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Assessment of the 10-year risk of cardiovascular events among a group of Sub-Saharan African post-menopausal women

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Abstract

Background: *Post-menopausal women may be at particular risk of developing cardiovascular disease due to metabolic changes occurring at menopause. The present study aimed to assess the 10-year cardiovascular risk (CVR) among a group of post-menopausal women and to determine associated factors.*

Methods: *This was a cross-sectional study conducted among post-menopausal women in Yaoundé, Cameroon. CVR was calculated using the Framingham risk score.*

Results: *We enrolled 108 women, their ages ranging from 45 to 80 years, with a mean of 56.4 ± ± 6.9 years. CVR ranged between 1.2% and greater than 30% with a mean of 13.4 ± 8.7%. Forty-three (39.8%) participants had a low CVR (< 10%), 39 (36.1%) women had a moderate CVR (10-20%), and 21 (24.1%) women had a high CVR (> 20%). Low-density lipoproteins cholesterol (LDL-C; β = 3.27, p = 0.004), fasting plasma glucose (β = 5.40, p = 0.015), and diastolic blood pressure (DBP; β = 3.49, p < 0.0001) were independently associated with CVR. Women not married (i.e. single, divorced or widowed) (adjusted odds ratio [aOR] 4.66, p = 0.002), those with high titers of LDL-C (≥ 1.6 g/L; aOR 5.07, p = 0.001), and those with elevated DBP (≥ 90 mm Hg; aOR 8.10, p < 0.0001) presented an increased likelihood to be at an advanced level of CVR.*

Conclusions: *A significant number of post-menopausal women are at considerable risk of cardiovascular events in our setting. Therefore, they should be educated to adopt healthy life-styles for substantial reduction in their CVR.* (Cardiol J 2016; 23, 2: 123–131)

Key words: post-menopausal women, cardiovascular disease, cardiovascular risk, Cameroon, Sub-Saharan Africa

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Introduction

Cardiovascular disease (CVD) is by far the leading cause of death in most developed countries and is rapidly becoming the leading cause of death in the world [1]. Indeed, the World Health Organization (WHO) estimates that annual global mortality due to CVD is projected to increase from 17.5 million in 2012 to 22.2 million by 2030, with almost 80% occurring in developing countries [2]. The high cardiovascular mortality in these countries is fueled by very low rates of awareness, treatment, and control of cardiovascular risk factors such as hypertension, diabetes and dyslipidemia alongside the increase in life expectancy [1].

Menopause, which is the cessation of monthly menstrual cycles resulting from the loss of ovarian function and a decrease in estrogen production, is widely recognized as a risk factor for CVD [3–6]. In fact, while cardiovascular events (CVE) are a rare occurrence in pre-menopausal women, their incidence increases drastically after menopause, and one related clue factor can be attributed to the significantly reduced production of estrogen along with concomitant loss of its direct and indirect cardioprotective effects [3, 7]. The prevalence of myocardial infarction in women with normal levels of estrogens has been shown to be very low (1% to 7% per 100,000) and 3–5 times lower than in men [8].

Actually, endogenous estrogens exert a protective effect against atherogenesis and consequential CVD [9]. Low plasma estrogen levels may explain some of the unfavorable lipid and carbohydrate metabolism changes rapidly occurring during menopausal transition and soon after menopause, which can result in metabolic disorders and the metabolic syndrome, increasing thereby the likelihood of diabetes and CVD [10–12].

Post-menopausal women are at higher risk of CVD. CVD is indeed considered to be the primary cause of mortality in these women [13]. In this regard, management of the peri-menopausal woman should not rely on the exclusive responsibility of the gynecologist. An interdisciplinary approach should be adopted by the gynecologist not just evaluating vasomotor and urogenital symptoms, but also assessing the patient for cardiovascular risk (CVR), and cardiovascular physician helping in the management and close follow-up of women at increased risk of CVD [7].

Accurate assessment of CVR in current medical practice is essential for clinical decision making, because the benefits, risks, and costs of alternative management strategies must be weighed to choose the best attitude or treatment for each patient [14]. However, very little is known about CVR in menopausal women from Sub-Saharan African (SSA) countries. The purpose of the present study was therefore to assess the 10-year risk of CVE among a group of SSA post-menopausal women and to determine associated factors.

Methods

Ethics statement

Prior to recruitment of participants, an institutional authorization was obtained from authorities of the Yaoundé University Teaching Hospital, and an ethical clearance was granted by the Ethical Review Board of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I, Cameroon. All the procedures used in the present study were in keeping with the current revision of the Helsinki Declaration. Respondents were all informed of the various aspects of the study, and were enrolled only after they had provided a signed consent form.

