身體組成對泰國婦女冠心病危險因子的影響

Influence of body composition on risk factors for coronary heart disease in Thai women

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Height, body weight, body mass index (BMI), waist-to-hip circumference ratio (W HR), and body fat (BF) were determined in 453 female Ramathibodi Hospital Staff, aged 19–61 years. These mean (±SEM) anthropometric parameters were 1.55 ± 0.002 m, 55.1 ± 0.4 kg, 23.0 ± 0.2 kg/m^2, 0.82 ± 0.003, and 21.2 ± 0.2 kg, respectively. The prevalences of overall obesity (BMI$\geq$25 kg/m^2) and abdominal obesity (W HR>0.8) were 27.0 and 54.1%, respectively. Their serum TC, LDL-C, TG, TC/HDL-C, LDL-C/HDL-C, apo B and FBG increased with overall obesity based on BMI or BF whereas opposite results were observed for serum HDL-C and apo A-I levels. Except serum TC, LDL-C, and apo A-I levels, other biochemical parameters were also influenced by abdominal obesity based on W HR.

Introduction

Several prospective studies have shown that both overall and abdominal obesity relate to cardiovascular disease, either through alterations in one or several of the risk factors or directly[1]. Thus we are interested in assessing the influence of body composition on risk factors of coronary heart disease (CHD) in Thai women.

Materials and methods

The study was conducted in 453 female Ramathibodi Hospital Staff (RHS), aged 19–61 years. Their body composition was measured by body mass index (BMI), waist-to-hip circumference ratio (WHR)^2, and body fat (BF, kg) by near-infrared absorptiometry (Futrex-5000A, Futrex Inc, Gaithersberg, MD, USA).

Venous blood was obtained from each subject after a 12–14 h fast for the determination of serum total cholesterol (TC), HDL-C, and triglyceride (TG) by enzymatic-calorimetric methods (Boehringer Mannheim GmbH Diagnostica, Mannheim, Germany), apoprotein (Apo) A-I and Apo B by immunochemical reaction with specific antibodies (Behringworke AG, Marburg, Germany), fasting blood glucose (FBG) and 2-h postprandial blood glucose (PBG) after

oral consumption of 75 g of glucose dissolved in 250 ml of water, by glucose oxidase reaction. Serum LDL-C was calculated from Friedewald's formula[3].

The statistical analysis was performed with SPSS PC version 4.0.

Results

Table 1 shows that mean BMI, BF and W HR as well as the prevalencess of overall obesity (BMI $\geq$25 kg/m^2) and abdominal obesity (W HR >0.8) in RHS increased significantly with age. Similar findings were also observed for serum TC, LDL-C, TG, apo A-I, apo B, FBG and PBG (Table 2).

Linear regression analysis reveals that there were significantly positive correlations between age and BMI (r=0.306, P<0.00005), BF (r=0.268, P<0.00005), and WHR (r=0.488, P<0.00005).

Table 3 shows correlation coefficients derived from linear and multiple linear regression analysis between age, BMI,

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Table 1. Means±SEM of BMI, body fat and W HR and prevalence of obesity in 453 Thai women by age groups.

Age	BMI	BF	W HR	Prevalence of obesity*	
				Overall†	Abdominal‡
year	kg/m^2	kg		← % →	
19–29	21.3 ± 0.3	18.7 ± 0.4	0.77 ± 0.01	11.4	23.7
30–39	22.8 ± 0.3^a	21.1 ± 0.5^a	0.80 ± 0.01^a	21.4	45.5
40–49	23.6 ± 0.3^{ab}	22.1 ± 0.4^a	0.84 ± 0.01^{ab}	32.9	70.3
50–59	25.5 ± 0.5^{abc}	23.5 ± 0.8^{ab}	0.89 ± 0.01^{abc}	59.0	93.2
Total	23.0 ± 0.2	21.2 ± 0.2	0.82 ± 0.003	27.0	54.1

*P-value <0.0005 by $n2$ test; †BMI $\geq$25.0 kg/m^2; ‡WHR >0.8. Significant difference from a: 19–29 years P<0.02; b: 30–39 years P<0.05; c: 40–49 years P<0.01.

