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ABSTRACT

Association between Type 2 Diabetes Mellitus and Adiposity Indicators in Adults from Qatar

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Background: Type-2 Diabetes Mellitus (T2DM) is a chronic metabolic disease characterized by high peripheral glucose levels. The global prevalence of T2DM is expected to increase to 7079 individuals per 100,000 by 2030, indicating a significant public health concern . In Qatar, the prevalence of T2DM among adults was approximately 17% in 2019 , highlighting the need for studies regarding the changes in persons with T2DM to improve clinical assessment and management.

The deposition of excess adipose tissue as the underlying mechanism involved in the cardio-metabolic risk is well studied. In contrast, very few studies have examined the nature of fat tissue deposition in individuals with T2DM compared to normoglycemic persons. Anthropometric measurements, including weight, height, BMI, Waist circumference, and waist-to-hip ratio (WHR), are commonly used to estimate adiposity. However, the gold standard for adiposity measurement is Dual Energy X-ray Absorptiometry (DEXA), which provides a quantitative assessment of whole body and regional fat mass, lean mass, and bone mineral density.

Objectives: We aimed to investigate the difference in adiposity measured by DEXA between people with type 2 diabetes and non-diabetic participants. We also aimed to find the most reliable adiposity measure for discriminating people with type 2 diabetes mellitus from those without in clinical settings.



Methods: We conducted a cross-sectional study from the database of Qatar Biobank (QBB), which comprised adult volunteers over 18 with a previous diagnosis of T2DM mellitus in Qatar, defined as FPG \geq 126 mg/dL, 2-hour plasma glucose \geq 200 mg/dL or HbA1C \geq 6.5%. We used t-test and multivariable linear regression models to assess the association between T2DM and the difference in DEXA and BMI adiposity measures. We also evaluated the odds of abnormal waist-hip ratio in participants with T2DM using an adjusted multivariable logistic regression. In addition, We examined the area under the curve for all the adiposity markers that were assessed to find the most reliable marker to discriminate type 2 diabetes mellitus.

Results: We found that among the participants with T2DM, males have less fat in the leg region, while females have less fat in the legs and gynoid regions. Females with type 2 diabetes had a higher average BMI. We also found that the odds of having an abnormal waist-to-hip ratio are 5 folds higher in females with T2DM and 3 folds higher in males with T2DM compared to persons without T2DM in respective genders. Waist hip ratio showed the greatest area under the curve.

Conclusion: We found different patterns of fat deposition in males and females with Type 2 diabetes. Type 2 diabetes mellitus is associated with a high BMI in females only, while the odds of abnormal Waist-hip ratio were higher in individuals with type 2 diabetes of both genders. Waist-hip ratio reliably discriminates against type 2 diabetes cases and has implications for clinical practice.

Keywords: Type 2 diabetes mellitus (T2DM), DEXA, DXA, Waist hip ratio, BMI.