Study design and participants

This was a cross-sectional study conducted in January 2015 at the Yaoundé University Teaching Hospital, Cameroon. We enrolled post-menopausal women whose last menses dated back to at least 1 year, with no previous history of CVE, in apparent good health, who were visiting the study site for various reasons, and who volunteered to participate in the survey. A convenient sample of 100 women was set, and women fulfilling our inclusion criteria were recruited during the study period.

Data collection

A structured pre-tested questionnaire served for collection of data which included socio-demographic characteristics (age, region of origin, religion, profession, marital status), medical history (past medical events, family history of diabetes, hypertension or other relevant disease), and lifestyle habits (physical exercise, smoking (defined as having smoked any cigarettes in the past month), consumption of alcohol, lipids and butter specifically, carbohydrates, and consumption of fruits and vegetables among others). A physical examimtion was subsequently undertaken during which blood pressure and anthropometric variables were measured. These latter parameters included body weight (to the nearest kilogram), and height (to the nearest centimeter). Body mass index (BMI) was then derived as weight [kg] / height × height [m]. At the end of this stage, participants were given an appointment for blood collection.

Blood sampling and biochemical measurements

Fasting blood samples were collected after a 12-hour overnight fasting, and processed for biochemical determinations including fasting plasma glucose (FPG), total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C) and uric acid. Low-density lipoprotein cholesterol (LDL-C) was then derived using Friedwald formula [15].

Cardiovascular risk assessment and stratification

The 10-year CVR was assessed using the Framingham risk score (FRS) [16] and was electronically calculated after entering the required parameters on this web page: https://www.cvdrisk-checksecure.com/FraminghamRiskScore.aspx/. The FRS predicts the 10-year risk of developing a coronary event (composite of myocardial infarction and coronary death), and is considered a standard and generally acceptable approach to risk prediction [17]. Participants were afterwards grouped into 3 classes, given they presented a low CVR (score < 10%), a moderate CVR (score 10–20%) or a high CVR (score > 20%) [16].

Statistical methods

Data were coded, entered and analyzed using SPSS version 20.0 (IBM SPSS Inc., Chicago, Illinois, USA). Results are presented as count (proportion) for qualitative variables and mean ± standard deviation (SD) for quantitative ones. The Student's *t* test served for comparison of quantitative variables. The Pearson correlation test and linear regression models were used to seek linear relation between quantitative variables. Odds ratios (OR) with 95% confidence intervals (CI) were used to investigate the influence of categorical variables on CVR, and were assessed by both univariable and multivariable logistic regression analyses while adjusting for confounders. All variables with a p value < 0.20 were introduced in the multivariable models. A p value < 0.05 was used to characterize statistically significant results.

Results

Socio-demographic background, medical history and lifestyle habits

On the whole, we enrolled 108 women, their ages ranging from 45 to 80 years with a mean of 56.4 ± 6.9 years. Most of women (67.5%) originated from the West region of Cameroon (Table 1).

Table 1. Socio-demographic profile, medical history and lifestyle habits of the study population (n = 108).

Variable	Number (%)
Age:	
≤ 60 years old	85 (78.7%)
> 60 years old	23 (21.3%)
Religion:	
Catholic	59 (54.6%)
Protestant	48 (44.6%)
Pentecost	1 (0.9%)
Region of origin:	
Center	23 (21.3%)
West	71 (65.7
Littoral	7 (6.5%)
South-West	1 (0.9%)
North-West	1 (0.9%)
North	3 (2.8%)
South	2 (1.9%)
Profession:	
Housewife	65 (60.2%)
Civil servant	14 (13.0%)
Retired	8 (7.4%)
Trader	21 (19.4%)
Marital status:	
Single	9 (8.3%)
Married	72 (66.7%)
Widowed	25 (23.1%)
Divorced	2 (1.9%)
Known diabetes patient: Yes	16 (14.8%)
Known hypertensive patient: Yes	37 (34.3%)
Family history of diabetes or hypertension: Yes	54 (50.0%)
Practicing a physical activity: Yes	56 (51.9%)
Type of physical activity practiced:	
Walking	55 (98.2%)
Riding a bicycle	1 (1.8%)
Smoking: Yes	5 (4.6%)
Taking alcohol occasionally: Yes	77 (71.3%)
Regular consumption of carbohydrates: Yes	72 (66.7%)
Regular consumption of butter: Yes	49 (45.4%)
Regular consumption of lipids: Yes	103 (95.4%)
Used to eat fruits and vegetables: Yes	106 (98.1%)

Fifty four point six percent of women were catholic by faith, 60.2% were housewives, and 66.5% were married (Table 1).

