Watch the belly to protect the heart

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The role of obesity as a risk factor in cardiovascular diseases, especially in coronary heart disease, has been controversial for a long time due to inconsistent results. Several methodological reasons account for the discrepancies between studies, particularly those linked to the measurement of body fatness, to the indexes used to define obesity and to the end-points. The term obesity refers to excess body fat. Precise measurement of body fat is complex and not feasible for large epidemiological surveys or clinical trials. Hence, body fat surrogates have been used, such as weight, relative weight and weight for height indexes among which the Quetelet index or body mass index (weight in kilograms/height in metres$^2$) is the most common. However, these types of indicators do not necessarily measure adiposity as they could reflect lean body mass as much as fat mass. Abdominal fat can vary enormously within a very narrow range of body mass index.

Past epidemiological studies used a variety of obesity indexes and their comparability is therefore difficult, although there were both negative and positive studies regardless of the obesity index used. Indeed some\cite{1} found an elevated incidence of acute myocardial infarction in people in the upper compared with the lower ranges of body mass index. But very few\cite{2,3} were able to show that indicators of obesity made an additional contribution to cardiovascular risk, once classical risk factors were taken into account, no matter which obesity indicator was used. In other words, the position of obesity in the causal pathway of coronary heart disease was unclear due to the cluster of metabolic associated disorders.

In the quest for better methods to measure adiposity, fat distribution became crucial. Is it total or regional (gluteofemoral, subcutaneous, abdominal) adiposity that matters? In this issue, Lakka and colleagues\cite{4} contribute to the understanding of this hot subject by presenting new prospective data about the effect of abdominal obesity on 11-year risk of coronary heart disease. The data originates from the Kuopio Ischaemic Heart Disease Risk Factor Study cohort (KIHD), a cohort of 2682 Finnish men aged 42–60 years ongoing since 1984–1989. In this study, two indicators of abdominal obesity were used namely, waist to hip ratio and waist circumference.

Several aspects deserve emphasis. To start with, KIHD is the first European study to report abdominal obesity as an independent risk factor for coronary heart disease. Although original clinical observations were made by Vague\cite{5} as early as in 1956, it was not until the mid-1980s that the epidemiological link was demonstrated by Larsson and colleagues\cite{6} in the Gothenburg study. But in men, the association could not be shown to be independent once smoking, blood pressure and total cholesterol were taken into account, probably due to small numbers. Positive findings were also found in occupational cohorts\cite{7} and more recently, in the ARIC study\cite{8}. Although other studies also reported a significant relationship, they are flawed by selection and measurement biases (use of postal questionnaires, self-reported anthropometric data) and external validity problems\cite{9} (health professionals only). In KIHD, actual anthropometric measurements were performed and coronary events were followed and defined with the rigorousness of the MONICA registers, although the study excluded a considerable number of subjects due to baseline prevalent cardiovascular disease or cancer.

What then is KIHD adding? The atherogenic metabolic profile of abdominal obesity includes fasting hypertrygliceridaemia and hyperinsulinaemia and increased apolipoprotein B\cite{10}. The contribution of KIHD is the demonstration that waist to hip ratio is an independent risk factor for coronary heart disease, because the associated risk goes beyond its effects through insulin resistance, diabetes, lipid profile, blood pressure, fibrinogen and uric acid. These findings are consistent with the premise that adipose tissue is an active endocrine organ able to secrete pro-inflammatory molecules such as interleukin-6 and tumour necrosis factor-$\alpha$\cite{11}.

The second aspect deserving mention is the very high relative risks, nearly threefold, found in this study. Waist to hip ratio was a stronger and more consistent predictor of coronary heart disease than
body mass index or waist circumference alone, the latter showing a less clear linear, but still significant relationship. Finally, another major finding of KIHD was the strong synergism of abdominal obesity with smoking and with physical unfitness in predicting coronary heart disease.

On the basis of the pioneer studies, Björntorp[12] proposed more than 15 years ago, that intervention in abdominal obesity should start at thresholds of waist to hip ratios of 1·0 for men and 0·8 for women. There were subsequent modifications to these cut-off points, and others were based on waist circumference alone[13,14] but they were all based on arbitrary criteria and not on prospective observations of long-term cardiovascular or other metabolic risks. Lakka et al. have now demonstrated that, similar to other biological risk factors, there is a continuum of coronary heart disease risk in men: for each increase of 0·06 in waist to hip ratio or 10 cm increase in waist, coronary heart disease risk rises by 20%. Coronary risk goes up gradually from levels of waist to hip ratio as low as 0·91 or less. This level is lower than those reported in the original studies (waist to hip ratio above 0·93) or in ARIC (waist to hip ratio above 0·96). It would therefore be important to try to replicate these longitudinal results in other populations in the near future, since there are some indications that cardiovascular susceptibility to abdominal obesity differs among ethnic groups[15]. This may in part be due to different correlations of visceral fat with waist circumference. Furthermore, the WHO–MONICA study shows that the sensitivity and specificity of detecting obesity might be population specific[16]. Validation studies with imaging techniques should help in understanding these differences. More recently, waist action levels of 90 cm in men and waist rather than weight management have been recommended to identify high risk obese patients[10]. Waist circumference provides a crude index of the absolute amount of visceral adipose tissue, whereas waist:hip ratio provided an index of the relative accumulation of abdominal fat. In order to monitor patient risk, changes in waist circumference might be more informative. This cut-off is in line with KIHD findings, but preventive trials would be desirable and it remains to be seen whether waist alone or waist to hip ratio will identify coronary heart disease risk better in other populations.

What are the clinical and the public health implications of these results? At the beginning of the 1990s, one in two men aged 35 to 64 had a waist to hip ratio above 0·91[17] in the majority of western populations. If the results of KIHD were applicable to these populations, it would mean that up to half of men of this age in the western world are at a threefold or greater risk of acute coronary events. The magnitude of the problem contrasts with its relative unawareness. While the role of obesity in high blood pressure has generally been widely accepted, the need to control obesity as a means to prevent coronary heart disease is hardly recognized. This is illustrated by the findings of the Euroaspire surveys showing that height and weight were not always routinely recorded in hospital medical records[18] and that prevalence of general obesity (BMI>30) largely increased from 25% to 33% over 4 years in coronary patients examined 6 months after the acute event[19]. This should not be surprising given the divergent results of past studies on total obesity and taking into account that, except in cases of morbid obesity, overweight has been regarded more as a cosmetic rather than a health issue and hence a problem for women but not for men. The lesson now is that not only height and weight, but also waist and if possible hip circumferences should be assessed. There is clearly a need to better educate nurses and doctors in this field.

Last, but not least, of utmost importance is the fact that obesity, like smoking, is not evenly distributed in society. Not only is obesity heavily linked to socioeconomic disadvantage but also the social gap is increasing[20]. Given the results of this study, anti-smoking intervention and waist management should go hand in hand, even more so considering the increase in body weight that usually follows smoking cessation. Programmes of stress management and behavioural modification directed to the practice of regular physical exercise, and the intake of a balanced diet will be particularly important in this subgroup of the population.

While new research efforts help to obtain a more precise picture worldwide, there already seems to be a strong basis for the active detection of abdominal obesity in clinical settings and for developing nutritional and physical activity policies to help abate the global obesity epidemic and its potential health consequences.

S. SANS
Institute of Health Studies, Barcelona, Spain

References
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