

# **Title: Waist to hip ratio is a better predictor of type 2 diabetes than body mass index in Emiratis: a case-control study**

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## **Background**

The high rates of type 2 diabetes mellitus (T2DM) in the UAE have been primarily attributed to unfavourable changes in several modifiable risk factors, with adiposity being one of the most significant contributors. General obesity and central adiposity have been consistently shown to be associated with increased risk of T2DM in several ethnic populations; however, studies in the Gulf region in general, and in the UAE in particular, are limited.

## **Aim**

Investigate the association of obesity, and central adiposity with T2DM in a cohort of Emiratis subjects.

## **Methods**

Emirati patients, with and without T2DM, visiting Imperial College London Diabetes Centre (ICLDC, Abu Dhabi) were recruited for this study. Recruitment was done randomly in an age and gender stratified manner. All participants were screened using standardized, structured protocols. T2DM was defined according to American Diabetes Association Criteria. Obesity was defined as having a body mass index (BMI)  $\geq 30 \text{ Kg/m}^2$ , and central adiposity was defined as having a waist to hip ratio (WHR)  $\geq 0.9$  in males and  $\geq 0.8$  in females, respectively. We used regression analysis to test the relationship between obesity and central adiposity with T2DM risk among Emiratis. Statistical analyses were performed in SPSS (Version 19.0).

## **Results**

We studied 979 Emiratis (487 males and 492 females), 367 with normoglycaemia, 200 with prediabetes, and 412 with T2DM. There were no significant differences in the mean BMI between participants with normoglycaemia compared to those with prediabetes or T2DM (Table 1). The prevalence of obesity in this cohort was 59%; highest among participants with T2DM (67.7%), followed by those with prediabetes (64%) and normoglycaemia (46.9%). Logistic regression analysis showed a significant association of BMI with risk of T2DM, with every  $1 \text{ Kg/m}^2$  increase in BMI an increase in risk of T2DM by 7% [OR=1.07 (95%CI 1.05-1.09)  $P<0.001$ ]. Prevalence of T2DM increased with increasing BMI, reaching >60% in participants with BMI  $\geq 45 \text{ Kg/m}^2$ . The mean WHR among participants with normoglycaemia was significantly lower compared to those with prediabetes or T2DM (Table 1). The prevalence of central adiposity in this cohort was 82.2%; highest among participants with T2DM (92.6%), followed by those with prediabetes (86.7%) and normoglycaemia (66.5%). Also, logistic regression analysis showed a significant association of WHR with risk of T2DM; an increase of 0.1 in WHR was shown to increase risk of T2DM by 2.3-fold [OR=2.32 (95%CI 1.94-2.78)  $P<0.001$ ]. After adjustment for differences in BMI, the OR for the association of WHR with T2DM remained high at 2.28 (95% CI 1.90-2.74,  $P<0.001$ ).

## **Discussion**

Our data indicate that central adiposity is a more powerful predictor of T2DM predisposition compared to BMI alone. This highlights the importance of WHR measurements in screening for diabetes risk and in medical consultations in general.

**Table 1.** Basic Characteristics of 979 Emiratis (367 with normoglycaemia, 200 with prediabetes, 412 with T2DM)

|                          | All Cohort |      | Normoglycaemia |      | Prediabetes |      |                | T2DM |      |                |
|--------------------------|------------|------|----------------|------|-------------|------|----------------|------|------|----------------|
| Factors                  | Mean       | SD   | Mean           | SD   | Mean        | SD   | P <sub>a</sub> | Mean | SD   | P <sub>b</sub> |
| Age (years)              | 37.4       | 6.4  | 37.3           | 6.6  | 39.4        | 6.6  | 0.685          | 36.4 | 5.8  | 0.19           |
| BMI (Kg/m <sup>2</sup> ) | 31.5       | 6.3  | 29.7           | 5.92 | 31.8        | 5.7  | 0.253          | 33.1 | 6.6  | 0.24           |
| WHR (cm)                 | 0.91       | 0.09 | 0.88           | 0.1  | 0.91        | 0.08 | 0.004          | 0.94 | 0.08 | 0.01           |