Table 2. Clinical and biochemical measurements.

Variable	Minimum	Maximum	Mean ± SD	Median (IQR)
Weight [kg]	51	123	82.19 ± 14.29	80.5 (72–93.8)
Height [m]	1.50	1.79	1.61 ± 0.05	1.62 (1.58–1.65)
BMI [kg/m^2]	21.20	43.60	31.56 ± 5.27	31.6 (27.93–35.0)
Systolic BP [mm Hg]	100.0	210.0	138.6 ± 23.6	140 (120–150)
Diastolic BP [mm Hg]	60.0	120.0	80.2 ± 13.0	80 (70–90)
Total cholesterol [g/L]	1.05	4.23	2.29 ± 0.63	2.29 (1.84–2.64)
LDL cholesterol [g/L]	0.22	3.54	1.59 ± 0.58	1.61 (1.22–1.89)
HDL cholesterol [g/L]	0.21	0.88	0.48 ± 0.12	0.47 (0.40–0.55)
Triglycerides [g/L]	0.22	2.44	0.87 ± 0.47	0.78 (0.52–1.12)
Uric acid [mg/L]	23.30	121.40	57.32 ± 18.19	53.9 (46.17–65.38)
FPG [g/L]	0.6	3.31	0.65 ± 0.30	0.79 (0.70–0.95)

SD — standard deviation; IQR — interquartile range; BMI — body mass index; BP — blood pressure; LDL — low-density lipoprotein; HDL — high-density lipoprotein; FPG — fasting plasma glucose

Table 1 also displays the medical history and lifestyle habits of our respondents. Sixteen (14.8%) participants were known diabetes patients, and 37 (34.3%) were known hypertensive. Fifty-four (50%) respondents had a family history of diabetes or hypertension, one or both of their parents being concerned in 74.1% of cases. There was no known family history of CVE. No woman was alcoholic, though 77 (71.3%) used to drink alcohol occasionally. Five (4.6%) women used to smoke. Fifty-six (51.9%) participants were currently practicing a physical activity: walking especially in 98.2% of cases. The frequency of physical exercise ranged from 1 to 7 sessions per week (mean: 3.2 ± 1.6), each session lasting from 15 to 248 min with a mean of 62.5 ± 42.8 min. One hundred and three (94.4%) women had a diet rich in lipids, with 49 (45.4%) women who used to take butter. Seventy-two (66.7%) participants were used to consuming carbohydrates, and 106 (98.1%) women used to eat fruits and vegetables, the frequency ranging between 1 and 7 days per week (mean: 2.9 ± 1.7).

Clinical and biochemical parameters

The mean levels of clinical and biochemical variables are depicted by Table 2. Thirty-seven (34.3%) women were overweight (BMI 25–29.9 kg/m^2) and 61 (56.5%) were obese (BMI ≥ 30 kg/m^2), among whom 9 (14.8%) women were severely obese (BMI ≥ 40 kg/m^2). Fifty-eight (53.7%) women had an abnormal systolic blood pressure (SBP; ≥ 140 mm Hg), and 38 (35.2%) women had an abnormal diastolic blood pressure (DBP; ≥ 90 mm Hg). Overall, 83 (76.9%) respondents had abnormally high blood pressure values. Six (5.6%) respondents had a high FPG level (≥ 1.26 g/L). We recorded 73 (67.6%) cases of elevated levels of TC (≥ 2 g/L), 9 (8.3%) cases of high TG values (≥ 1.6 g/L), 55 (50.9%) cases of high LDL-C titers (≥ 1.6 g/L), and 12 (11.1%) women showed low levels of HDL-C (≤ 0.35 g/L). Forty-one (38%) women had hyperuricemia (≥ 60 mg/L).

