of Parents hypertensive		
No	103 (78.6)	34 (33.0)
Yes	28 (21.4)	12 (42.9)

Key: BMI: Body Mass Index, FBS: Fasting Blood Sugar, Pre DM: Pre-Diabetic, DM: Diabetic

Table 3 : Risk factors for hypertension and bivariate analysis

Variables	N (%)	OR	95%CI	P
Age 0 - 42 years	80(51.6)	0.22	0.11 - 0.44	0.00
Male	65 (41.9)	1.21	0.63 - 2.30	0.34
Ever been married	112(72.3)	2.32	1.08 - 4.98	0.02
> 6 years working in VCH	77(49.7)	2.87	1.48 - 5.56	0.00
> 10 years in practice	71(45.8)	3.05	1.57 - 5.91	0.00
Health Care Provider	64(41.3)	0.73	0.38 - 1.41	0.22
Tertiary Education	76(49.0)	0.53	0.28 - 1.02	0.04
Do you exercise (Yes)	71 (45.8)	0.83	0.44 - 1.57	0.34
Overweight/Obese	86 (55.5)	2.39	1.23 - 4.65	0.00
Waist Circumference 88 - 130cm	99 (63.9)	2.16	1.08 - 4.32	0.02
Aerobic exercise (Yes)	11 (7.1)	1.73	0.50 - 5.93	0.28
Diabetic (Yes)	9 (5.8)	1.79	0.46 - 6.95	0.30
Sleep > 8 hours (Yes)	76 (49.0)	0.74	0.39 - 1.40	0.22
Adequate water intake (Yes)	17 (11.0)	0.73	0.26 - 2.09	0.38

Table 4: Multivariate logistic regression of factors predicting undiagnosed hypertension

Variables	OR	95% CI	P
Age less than or equal to 42 years	0.24	0.10 - 0.72	0.01
BMI > 25	1.63	0.58 - 4.59	0.36
More than a secondary school education	0.67	0.26 - 1.74	0.41
History of hypertension in parents	2.31	0.82 - 6.52	0.11
Presently married	0.72	0.25 - 2.07	0.55
Years in practice greater than or equal to 10 years	1.86	0.70 - 4.90	0.21
Pre -DM/DM	2.01	0.82 - 4.90	0.13
Male	1.77	0.70 - 4.49	0.23
Sexually active	1.75	0.57 - 5.35	0.33
High waist circumference (88-130cm)	0.68	0.23 - 2.02	0.48

Key: BMI: Body Mass Index, Pre DM: Pre-Diabetic, DM: Diabetic

Hypertension and undiagnosed Hypertension prevalence, risk factors, bivariate and multivariate analysis
The prevalence of hypertension was 41.9% and of those that had hypertension, 46 (70.8%) were not aware that they were hypertensive. Those who self-reported that they had been diagnosed to have hypertension were 24 (15.5%) of the participants. Among those who had self-reported hypertension, 19 (79.1%) were found to have hypertension by the researchers while among those who had no history of hypertension, (131 participants), 46 (35.1%) were hypertensive. When the history of hypertension is used as a screening test for the diagnosis of hypertension, it gave a sensitivity of 29.2%, specificity of 94.4%, positive predictive value of 79.1%, negative predictive value of 64.9% and accuracy of 67.1%. The age group with the highest percentage of persons with undiagnosed hypertension was those in their fifties, (55.2%), while those in their twenties had the lowest (12.5%). Males 23/58 (39.7%) were found to have a higher number of persons with undiagnosed hypertension compared with females 23/73 (31.5%). Those who were married (39.1%), had more than 10 years practice experience (50.9%), health management support workers HMSW (38.0%) and those that did not have more than a secondary school education (44.1%) had higher rates of undiagnosed hypertension. Prevalence of undiagnosed hypertension was higher (41.5%) among those who were overweight/obese (41.5%), pre-diabetic (48.1%) and diabetic (50.0%). See Table 2 for details.

Bivariate analysis showed that age greater than 42 years, being married; having practiced for more than 10 years, more than a secondary school education, being overweight, a waist circumference more than 88cm and being pre-diabetic (FBS $\geq$ 100 mg/dL) had significant odds of being an undiagnosed hypertensive. Multivariate analysis showed that age less than or equal to 42 years (OR=0.24;95% CI:0.10-0.72) was protective for undiagnosed hypertension. See Tables 3 and 4 for details.

Discussion
Prevalence and correlates of undiagnosed hypertension
The prevalence of undiagnosed hypertension in this study was found to be 35.5% and those who were over 42 years are at risk for undiagnosed hypertension. This is similar to that found among health care workers in Jigawa state (35.4%),[23] but greater than that among health professionals in Saudi Arabia 15.6%.[16] The studies in Jigawa State and Saudi Arabia were both in urban settings and had heath care workers with a higher level of education as these institutions are for specialist and tertiary care. Our study had a higher mean age as such, more persons are likely to be hypertensive and undiagnosed. The study in Jigawa had more males than females and this is likely to give a relatively higher value of undiagnosed hypertension than if this was the reverse.[11]

Among dental patients in a tertiary institution, the prevalence of undiagnosed hypertension was 10.3%.[24] Dental patients are usually referred to the dental clinic as such, blood pressure checked at the first point of care and appropriately counseled. Some of these patients would also have been on follow up visits in the dental clinic where their blood pressure checked again. This explains why the prevalence of undiagnosed hypertension in our study is three times more than among patients who were seen at a tertiary point of care.

