Original article:

Effect of Weight Gain and Weight Loss on Risk of Diabetes amongst Over Weight Subjects: A Hospital Based Study

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Abstract:

Background: Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. The present study was conducted to assess the effect of weight loss and gain on risk of diabetes.

Materials & Methods: The present study was conducted on 150 subjects of both genders.

The BMI is defined as the body mass divided by the square of the body height, and is universally expressed in units of kg/m2, resulting from mass in kilograms and height in metres. In all subjects, fasting blood glucose level was estimated.

Results: Out of 150 patients, males were 80 and females were 70. The difference was non- significant (P- 0.1). BMI was underweight in males (5) and females (7), normal in males (10) and females (8), overweight in males (35) and females (30) and obese in males (30) and females (25). The difference was significant (P< 0.05). Out of 12 underweight, 2 had diabetes, out of 18 normal subjects, 4 had diabetes, out of 65 overweight, 40 had diabetes and out of 55 obese, 38 had diabetes, overweight in males (35) and females (30) and obese in males (30) and females (25). The difference was significant (P< 0.05).

Conclusion: Diabetes mellitus was significantly more frequent among obese patients as compared to non obese patients.

Key words: Diabetes mellitus, Obese, Underweight.

INTRODUCTION

Diabetes is a chronic disease that occurs either when the pancreas does not produce enoughinsulin or when the body cannot effectively use the insulin it produces. There are mainlytwo types of diabetes; Type 1 diabetes is immune-mediated and requires daily administration of insulin. The other common type is type 2 diabetes and characterized by insulin resistance or relative insulin deficiency.[1] Type 2 diabetes is the most common form and comprises of 90% of people with diabetes around the world. The prevalence of type 2 diabetes rates continue to increase with increasing number of patients at risk of serious diabetes-related complications. Having type 2 diabetes increase the risk of a myocardial infarction two times and the risk of suffering a stroke two to four times. It is also a leading cause of blindness, limb amputation and kidney failure.[2]

The classic symptoms of untreated diabetes are weight loss, polyuria (increased urination), polydipsia (increased thirst) and polyphagia (increased hunger). Symptoms may develop rapidly (weeks or months) in type 1 DM, while they usually develop much more slowly and may be subtle or absent in type 2 DM.[3] Risk factors include obesity, smoking and hypertension etc.

Several other signs and symptoms can mark the onset of diabetes although they are not specific to the disease. In addition to the known ones above, they include blurry vision, headache, fatigue, slow healing of cuts, and itchy skin. Prolonged high blood glucose can cause glucose absorption in the lens of the eye, which leads to changes in its shape, resulting in vision changes. A number of skin rashes that can occur in diabetes are collectively known as diabetic dermadromes.[4] The present study was conducted to assess the effect of weight loss and gain on risk of diabetes.

MATERIALS & METHODS

We planned the present study in the department of Medicine of Government Hospital, Barmer, Rajasthan, India. The present study was conducted on 150 subjects of both genders. All were informed regarding the study and written consent was obtained. Ethical clearance was obtained before the start of study. General information such as name, age, gender etc. was recorded in case history performa.

The BMI is defined as the body mass divided by the square of the body height, and is universally expressed in units of kg/m2, resulting from mass in kilograms and height in metres. In all subjects, fasting blood glucose level was estimated. Results were tabulated and subjected to statistical analysis using chi- square test. P value less than 0.05 was considered significant.

RESULTS

Table I shows that out of 150 patients, males were 80 and females were 70. The difference was non- significant (P-0.1).Graph I shows that BMI was underweight in males (5) and females (7), normal in males (10) and females (8), overweight in males (35) and females (30) and obese in males (30) and females (25). The difference was significant (P< 0.05).

Table II shows that out of 12 underweight, 2 had diabetes, out of 18 normal subjects, 4 had diabetes, out of 65 overweight, 40 had diabetes and out of 55 obese, 38 had diabetes,overweight in males (35) and females (30) and obese in males (30) and females (25). The difference was significant (P< 0.05).

DISCUSSION

Hypertension, diabetes mellitus, hyperlipidemia, smoking and positive family history are established risk factors for coronary artery disease. The prevalence of these risk factors is more in obese patients with coronary artery disease (CAD) as compared to non-obese patients with coronary artery disease. Body weight and prevalence of obesity and its complications are rising so rapidly in many countries of the world, that WHO has recognized that there is 'Global epidemic of obesity' which is clear from the fact that worldwide more than one billion adults are overweight and at least 30 million are obese. Up to 130 million people throughout the Asia-Pacific region will suffer from obesity by the year 2010.3 BMI (weight in Kg/height^2 in meters) is frequently used as a surrogate measure of fatness in children and adults.[5]