Cardiovascular risk score and stratification

The 10-year risk of CVE ranged from 1.2% to greater than 30% with a mean of 13.4 ± 8.7%. The mean risk was statistically different between known and unknown diabetes participants (21.0 ± ± 10.4% vs. 12.0 ± 7.7%, $p < 0.0001$). Likewise, there was a significant difference between smokers and non-smokers ($p = 0.001$), those consuming butter or not ($p = 0.028$), fruits and vegetables regularly or not ($p = 0.002$), those with high levels of SBP, DBP, TC, LDL-C, FPG, uric acid (all p values < 0.0001), and those with low levels of HDL-C ($p = 0.001$) when compared to their counterparts. On the contrary, there was no difference in mean of CVR with regard to regular consumption of lipids ($p = 0.597$), of carbohydrates ($p = 0.171$), regular physical activity (≥ 3 sessions per week) ($p = 0.578$), and high or low levels of TG ($p = 0.214$). Forty-three (39.8%) participants had a low risk of CVD (< 10%), 39 (36.1%) women had a moderate risk (10–20%), and 21 (24.1%) women had a high risk of CVD (> 20%). Besides, 90 (83.3%) participants had a CVR > 5%.

In univariable linear regression analysis, CVR was associated with LDL-C ($\beta = 1.79$, 95% CI 0.74–2.84; $p = 0.001$, $R^2 = 0.98$), TG ($\beta = 1.94$, 95% CI 0.62–3.27; $p = 0.004$, $R^2 = 0.074$), uric acid

(β = 0.17, 95% CI 0.08–0.25; p < 0.0001, R^2 = 0.12), FPG (β = 8.01, 95% CI 2.66–13.36; p = 0.004, R^2 = 0.077) and DBP (β = 3.88, 95% CI 2.84–4.92; p < 0.0001, R^2 = 0.34), but not with BMI (β = 0.29, 95% CI –0.03–0.60; p = 0.073, R^2 = 0.030). In the multivariable model, LDL-C (adjusted β = 3.27, 95% CI 1.06–5.49; p = 0.004, R^2 = 0.048), FPG (adjusted β = 5.40, 95% CI 1.09–9.71; p = 0.015, R^2 = 0.035), and DBP (adjusted β = 3.49, 95% CI 2.48–4.48; p < 0.0001, R^2 = 0.275) remained associated with CVR, the coefficient of determination of this model being R^2 = 0.426.

All the variables significant in univariable logistic regression analyses are presented in Table 3. After adjustment, women not married (i.e. single, divorced or widowed) (adjusted odds ratio [aOR] 4.66, 95% CI 1.72–12.60; p = 0.002), those with high titers of LDL-C (≥ 1.6 g/L; aOR 5.07, 95% CI 2.01–12.83; p = 0.001), and those with elevated DBP (≥ 90 mm Hg; aOR 8.10, 95% CI 3.07–21.33; p < 0.0001) when compared with their counterparts, presented an increased likelihood to be at an advanced level of CVR in comparison to their current one (Table 4).

Discussion

This cross-sectional study conducted among 108 SSA post-menopausal women revealed that nearly two-thirds of participants (60.2%) presented a moderate or high 10-year risk of CVD. Marital status, LDL-C, DBP and FPG may be other factors shaping CVR in our context. Therefore, concurring Sekuri et al. [18] recommendations, strong interventions to significantly reduce CVR among post-menopausal women should be included in routine primary health care programs. As such, these women should receive educational sessions on healthy lifestyles, which revolve around emphasizing regular physical activity, avoiding or stopping smoking, avoiding excessive alcohol consumption, maintaining a normal body weight, and adopting a healthy diet [2, 19, 20]. Omega-3 fatty acids may be administered in high-risk women, as well as folic acid, vitamin K and vitamin D [19, 21, 22]. On another hand, glucose intolerance and diabetes should be screened, and women suffering from diabetes should receive adequate management to prevent or delay related complications.

Using the Cardiovascular Risk Score of the European Society of Cardiology, Sekuri et al. [18] assessed the CVR among 207 post-menopausal Turkish women from a rural setting, and found that 86% of the women would be carrying more than a 5% probability of developing a CVE in the next 10 years. These results may resemble ours despite the fact that different tools were used to assess CVR. We found indeed that 83.3% of our participants had a risk > 5%. Contrariwise, we observed that 24.1% of women had a high CVR, more than thrice equal to the 7% frequency found by Sekuri et al. [18]. Besides, the number of women presenting high titers of TC in our study (67.6%) was almost twice equal to the 35.3% percentage obtained by Sekuri et al. [18] among their Turkish women. Our results may reflect an unhealthy diet consumed in our settings made up of plenty of fats (especially unsaturated fatty acids), added to a lack of regular physical exercise as we have observed.