In a study among University staff, the Prevalence of undiagnosed hypertension was 36.1%.[25] This is comparable to our study finding of 35.1%. Our study was among HCW and this study was among university staff who are also more educated and enlightened so the advantage of being HCW may have been compensated for by their educational status.

Among hospital staff in Iran, awareness among those found to have hypertension was 3.0%.[26] The prevalence of hypertension of 8.6% may be the reason why the awareness is also this small since it is not a problem in the community, however, in our study where the prevalence of hypertension was 41.9%, 79.1% of those who were found to have hypertension self-reported. In North West Tanzania, in a community based study, the prevalence of hypertension was found to be 8.0%. Among participants with hypertension, awareness was 9.4%.[3] These findings corroborate the theory that a low awareness may correlate with a low prevalence as shown by the report of the prevalence of hypertension in Africa of 19.7% in 1990, 27.4% in 2000 and 30.8% in 2010 whereas the awareness rates were 16.9%, 29.2% and 33.7% respectively.[27] Also, among workers in West Africa, as the prevalence of hypertension increased progressively from 12.9% in studies published in the 1980s to 34.4% in those published in the 2010-2014, the proportion of hypertensive patients who were previously aware of their diagnosis also increased 19.6-84.0%.[11]

In Yenagoa, Nigeria, among employees of a tertiary hospital, 34.7% were previously diagnosed hypertensives while 65.3% were not aware they had hypertension.[28] This is much higher than 35.1% found in our study, even though the prevalence of hypertension is lower 23.8%. This may be reflective of the younger mean age of respondents and the health seeking behavior of the study population.

Our study showed that health care workers less than 42 years old were less likely to have undiagnosed hypertension compared to older workers. It is well reported that hypertension prevalence increases with age and may be attributed, in part, to increased peripheral vascular resistance due to the high prevalence of atherosclerosis and arteriosclerosis that develops with increasing age.[26,29] Age, BMI and physical in-activity levels were found to be significantly associated with undiagnosed hypertension in Jigawa.[23] It would appear that younger health care workers therefore had decreased risk of undiagnosed hypertension. It would also seem to imply that older health care workers in our setting, might not be aware of this increased risk hence are more likely to have undiagnosed hypertension. Experienced and older staff could provide leadership to younger HCW as such there is need to target screening this population

periodically in order to forestall the complications that arise from hypertension, enabling them provide their services for a longer duration.

In a systematic review among workers in West Africa, health workers and the most educated group of workers are most likely to be aware of their hypertensive status.[11] There was however some variability to this pattern as awareness was more among a group of mill operators compared to a group of civil servants.[11] This may have been as a result of occupational health interventions among the mill operators as again shown by the study by Familoni,[24] where knowledge level of factory workers was significantly higher than that of hospital employees. This suggests that it is not right to believe that working in a medical environment causes a higher level of knowledge for all employees. Health institutions should have occupational health interventions directed at increasing awareness of hypertension among staff.

Our study showed that only 29.2 % of participants found to be hypertensive were aware that they had hypertension in contrast to findings in Ogbomosho, 64.7% and Yenagoa 34.7% which are tertiary centres.[28,29]

Relevance of undiagnosed hypertension to health care workers

To achieve the Million Hearts goal of preventing one million heart attacks and strokes, it is estimated that an additional 10 million people will need to have their blood pressure under control. Finding individuals with undiagnosed hypertension is key to meeting this goal.[19]

It has been a common assumption that individuals who are not aware that they have hypertension, untreated or have uncontrolled hypertension are among the uninsured population without regular access to the health care system and who, consequently, have not had an opportunity for detection and diagnosis of hypertension. However, data from analysis of 2009–2012 NHANES show that among the unaware, untreated, and uncontrolled hypertensive population, 81.8% have health insurance, 82.5% have a usual source of care, and 61.7% have received care two or more times in the past year.[22] These data suggest that potentially millions of people with uncontrolled high blood pressure are being seen by health care professionals each year but remain undiagnosed and "hiding in plain sight" within clinical settings.[22] Even though they may be working in a health facility, many health workers may still lack knowledge about hypertension and this would serve as a barrier to being aware of their hypertension status.[30] Also the fact that health workers are prone to stress, anxiety and depression, they are less likely to be engaged in healthy lifestyle activities.[30] The control of blood pressure among health care workers is important because

as well as being a population at risk for hypertension, they are also a population for which the awareness and control of the general population can be made through them.

Limitations
The study was a cross sectional study as such causality cannot be inferred from the results.

Conclusion
There was a high prevalence of hypertension among health care workers and about a third of those found to be hypertensive were not aware. Those who were less than 42 years of age were less likely to have undiagnosed hypertension This calls for urgent workplace strategies to create more awareness as a prevention and control strategy for the facility and the general population.

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