

# Clustering of cardiometabolic risk factors in Asian Indian women: Santiniketan women study

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## Abstract

**Objective:** The aim of the present cross-sectional study was to investigate the clustering of cardiometabolic risk factors in premenopausal and postmenopausal Asian Indian women.

**Methods:** A total of 214 healthy women (25–65 y) from the Bolpur-Santiniketan area, West Bengal, India, took part in the study. The women were categorized into two groups, namely, premenopausal (n = 161) and postmenopausal (n = 53). Anthropometric measures, namely, minimum waist circumference (WC) and the sum of four (biceps + triceps + subscapular + suprailliac) skinfolds (SF<sub>4</sub>), were measured accordingly. Intra-abdominal visceral fat (IVF) was also measured. Left arm systolic (SBP) and diastolic (DBP) blood pressure was taken in participants. Metabolic profiles, namely, total cholesterol (TC), triglyceride (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), fasting plasma glucose (FPG), insulin, testosterone, and estrogen, were measured accordingly.

**Results:** The four factors identified in premenopausal women were factor 1: WC, SF<sub>4</sub>, IVF, TC, and TG; factor 2: HDL, SBP, DBP, and insulin; factor 3: TC, TG, LDL, and testosterone; and factor 4: FPG, testosterone, and estrogen. These four factors cumulatively explained 72.97% of the total phenotypic variation. In postmenopausal women, the four factors identified were factor 1: TC, TG, HDL, LDL, and DBP; factor 2: FPG, SBP, and DBP; factor 3: WC, SF<sub>4</sub>, and IVF; and factor 4: FPG, insulin, testosterone, and estrogen. These four factors together explained 90.71% of the total phenotypic variation in cardiometabolic risk factors.

**Conclusions:** No common underlying physiological variables in premenopausal and postmenopausal women indicate that a single risk axis for clustering of cardiometabolic phenotypes is highly unlikely.

**Key Words:** Metabolic syndrome – Hormone – Menopause – Cardiovascular disease – Asian Indians.

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Cardiovascular disease (CVD) accounts for a large proportion of all deaths and disability worldwide. The Global Burden of Disease Study reported that in 1990, there were 5.2 million deaths from CVD in economically developed countries and 9.1 million deaths from the same cause in developing countries.<sup>1</sup> It has been predicted that by the year 2020, there will be an increase by almost 75% in global CVD prevalence, and almost all of this increase will occur in developing countries.<sup>2</sup> It was reported<sup>3</sup> that mortality from CVD was projected to decline in

developed countries from 1970 to 2015, whereas it was projected to almost double in the developing countries.

The prevalence of coronary heart disease (CHD) is known to be high in people of South Asian descent (persons originally from Indian subcontinent). Moreover, CHD among these individuals is often premature and occurs a decade earlier than that seen in Europeans and/or Americans.<sup>4</sup> However, its precise etiology and mechanisms remain incompletely understood, yet it is quite clear that some metabolic abnormalities are more prevalent among them, including high triglyceride (TG) concentration, increased total cholesterol (TC) and high-density lipoprotein (HDL) ratio, type 2 diabetes mellitus, and central or visceral obesity.<sup>5</sup>

The rates of CVD have decreased significantly for men through the past few decades, but similar reductions have not occurred in women. Men usually develop heart disease earlier than women do, but women develop heart disease more rapidly once menopause has occurred.<sup>6</sup> Before menopause, women are relatively protected from ischemic heart disease and thromboembolism by their circulating estrogens, but this protection is lost after menopause. Through the effect of the menopausal transition, the morbidity and mortality from CVD in women are increased.<sup>7</sup> Menopause is defined biomedically as the last menstrual period identified in

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Received June 5, 2009; revised and accepted August 11, 2009.

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Authors' contribution: A.G. was responsible for the study design, analyses, and final version of the manuscript. M.B. was responsible for data collection as well as preparation of the draft version. S.M., P.D., R.G., S.P., and M.D. were responsible for data collection only.

Financial disclosure/conflicts of interest: None reported.

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