In fact, physical inactivity is a well-recognized and important contributor to coronary heart disease (CHD), especially in women [23]. Adults who are insufficiently physically active have a higher risk of all-cause mortality compared with those who do at least 150 min of moderate-intensity physical activity per week, or equivalent, as recommended by WHO [2]. Regular physical activity reduces the risk of CHD, stroke, diabetes, and breast and colon cancers [2]. Specifically, physical activity is associated with beneficial changes in circulating lipids and lipoproteins [24, 25], body weight, blood pressure, insulin sensitivity [26], and coagulation parameters [27, 28]. There is overwhelming evidence of an association between regular physical training and lowering of plasma TG, TC and LDL-C concentrations, and an increase in the plasma HDL-C titers, hence a significant reduction in CVR [24, 29, 30]. Therefore, our women should be encouraged to practice regular physical exercise.

High levels of TG and LDL-C, and low levels of HDL-C are the three elements shaping atherogenic dyslipidemia, and are recognized as independent risk factors for CVD [31, 32]. We observed that each increase in LDL-C levels of 1 g/L may lead to a 3.2% increase in CVR, and women who have elevated titers of LDL-C (≥ 1.6 g/L) when compared to their counterparts, may present a 5-fold increased likelihood to be at an advanced level of CVR in comparison to their current one. Therefore, it can be inferred from the present study that reduction of CVR in post-menopausal women of our settings must focus on strategies to reduce LDL-C levels. In this regard, women should be educated on consumption of a healthy diet, i.e. consumption of a variety of fruits, vegetables, cereals, dairy products with low or without fat; consumption of fish, legumes, and proteins with low content of unsaturated fat (poultry, lean meat,

Table 3. Univariable logistic regression analyses with presentation of odds ratios and 95% confidence intervals (CI) for increased risk of cardiovascular disease.

Variable	Odds ratio	95% CI	P
Religion:			
Catholic	0.83	0.41–1.68	0.612
Protestant	1		
Marital status:			
Married	1		
Alone (single + divorced + widowed)	**2.62**	**1.23–5.58**	**0.013****
Profession:			
Does not earn money (housewife + retired)	1	0.47–2.10	0.997
Earn money (civil servant + trader)	1		
Family history of diabetes or hypertension:			
No	0.95	0.47–1.92	0.892
Yes	1		
Occasional consumption of alcohol:			
No	0.86	0.40–1.87	0.705
Yes	1		
Regular consumption of lipids:			
No	1.47	0.28–7.66	0.649
Yes	1		
Regular intake of carbohydrates:			
No	1.95	0.92–4.11	0.081*
Yes	1		
Regular consumption of butter:			
No	**2.59**	**1.26–5.35**	**0.010****
Yes	1		
Consumption of fruits and vegetables:			
< 3 days per week	**2.57**	**1.25–5.29**	**0.010****
≥ 3 days per week	1		
Physical activity:			
< 3 sessions per week	0.75	0.36–1.55	0.431
≥ 3 sessions per week	1		
Body mass index:			
Normal (18–24.9 kg/m^2)	**0.15**	**0.02–0.90**	**0.038****
Overweight (25–29.9 kg/m^2)	0.50	0.13 -1.92	0.311
Obesity (30–39.9 kg/m^2)	0.58	0.16–2.14	0.411
Morbid obesity (≥ 40 kg/m^2)	1		
Diastolic blood pressure:			
< 90 mm Hg	1		
≥ 90 mm Hg	**6.45**	**2.86–14.56**	**< 0.0001****
Fasting blood glucose:			
< 1.26 g/L	1		
≥ 1.26 g/L	**20.33**	**2.20–187.35**	**0.008****
Uric acid:			
< 60 mg/L	1		
≥ 60 mg/L	**4.54**	**2.10–9.81**	**< 0.0001****
Triglycerides:			
< 1.6 g/L	1		
≥ 1.6 g/L	2.68	0.75–9.63	0.131*
LDL cholesterol:			
< 1.6 g/L	1		
≥ 1.6 g/L	**3.94**	**1.87–8.29**	**< 0.0001****

*p < 0.20; **p < 0.05; LDL — low-density lipoprotein

Table 4. Multivariable logistic regression analysis with presentation of adjusted odds ratios (aOR) and 95% confidence intervals (CI) for increased risk of cardiovascular disease.