In present study, out of 150 patients, males were 80 and females were 70. Obesity is associated with an increase in circulating inflammatory markers, including C-reactive protein (CRP) and cytokines (i.e., interleukin-6 [IL-6], IL-18, and P-selectin). Adipose tissue itself is a likely source of these excess cytokines, and IL-6, which stimulates the production of CRP by the liver. The increase in inflammatory markers is associated with insulin resistance and is an important predictor of atherosclerotic events.[6]

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We found that out of 12 underweight, 2 had diabetes, out of 18 normal subjects, 4 had diabetes, out of 65 overweight, 40 had diabetes and out of 55 obese, 38 had diabetes, overweight in males (35) and females (30) and obese in males (30) and females (25). This is similar to Patadin et al.[7]

In a study by Warram[8], there were 1091 respondents who were selected after cleaning the data, among them 293 were males and 798 were females. Of the total 15.41% of the males and 12.31% of females were found to have diabetes mellitus. Thus making a total prevalence of 13.14%. Impaired fasting glucose (IFG) was found in 5.14% males and 5.78% females making a total prevalence of 5.61%. Over all (DM & IFG) was found to be 20.55% in males and 18.09% in females. The main risk factors identified were obesity, family history, hypertension and increasing age.

Dunstan et al[9] in their study of 200 patients with diagnosed coronary artery disease were enrolled, 100 were classified as obese and 100 as non-obese. Among these, 139 patients were male and 61 female. A total of 88 were found to be diabetic, 54 of these were obese and 34 non-obese (p=0.004). Resnick H et al determined whether long term weight gain and weight loss are associated with subsequent risk of type 2 diabetes in overweight, non-diabetic adults. Baseline overweight was defined as BMI⩾27.3 for women and BMI⩾27.8 for men. Annual weight change (kg/year) over 10 years was calculated using measured weight at subjects' baseline and first follow up examinations. In the 10 years after measurement of weight change, incident cases of diabetes were ascertained by self report, hospital discharge records, and death certificates. 1929 overweight, non-diabetic adults participated in the study. Incident diabetes was ascertained in 251 subjects. Age adjusted cumulative incidence increased from 9.6% for BMI<29 to 26.2% for BMI⩾37. Annual weight change over 10 years was higher in subjects who become diabetic compared with those who did not for all BMI<35. Relative to overweight people with stable weight, each kg of weight gained annually over 10 years was associated with a 49% increase in risk of developing diabetes in the subsequent 10 years. Each kg of weight lost annually over 10 years was associated with a 33% lower risk of diabetes in the subsequent 10 years. Weight gain was associated with substantially increased risk of diabetes among overweight adults, and even modest weight loss was associated with significantly reduced diabetes risk. Minor weight reductions may have major beneficial effects on subsequent diabetes risk in overweight adults at high risk of developing diabetes.[10]

CONCLUSION

Diabetes mellitus was significantly more frequent among obese patients as compared to non obese patients.

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Table 1: Distribution of patients

Total- 150		
Males	**Females**	**P value**
80	70	0.1

Graph 1: BMI in subjects

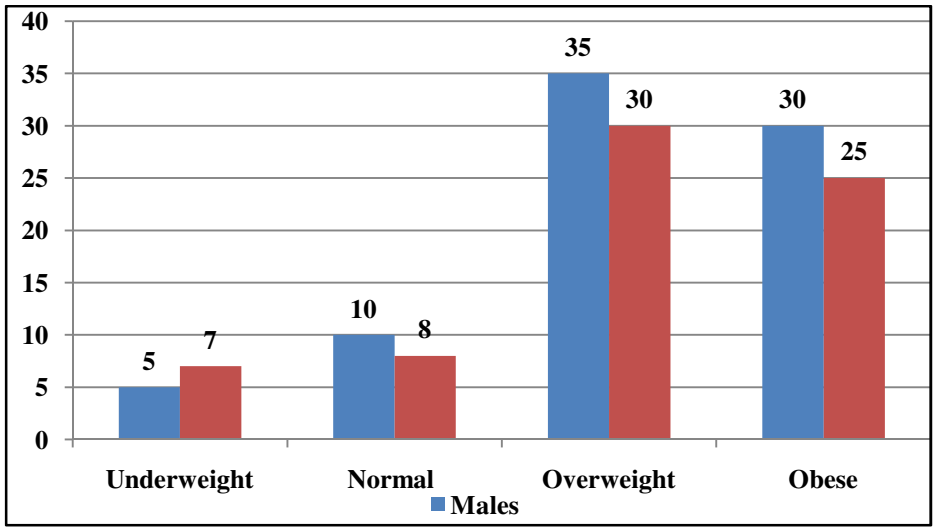

Table 2: Diabetes in subjects

BMI	Diabetes	P value
Underweight (12)	2	0.01
Normal (18)	4	
Overweight (65)	40	
Obese (55)	38	
Total	84	

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