

Neck Circumference as a Simple Tool for Assessing Central Obesity in Patients with Type 2 Diabetes Mellitus in Greece – A Descriptive Study

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To the Editor

Neck circumference (NC) is a marker of upper-body subcutaneous adipose tissue, and may represent additional metabolic risk factors independent of central adiposity [1]. It has so far been associated with type 2 diabetes mellitus (T2DM), insulin resistance, and the metabolic syndrome (MS) [1]. However, epidemiological studies on the clinical significance of NC in subjects with T2DM are lacking. Therefore, the aim of the present study was to determine whether NC alone can be used for easy determination of overweight and central obesity in patients with T2DM.

We included 100 subjects (57 men) with age (mean ± SD) 68.8 ± 9.4 years, T2DM duration 11.9 ± 6.2 years, and HbA1c 6.8 ± 0.9%. Waist circumference (WC) was measured at the level midway between the lower rib margin and the iliac crest. NC was measured with head erect and eyes facing forward, horizontally at the upper margin of the laryngeal prominence (Adam's apple). Overweight was defined as body mass index (BMI) ≥ 25 kg/m², and central obesity was defined as WC ≥ 102 cm for men and ≥88 cm for women [1]. Statistical analysis (t-test, Pearson's correlation coefficient,

and receiver operating characteristic (ROC) curves) was performed using the Statistical Package for Social Sciences (SPSS) 19.0 software.

Central obesity was found in 79.7% and overweight in 90.5% of patients. Men had wider NC than women (41.8 ± 3.3 vs. 36.9 ± 2.9 cm, p < 0.001). In the entire population, NC was positively correlated with BMI (r = 0.47, p < 0.001) and WC (r = 0.60, p < 0.001). NC was higher in the presence vs. absence of overweight (39.7 ± 3.9 vs. 35.6 ± 3.9 cm, p = 0.02), but not in the presence vs. absence of central obesity (39.7 ± 3.9 vs. 38.2 ± 3.3 cm, p = 0.19). NC > 37 cm was the best cut-off for determining central obesity, with a positive predictive value of 90.1%. NC > 36 cm was the best cut-off for determining overweight, with a positive predictive value of 92.3%.

Abbreviations:

BMI	body mass index
HbA1c	glycated hemoglobin
MS	metabolic syndrome
NC	Neck circumference
ROC	receiver operating characteristic
SPSS	Statistical Package for Social Sciences
T2DM	type 2 diabetes mellitus
WC	waist circumference

This study proves that a positive correlation of NC with BMI and WC exists. There is evidence that upper body subcutaneous fat is responsible for a much larger proportion of systemic free fatty acid release than visceral fat [1], and that NC is a powerful marker of both visceral adipose tissue and insulin resistance [2]. The use of NC as indicator of overweight and adiposity in relation to diabetes is therefore recommended.

While the Framingham Heart Study found that NC was associated with T2DM and WC only, and not with BMI [1], several other studies prove a clear link between NC, WC, and BMI. In Chinese T2DM patients, NC was related to BMI, WC, and metabolic syndrome [3]. A recent study in subjects with severe obesity has reported that NC performed better than WC in the assessment of metabolic health [4]. In a large Brazilian population-based sample, within a wide range of adiposity and glucose tolerance, NC was correlated with both WC and BMI [5].

In addition to these findings, we have also reported NC cut-offs for determining central obesity and overweight. This new observation encourages the wider application of NC as a tool to evaluate obesity features in T2DM.

In conclusion, our results indicate that NC may serve as an alternative approach for determining

overweight and central obesity in T2DM. Since it is simple and easy to perform, NC may be useful as a quick means of assessing these parameters in today's busy diabetes clinics, potentially with the advantage of identifying a risk of insulin resistance in obese patients more effectively than WC.

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