Variable	aOR	95% CI	P
Marital status:			
Married	1		
Alone (single + divorced + widowed)	**4.66**	**1.72–12.60**	**0.002***
Regular consumption of butter:			
No	1.78	0.76–4.17	0.187
Yes	1		
Regular intake of carbohydrates:			
No	1.96	0.79–4.84	0.144
Yes	1		
Consumption of fruits and vegetables:			
< 3 days per week	1.01	0.42–2.34	0.980
≥ 3 days per week	1		
Body mass index:			
Normal (18–24.9 kg/m^2)	0.18	0.02–1.68	0.134
Overweight (25–29.9 kg/m^2)	0.55	0.09–3.27	0.513
Obesity (30–39.9 kg/m^2)	0.54	0.10–3.01	0.478
Morbid obesity (≥ 40 kg/m^2)	1		
Diastolic blood pressure:			
< 90 mm Hg	1		
≥ 90 mm Hg	**8.10**	**3.07–21.33**	**< 0.0001***
Uric acid:			
< 60 mg/L	1		
≥ 60 mg/L	1.50	0.54–4.14	0.439
LDL cholesterol:			
< 1.6 g/L	1		
≥ 1.6 g/L	**5.07**	**2.01–12.83**	**0.001***
Fasting blood glucose:			
< 1.26 g/L	1		
≥ 1.26 g/L	14.60	0.80–265.87	0.070
Triglycerides:			
< 1.6 g/L	1		
≥ 1.6 g/L	0.69	0.13–3.53	0.655

*$p < 0.05$; all variables with a p value < 0.20 in the univariable models (see Table 3) were introduced in this multivariable model: R^2 (McFadden) = 0.286; $p < 0.0001$; LDL — low density lipoprotein

plant); restriction of consumption of unsaturated fat (< 10% of total calories), cholesterol (300 mg/ /daily), and trans-fatty acids) [2, 19, 20]. It is worth emphasizing, however, that diet alone may be unsatisfactory and should therefore be associated with regular physical exercise as it has been shown that diet restriction without exercise may appear inefficient [20, 33].

Diabetes is known to substantially increase the risk of CVD [34]. Indeed, Haffner et al. [34] demonstrated that individuals with diabetes have a 2- to 4-fold increased risk of developing CVE than those of the same age and sex without diabetes. Furthermore, individuals with a 2-h plasma glucose of 10.01–11.09 mmol/L have cardiovascular mortality risks similar to those with diabetes [35]. We found that an elevation of 1 g/L in FPG levels may be linked to an increase of 5.4% in CVR. We also observed that CVR was significantly higher among known diabetes patients ($p < 0.0001$), but may be due to our dichotomizing threshold, we did not find any relation between CVR and FPG in logistic regression. It appears nonetheless of great importance to screen for glucose intolerance and diabetes in our post-menopausal women.

Recently, new factors influencing CVR have been delineated among post-menopausal women, especially sleeping disorders, depression, vitamin D insufficiency, rheumatoid arthritis, sexual dysfunction, stress, and psychosocial factors [36]. This study adds to the literature that marital status of the post-menopausal woman may influence her CVR. We found indeed that women not in couple (single or divorced or widowed) presented a 4.7--fold increased likelihood to develop CVD than married women. Besides, we have also noticed that an increment of 1 mm Hg in DBP may be accompanied by an increase in CVR of 3.5%, and that women with elevated DBP (≥ 90 mm Hg) when compared to those with normal DBP may have an 8-fold increased probability to be at an advanced level of CVR in comparison to their current one. Nonetheless, more studies are needed to extensively examine the contribution of marital status as well as DBP on post-menopausal women CVR, especially in our context.

Presumably, the cross-sectional design of this study added to its relatively small sample size hindered from catching up other factors which could have impacted CVR in our setting. Additionally, in the absence of locally developed tools to assess CVR, we used the FRS which may lack to accurately assess CVR in African populations as they may present different patterns of CVD when compared with developed countries [37]. Recruitment of participants in a hospital setting rather than in the community could have perhaps led to an overestimation of CVR. Nonetheless, we used strong analytical methods to reliably investigate our research question. Besides and to the best of our knowledge, this is the first study held in Central Africa aiming at assessing post-menopausal women CVR.

Conclusions

This study showed that a significant number of post-menopausal women are at considerable risk of CVE in our setting. Marital status, FPG, DBP and LDL-C may influence these women's CVR, hence inferring that changes in lifestyle could significantly lessen the occurrence of CVD in this population. Therefore, women should be educated to adopt healthy lifestyles including avoidance or cessation of smoking, regular physical activity, maintenance of a normal body weight, and consumption of a diet containing low unsaturated fatty acids and intake of increased amounts of fruits and vegetables. More studies are needed to clarify the contribution of various risk factors on the occurrence of CVD in our context, and accurate CVR assessment tools urgently need to be developed locally.

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