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## Relationship between BMI and serum and lipoprotein lipids in the Hangzhou region

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**Background** –Many epidemiological and observational studies have consistently confirmed a direct correlation between body weight, mortality and multiple CVD risk factors including dyslipidemia, hypertension and glucose intolerance. BMI measurement is the most commonly used measure of general adiposity.
**Objective** – The aim of the present study was to investigate the relationship between BMI and serum and lipoprotein lipids in a population sample from Hangzhou, China.
**Design** – In this cross-sectional study, 271 (186 male, 56 ± 14 yrs and 85 female, 55 ± 11 yrs) free-living subjects were recruited from Hangzhou, China. BMI and other physiological parameters were measured. Each subject gave fasting blood, from which the serum and lipoprotein lipids were measured by standard methods.
**Outcomes** – BMI was 23.6 ± 2.9 and 22.7 ± 3.0 ($kg/m^2$) for males and females, respectively. Male and female subjects had a serum total cholesterol (TC) 4.7 ± 0.8 and 5.1 ± 0.9 mmol/L, LDL-C 2.2 ± 0.5 and 2.3 ± 0.6 mmol/L, HDL-C 1.2 ± 0.2 and 1.5 ± 0.3 mmol/L, and triacylglycerol (TAG) 1.6 ± 0.9 and 1.3 ± 0.4 mmol/L, respectively. BMI was significantly negatively correlated with HDL-C for both genders and all subjects ($P<0.05$), and it was significantly positively correlated with LDL-C and TAG for males and all subjects ($P<0.05$) (Table).

| | Male + Female (n=271) | | Male (n=186) | | Female (n=85) | |
|---|---|---|---|---|---|---|
| | R | P-value | R | P-value | R | P-value |
| TC | 0.017 | 0.7863 | 0.078 | 0.3236 | 0.002 | 0.9834 |
| LDL-C | 0.137 | 0.0329 | 0.164 | 0.0359 | 0.125 | 0.2647 |
| HDL-C | -0.287 | <0.0001 | -0.262 | 0.0007 | -0.242 | 0.0283 |
| TAG | 0.240 | 0.0002 | 0.225 | 0.0037 | 0.181 | 0.1048 |

**Conclusions** – The present results indicate that general adiposity, expressed as BMI, was significantly correlated with CVD risk factors such as decreased HDL-C, increased LDL-C and TAG in a sample of 271 adults from the Hangzhou population. This data is consistent with the results from Western countries.

## Phytosterols decrease the secretion of atherogenic lipoproteins from HepG2 liver and Caco2 intestinal cells

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**Background -** Several studies in humans have demonstrated the hypocholesterolemic effect of plant sterol consumption. It is unclear whether plant sterols regulate lipoprotein production and secretion from the liver and intestines, thereby decreasing the levels of circulating atherogenic lipoproteins.
**Objective** - To investigate the effect of the three main phytosterols: stigmasterol, campesterol, and β-sitosterol on lipoprotein production in HepG2 human liver cells and Caco2 human intestinal cells and the mechanisms involved.
**Design** - HepG2 and Caco2 cells were incubated for 24 h with 50 $\mu$M of the different phytosterols or 10 $\mu$M of atorvastatin. VLDL [measured by apolipoprotein B100 (apoB100)] levels in HepG2 cells and chylomicron [measured by apolipoprotein B48 (apoB48)] levels in Caco2 cells were measured using western blotting. Intracellular cholesterol levels were measured using gas chromatography. Analysis was carried out using student's t-test and ANOVA.
**Outcomes** - Secretion levels of apoB100 were significantly decreased by approximately 30% after incubation with all plant sterols compared to control. In addition, cholesterol ester concentrations were significantly decreased when HepG2 cells were incubated with stigmasterol, campesterol, and β-sitosterol compared to control cells. Secretion of apoB48 from intestinal cells was significantly decreased by 15% with stigmasterol, 16% with campesterol and 19% β-sitosterol compared to control.
**Conclusions** - Collectively the data suggests that plant sterols limit lipid (cholesterol ester) availability in cells leading to increased degradation of apoB100 in HepG2 liver cells and apoB48 in Caco2 intestinal cells. This results in decreased production of VLDL from the liver and chylomicrons from the intestine, precursors of LDL and chylomicron remnants, respectively. These results suggest that consumption of plant sterols would decrease numbers of the atherogenic lipoproteins LDL and chylomicron remnants, thereby reducing the risk of developing cardiovascular disease.