

## Sagittal abdominal diameter: comparison with waist circumference and its prediction of metabolic syndrome

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### Abstract

**Background** For an “in the field” estimate of visceral adiposity, simple, inexpensive, non-invasive and highly repetitive methods are needed. The anthropometric measurement most commonly used as an indicator for visceral fat deposits is waist circumference (W). Nevertheless, there are some doubts with regard to the anatomic landmark points where the evaluation needs to be carried out. Sagittal abdominal diameter (SAD) is another anthropometric measurement that has been proposed for the estimation of visceral fat.

**Objective** The aims of the study are to evaluate intra- and inter-operator variability of the estimation of the SAD compared to W; correlate SAD to other anthropometric parameters and to factors involved in the metabolic syndrome (MS); and identify the values for the estimation of the SAD able to classify different risk levels with respect to the MS.  
**Methods** Ninety-five subjects at the Metabolic and Nutritional Rehabilitation Unit “Villa delle Querce” in Nemi were selected. Anthropometric and biochemical parameters were collected. The presence of a MS was detected. Intra- and inter-operator variability in the measurement of W and SAD and the predictive capacity of SAD in the estimation of the risk for MS were calculated.

**Results** The main results achieved were reduced intra- and inter-operator variability in the measurement of SAD com-

pared to W; confirmation of the correlations between SAD and the anthropometric parameters as indicators of a higher fat mass; and good predictive capacity of SAD towards MS (cut-off points: 22.2 cm for men and 19.5 cm for women).

**Keywords** Nutritional status · Metabolic syndrome · Sagittal abdominal caliper · Waist circumference

### Introduction

Obesity represents a major public health problem of world relevance [1, 2]. Epidemiological studies have reported a correlation between obesity and morbidity–mortality [3–5].

Visceral fat seems to be related to metabolic alterations [5–7]. An evaluation of visceral fat can be obtained by computed tomography, the gold standard for estimation of adipose tissue [5, 8–12]. However, this technique has a few flaws and therefore its large-scale use does not seem advisable.

Actually, simple, inexpensive, non-invasive and highly repetitive methods are needed. Waist circumference (W) is the most utilised anthropometric measurement. The capacity of W to predict cardio-metabolic risk factors was tested through several studies [13–19].

Nevertheless, some doubts persist regarding the anatomic landmark points [20]. In the literature, up to 14 different descriptions of the site where the tape measure needs to be placed have been identified, 4 of which are most commonly used [20]. The midpoint between the costal arch and the iliac crest provides an estimate better correlated to the amount of visceral fat and to metabolic parameters [20, 21]. Furthermore, W shows a high inter- and intra-operator variability mostly among obese or eld-

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