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### Original Article

#### Changes in Body Weight and Fat Distribution; Risk Factors for Abnormal Glucose Homeostasis? Tehran Lipid and Glucose Study

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#### Abstract:

**Background:** Obesity is a known risk factor for type 2 diabetes and its prevalence is increasing. The aim of this study was to examine the association between changes in body weight and body fat distribution and the subsequent risk of pre-diabetes and/or diabetes over a 3-year period among a population of Tehran Citizenry.

**Methods:** A total of 3957 subjects aged 20 years and over, participants of the Tehran Lipid and Glucose Study, were included in this study. Demographic characteristics, plasma glucose in both the fasting state and two hours after 75gr oral glucose were measured at baseline (1998-1999) and after 3 years (2001-2002). Subjects were divided according to their baseline body mass index (BMI), weight changes (loss > 4%, loss or gain < 4%, 4-10% and > 10% weight gain), quintile of changes in waist circumference (WC) and waist to hip ratio (WHR) over the study period. The relative risk of developing pre-diabetes and/or diabetes was measured after adjustment for age, sex and family history of diabetes.


**Results:** After three years of follow-up, 3.7% developed diabetes. Weight gain and baseline BMI were related to risk of developing pre-diabetes or diabetes in subjects with normal plasma glucose. Compared with subjects with stable weight, those who gained weight by 4-10% and >10% had 1.2 (1.01-1.53) and 1.3 (1.04-1.86) times the risk of pre-diabetes or diabetes, respectively after controlling for age, sex, family history of diabetes and BMI. In contrast, participants who lost >4% in weight, the relative risk decreased significantly [RR: 0.4 (0.27-0.65)]. These effects of weight changes were seen mostly in female subjects. Also, according to the baseline BMI, the risk increased in overweight and obese subjects by 1.7 (1.36-2.40) and 2.0 (1.55-2.63) times, respectively. Individuals with pre-diabetes at baseline, only BMI  $\geq 30 \text{ kg/m}^2$  was associated with the increased risk of diabetes [ RR: 2.7 (1.49-4.78) ]. There was no relation between changes in WC or WHR and risk of developing abnormal glucose homeostasis after controlling for BMI and weight gain.

**Conclusion:** Weight gain and BMI were independent risk factors in the development of abnormal glucose homeostasis. The data support public health recommendations to reduce the risk of diabetes by preventing weight gain and encouraging weight loss in overweight and obese People.

#### Keywords:

Body mass index , waist circumference , Waist/Hip ratio , Obesity , Diabetes , Prediabetes

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