Table 2. Means±SEM of serum lipid and apoprotein, FBG and PBG levels in 453 Thai women by age group.

Age years	TC	LDL-C	HDL-C	TG	Apo A-I	Apo B	FBG	PBG
	← (mmol/l) →				← mg/dl →		← mmol/l →	
19–29	5.1±0.1	3.1±0.1	1.4±0.03	1.1±0.1	146±3	100±2	4.80±0.05	6.31±0.11
30–39	5.1±0.1	3.2±0.1	1.5±0.1	1.1±0.1	145±2	108±2^a	4.90±0.03	6.31±0.08
40–49	5.3±0.1^a	3.3±0.1^a	1.4±0.02	1.3±0.1^a	149±2	117±2^{ab}	5.19±0.06^{ab}	7.07±0.17^{abc}
50–61	5.8±0.2^{abc}	3.5±1.2^a	1.5±0.1	1.6±0.1^{abc}	151±4	131±6^{abc}	5.28±0.22^{ab}	7.56±0.53^{ab}
Total	5.2±0.1	3.2±0.1	1.5±0.1	1.2±0.1	148±1	112±1	5.02±0.03	6.70±0.09

Significant difference from a: 19–29 years P<0.02; b: 30–39 years P<0.05; c: 40–49 years P<0.01.

Table 3. Correlation coefficients between age and body composition parameters with serum lipid, apoprotein, and blood glucose levels in 453 Thai women.

Biochemical parameters	AGE*	BMI*	BF*	WHR*	AGE+BMI+BF+WHR$^+$
TC	0.182^{a2}	0.160^{a3}	0.167^{a2}	0.083	0.228^{a3}
LDL-C	0.113^{a}4	0.145^{a3}	0.158^{a3}	0.045	0.187^{a3}
HDL-C	0.004	-0.218^{a1}	-0.211^{a1}	-0.199^{a1}	0.274^{a1}
TG	0.243^{a1}	0.346^{a1}	0.230^{a1}	0.348^{a2}	0.405^{a1}
TC/HDL-C	0.138^{a3}	0.344^{a1}	0.330^{a1}	0.232^{a2}	0.353^{a1}
LDL-C/HDL-C	0.099^{a4}	0.287^{a1}	0.283^{a1}	0.158^{a3}	0.293^{a1}
Apo A-I	0.066	-0.149^{a1}	-0.139^{a3}	-0.081	0.199^{a3}
Apo B	0.315^{a1}	0.358^{a1}	0.341^{a1}	0.318^{a1}	0.428^{a2}
FBG	0.208^{a1}	0.239^{a1}	0.189^{a2}	0.171^{a3}	0.284^{a1}

*Single linear regression; $^+$Multiple linear regression.
^{a1}P<0.00005, ^{a2}P<0.0005, ^{a3}P<0.005, ^{a4}P<0.05.

BF and W HR with biochemical parameters for the CHD risk.

Discussion

The increases in BMI, BF, WHR and the prevalences of overall and abdominal obesity with age in RHS (Table 1) are consistent with our previous study[2]. Their serum TC, LDL-C, TG, apo B, FBG, and PBG also increased with age (Tables 2 and 3). Our study has shown that overall obesity based on BMI or BF had the effects on increasing serum TC, LDL-C, TG, TC/HDL-C, LDL-C/HDL-C, apo B and FBG levels but decreasing serum HDL-C and apo A-I levels. However, abdominal obesity based on W HR did not influence serum TC, LDL-C, and apo A-I levels. The data also indicate that not only age but also BMI, BF and WHR influence serum lipids, apoproteins and FBG in Thai women evidenced by the higher correlation coefficients derived from multiple linear regression analysis than those derived from single linear regression analysis (Table 3).

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