Abstract

Background: The changes in risk factors of cardiometabolic disease (CMD) over women's midlife remain understudied in sub-Saharan African (SSA) and other low- and middle-income countries (LMICs). It is unclear whether these changes are driven by the menopause transition (MT) or chronological aging. LMICs including those from SSA have a high population growth of midlife women, and a high prevalence of CMD and human immunodeficiency virus (HIV). The aim of this study was therefore to investigate the MT and its association with CMD risk factor levels in SSA women and women from other LMICs and whether any association is modified by HIV.

Methods: In this study, a meta-analysis of data on menopausal differences in CMD risk from LMICs was performed. Secondly, analysis of cross-sectional data embedded within a multi-centre study in five different sites across four SSA countries namely: South Africa (Dikgale and Soweto), East Africa (Nairobi, Kenya) and West Africa (Nanoro, Burkina Faso, and Navrongo, Ghana) was done. Thirdly, analysis of longitudinal cardiometabolic and sex hormone data from women in Burkina Faso and Ghana was performed, as they passed from pre- to peri- or pre- to post- or early to late postmenopause, at two time points. Lastly, analysis of cross-sectional data from pre- and postmenopausal women in the HIV prevalent regions of Kenya and South Africa was done.

Results: The meta-analysis showed that compared to premenopause, the postmenopausal stage was associated with higher metabolic syndrome (OR=1.18 (95% CI 1.11–1.27)), and higher triglycerides (OR=1.16 (95% CI 1.11–1.21)), elevated blood glucose (OR=1.21 (95% CI 1.15–1.28)), hypertension (OR=1.10 (95% 1.04-1.16)) and higher waist circumference (OR=1.16 (95% CI 1.08–1.25)). However, BMI

(OR=1.05 (95% CI 0.96–1.14)), high-density lipoprotein cholesterol (OR=0.71 (95% CI 0.19–1.22)) and carotid intima media thickness (OR=1.09 (95% CI 0.87–1.36)) did not differ between these groups. In the cross-sectional analyses, combined West African populations demonstrated that postmenopausal women had a larger waist circumference (β = 1.28 (95 % CI: 0.58; 1.98) cm), log subcutaneous fat (β =0.15 (0.10; 0.19)), diastolic (β = 3.04 (1.47; 4.62) mm Hg) and log systolic (β = 0.04 (0.02; 0.06)) blood pressure, log carotid intima media thickness (β = 0.03 (0.01; 0.06)), low-density lipoprotein cholesterol (β = 0.14 (0.04; 0.23) mmol/L) and log triglyceride (β= 0.10 (0.04; 0.16)) levels than premenopausal women. No such differences were observed in the South and East African women. In the longitudinal analyses, the sex hormones estradiol, sex hormone binding globulin, testosterone, and dehydroepiandrosterone decreased significantly but follicle stimulating hormone increased during the MT. Furthermore, androgens mediated minor changes in the levels of CMD risk factors whereas these changes were more strongly influenced by the study site. In the last cross-sectional analysis, age at menopause in women living with HIV was lower than in those living without HIV. However, there were no differences in CMD risk factor levels between menopausal groups and this was not affected by HIV status.

Conclusions: These findings suggest that there is need for a context-specific interventions to lower the risks of CMD in midlife women from SSA populations and other LMICs. Furthermore, this study provides insights into the biology of the menopause in a SSA population by showing minor associations between sex hormones and CMD risk factors but stronger associations with environmental factors. Lastly, HIV does not seem to modulate the menopausal differences on CMD risk factors, but it is associated with a lower age at menopause.