Age at natural menopause and body mass index: Longitudinal analysis

Zayne M. Roa-Díaz[1], Faina Wehrli[1], Pedro Marques-Vidal[2], Oscar H. Franco[1], Taulant Muka*[1].

[1]Institute of Social and Preventive Medicine (ISPM), University of Bern, Bern, Switzerland

[2]Institut Universitaire de Médecine Sociale et Préventive (IUMSP), Centre Hospitalier Universitaire Vaudois (CHUV) and University of Lausanne, Lausanne, Switzerland

Introduction

Early ANM has been described as a risk factor for cardiovascular diseases (1), association that could be mediated by factors such as obesity and hormonal changes secondary to menopause (2). Body mass index (BMI) is associated with ANM (3); nevertheless, few studies have evaluated the effect of ANM on BMI and a consensus about its association is lacking (1). Recently, a longitudinal study in British women found that 1-year older ANM was associated with lower log BMI at 53 and lower log BMI at age 69 years, albeit with confidence intervals spanning the null value (4). Another study conducted in Iran found that women with ANM at ≥49 years experienced a decreasing BMI (β=-0.03) compared with women with lower ANM, additionally it was found that the effect of ANM decreased overt time (5). Therefore, more evidence from longitudinal studies is necessary.

Objective

The aim of this study is to investigate whether time of natural menopause is associated with BMI

Material and Methods

Population: CoLaus is a population-based study in Caucasians 35-75 years living in the city of Lausanne (6). In this study, postmenopausal women from the baseline with available information in the first follow-up were included. The Institutional Ethic's Committee of the University of Lausanne - Switzerland, approved CoLaus; written informed consent was obtained from all participants.

Statistical analysis: We performed linear regression, using restricted cubic splines with three knots to allow for potential nonlinearity. First, we cross-sectionally investigated the association of age at natural menopause with the BMI at baseline. Second, we investigated the association of age at natural menopause with the BMI at follow-up. Third, we prospectively investigated the association of age at natural menopause with changes in BMI (calculated by subtracting the BMI at baseline from BMI at follow-up). BMI was log-transformed. Model were adjusted by: age, drinking status, diabetes, history of cardiovascular diseases, smoking status, hormone therapy, physical activity, education level, statin, antidiabetic and antihypertensive medication. Longitudinal analysis was further adjusted by baseline BMI

Results and Discussion

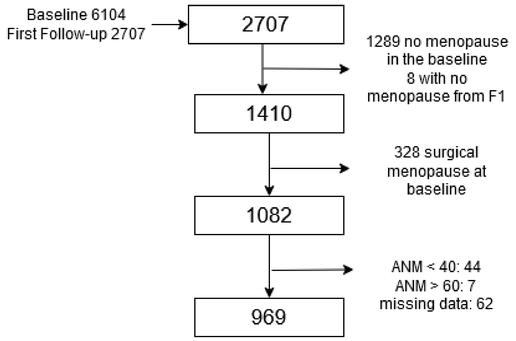

Figure 1. Study flowchart

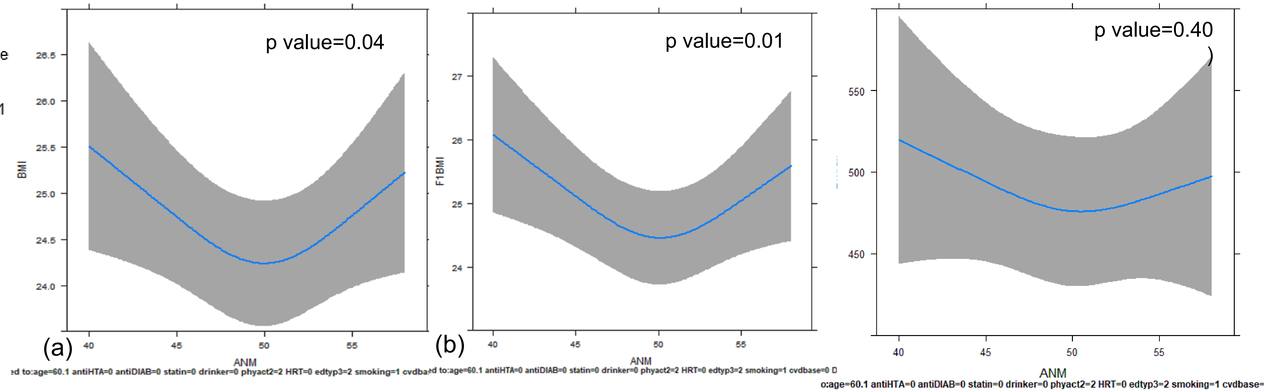

Figure 2. Association of ANM with BMI in cross-sectional analysis. (a) Baseline (n = 969) (b) follow-up (n = 953).

Figure 3. Prospective association of ANM with changes in BMI (n = 969).

Descriptive: age at baseline was 60.1 range (46.4; 74.6), mean ANM was 50 years old range (40-58). On average women had 15 years living with menopause (range 5.9; 33.1 years). Mean BMI at baseline was 24.6 (range 17.6; 41.0) and at follow-up was 25.3 range (range 17.4; 28.7)

Cross-sectional: There was a U-shape association of ANM and log BMI at baseline and follow-up; both women experiencing early and late menopause were having higher BMI.

Longitudinal: There was no association of ANM and BMI changes (β=-7.0 CI95% (-29.4;16.5 per year of ANM).

Restriction of the analysis to women with minimum 1.2 years and maximum 10 years after menopause did not materially change the results.

As other studies (4,5) have showed chronological age and time since menopause onset are factors that could confound the association of ANM and BMI.

Conclusion

No consistent association was found between ANM and BMI.

References

(1) Muka Taulant, et al. Association of age at onset of menopause and time since onset of menopause with cardiovascular outcomes, intermediate vascular traits, and all-cause mortality: a systematic review and meta-analysis. *JAMA cardiology*, 2016

(2) Zhu Dongshan, et al. Age at natural menopause and risk of incident cardiovascular disease: a pooled analysis of individual patient data. *The Lancet Public Health*, 2019

(3) Zhu Dongshan, et al. Body mass index and age at natural menopause: an international pooled analysis of 11 prospective studies. 2018.

(4) Effect of aging, menopause, and age at natural menopause on the trend in body mass index: a 15-year population-based cohort

(5) O'Keeffe Linda Marie, et al. Age at period cessation and trajectories of cardiovascular risk factors across mid and later life. *Heart*, 2020

(6) Firmann M, et al. The CoLaus study: a population-based study to investigate the epidemiology and genetic determinants of cardiovascular risk factors and metabolic syndrome. BMC Cardiovasc Disord. 2008

For more information about our group and to explore the prospect of a collaboration please visit our homepage.

Zayne M. Roa D., PhD Student in Health sciences | zayne.roadiaz@ispm.unibe.ch