Dyslipidemia and Its Relation with Body Mass Index Versus Waist Hip Ratio

Pages with reference to book, From 308 To 310

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Abstract

To study the magnitude of dyslipidemia in asymptomatic subjects and its relation to body mass index (BMI) and waist-hip-ratio (WHR), 88 subjects attending the health analysis programme were examined and their age, sex, BMI, WHR, fasting blood glucose and lipids were measured. The distribution of the lipid levels and the frequency of dyslipidemia were noted. Forty-eight percent had a total cholesterol of >200 mg/dl and 30% had an HDL-cholesterol of <40 mg/dl. On comparing the means of total cholesterol to BMI and WHR, it was found that total cholesterol level was statistically significant for WHR above and below 0.9 for males and 0.8 for females, whereas not so for BMI above and below 27 kg/rn2. The prevalence of dyslipidemia in asymptomatic people in this group emphasizes the need for routine health screening for early institution of preventive measures. The correlation with WHR rather than BMI points towards importance of measuring parameters of central obesity rather than body weight and height only (JPMA 47:308, 1997).

Methods

This was a prospective study of 88 consecutive subjects attending the health analysis programme. All the subjects were born in Pakistan or India and had been living in Pakistan for more than 10 years. On their clinic visit their data for age, sex, history of diabetes mellitus and hypertension was noted (the diabetics were not excluded). Their height, weight, waist and hip measurements were made by the registered nurse with standard techniques. The waist measurement was made mid-way between the lowest ribs and the iliac crest with the subject standing and hips at the greater trochanter. The blood pressure was measured in sitting position in the right arm. A blood pressure reading above 160/95 was taken as hypertension. Fasting blood samples were collected for measuring serum glucose, total cholesterol, total triglycerides, LDL-cholesterol and HDL-cholesterol. Seruni cholesterol and serum triglyceride were estimated by Astra System (Beckman). The equipment utilizes enzymatic rate/time end-point methodology using calorimetric principle. Serum HDL-cholesterol was quantified enzymatically by a manual method employing Boehringer Mannheim Kit Cat No. 543004. Sennn LDL-cholesterol was measured by employing manual method, Boehringer Mannheiin Kit Cat No. 726290 which involves calculation of the difference between the total cholesterol and the cholesterol in the supematant after centrifugation.

Results

The study group included 65(74%) males and 23 (26%) females. Their mean age was 41 years.

Table I. Clinical and Biochemical characteristics.

	Male (65)	Female (23)	Total (88)
Age (Years)	41±11	39±11	41±13
Weight (kg)	73.7±7	66.5±12.7	71.8±12.7
Height (cm)	170±7	157±7	166±9
BMI (kg/m^2)	25.7±5	27±6	26±5
Waist-Hip ratio (WHR)	0.91±0.06	0.85±0.09	0.89±0.07
Mean total cholesterol (mg/dl)	198±38	186±47	195±41
Mean total triglycerides (mg/dl)	150±38	98±42	136±90
Mean LDL-cholesterol (mg/dl)	136±35	133±41	135±36
Mean HDL-cholesterol (mg/dl)	38±6	42±8	39±7
Mean FBS (mg/dl)	101±31	95±10	100±28

All values are mean±SD.

Table I presents the clinical and biochemical characteristics of the subjects studied.

Table II. Frequency of abnormalities of lipid profile in screened subjects.

	Male (65)		Female (23)		Total (88)	
	No.	%	No.	%	No.	%
Total cholesterol >240 mg/dl	10	15	3	13	13	15
Total cholesterol >200 mg/dl	32	49	9	39	41	47
Total triglycerides >300 mg/dl	32	49	0	0	32	36
LDL-cholesterol >150 mg/dl	20	31	5	22	25	28
HDL-cholesterol <40 mg/dl	38	58	8	35	46	52

Table II summarizes the data about the prevalence of dyslipidemia among the screened subjects. Forty-eight percent had a total cholesterol of >200 .mg/dl and 50% had HDL-cholesterol of <40 mg/dl. Despite the meanweight of the groupbeing7 1.8±12.7 kg(73 .7±12.3 formales and 66,5±12.7 for females) and the mean BMI of 26.0±5.0 (25.7±5 for males and 27±6.0 for females), about 50% had borderline hypercholesterolemia and about the same percentage had an HDL-cholesteml <40 mg/dI. On comparing the mean of total cholesterol to BMI and WHR as shown in Table III and Table IV,

Table III. Comparison of lipid profile between subjects with BMI above and below 27.

	Body Mass Index		p value
	≤27	>27	
Males (n)	39*	24**	
Mean cholesterol (mg/dl)	193±38	208±36	NS
Mean HDL-cholesterol	38.2±6.7	38±6	NS (0.67)
Females (n)	12	11	
Mean cholesterol	177±32	195±60	NS (0.63)
Mean HDL-cholesterol	42±7	42.7±9	NS (0.85)

*All values are mean±SD

**For 2 subjects, height data was missing so excluded.

Table IV. Comparison of lipid profile with WHR above and below cut-off for each sex.

	Waist-Hip ratio		p value
	≤0.9	>0.9	
Male (n)	20	45	
Mean cholesterol (mg/dl)	184±37	205±37	0.04
Mean HDL-cholesterol (mg/dl)	121±38	142±32	0.03
	≤0.8	≥0.8	
Females (n)	8	15	
Mean cholesterol (mg/dl)	158±34	201±48	0.03
Mean HDL-cholesterol (mg/dl)	106±30	144±41	0.05

All values are mean±SD.

the total cholesterol was statistically significant for WHR above and below 0.9 for males and 0.8 for females. On the contrary the BMI above and below 27 kg/m^2 did not correlate significantly to the mean total cholesterol level.

Discussion

The major metabolic cardiovascular risk factors (high blood pressure, plasma lipids, insulin resistance) all aggregate independently with both body mass index and WHR1 and improve with weight loss[2-4]. The influences of body mass index and waist:hip ratio on metabolic and cardiovascular disease are multiplicative[5,6], so weight loss should be urged for all those with a high body mass index. The significant correlation of waist:hip ratio to serum cholesterol as opposed to BMI in this study, indicates that weight loss should be recommended for those with a low body mass index but high waist:hip ratio. Consensus emerging from prospective studies suggests cut offs of \\VHR 0.9 in men and 0.8 in women

as values above which health risk increases appreciably[7.8]. Metabolic risk factors, particularly serum concentration of triglycerides and high density lipoprotein- cholesterol have been reported to improve most with weight loss in men with a WHR_0.95[9-11] and women with a WHR>0.80[3,4], but they did not correlate significantly with WHR in our study. These results suggest thatthe strategy of defining obesity onthe basis of BMI alone may not be applicable to this population group and the WHR may be more important in assessing the nsk as has been reported in other studies[12,13]. Hence the practice of routine measurement of height and weight should also include measurement of waist and hip circumference. A recent study has shown that habitual aerobic exercise reduced the WHR and also had beneficial effect in reducing the plasma triglycerides and increasing HDL-cholesterol[14]. Although McKeigh[15] has linked the differences in HDL-cholesterol and triglycerides and the high incidence of diabetes in the UK, Asian immigrants to an underlying mechanism of "insulin resistance", the high prevalence of hypercholesterolemia in this study indicates that many of the risk markers applicable to non-Asians are equally valid for Asians as well. The high prevalence of dyslipidemia in the population group emphasizes the need for routine health screening for early institution of preventive measures. The correlation with WHR rather than BMI points towards importance of measuring parameters of central obesity rather than body weight and height only. The preventive strategies therefore, should target the reduction of WHR besides control of hypercholesterolemia.

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