ORIGINAL ARTICLE

Anthropometric Parameters of Central Obesity in Non Diabetic Offspring of Type 2 Diabetics and Non Diabetic Offspring of Non Diabetics

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ABSTRACT

The aim of the study was to compare the anthropometric parameters of central obesity (including waist circumference and waist to hip ratio) between non diabetic offspring of type 2 diabetics and non-diabetic offspring of non-diabetics. It was a comparative study. The study population included eighty male subjects between the ages of 20 to 40 years. They were divided into two groups. Each group included 40 subjects. Group A included non-diabetic offspring of type 2 diabetics and Group B included non-diabetic offspring of non-diabetics. Both groups were age and BMI matched. Waist circumference and waist to hip ratio were significantly higher in non-diabetic children of type 2 diabetics as compared to those of the non-diabetics. Early identification of simple physical parameters of central obesity can be helpful in primary prevention of type 2 diabetes.

Keywords: Type 2 diabetes, obesity, anthropometric parameters

INTRODUCTION

Type 2 diabetes mellitus (T2DM) has become a global health issue. According to WHO, in 2000- 171 million people worldwide, suffered from diabetes and it is approximated that by 2030, the number of diabetics will exceed to 366 million. Pakistan will show an increase from 5.3 million cases in 2000 to 13.9 million cases in 2030[1,2]. Type 2 diabetes mellitus results from interplay of genetic and environmental factors. Individuals with T2DM show insulin resistance and Beta cell dysfunction[3]. Insulin resistance is present several years before the onset of T2DM. First degree relatives of type 2 diabetics usually have insulin resistance even when they are having normal glucose levels and are non-obese exhibiting a strong genetic component in development of insulin resistance. Insulin resistance seems appears to be the strongest risk factor for the development of T2DM in children of susceptible families[4,5].

SUBJECTS AND METHODS

It was a comparative study, carried out in the Physiology department UHS Lahore. Eighty healthy males of 20-40 years were selected fulfilling the inclusion criterion. (No evidence of hypertension, diabetes mellitus, acute or chronic infection). They

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were divided into two groups. Group A; included non-diabetic children of type 2 diabetics (One or both parents suffering from T2DM). Group B; included non-diabetic children of non-diabetics. After sample selection, proper documented consent was obtained. Circumference of waist was measured between the lower end of the costal margins and the highest point of iliac crest at the end of tidal expiration. Circumference of hip was measured at the most wide point of subject's gluteal region. Waist circumference was divided by hip circumference to determine the waist to hip ratio. Height and weight were taken in meters and kilograms respectively in persons wearing usual clothes & bare footed. In order to determine Body mass index (BMI) body weight was divided by the height in meter square. Blood pressure was recorded with a mercury manual non-digital sphygmomanometer on the right arm of the persons in sitting position in a comfortable couch and minimally resting for at least 5-6 minutes[6].

Statistical analysis: The data was composed and finally analyzed by SPSS 17.0 (Statistical Package for Social Sciences). Normal distribution of the compiled data was thoroughly checked &Mean ± SEM (Standard error of mean) were given for normally distributed quantitative variables. An independent sample t test was applied to compare quantitative variables of two groups.

RESULTS

Mean age of the subjects in group A was 30.76±0.65 years and in group B was 29.02±0.70 years. It was found that the difference in the mean ages of two groups was non-significant statistically (p =0.216).

Mean BMI of the subjects in group A was 24.62±0.36 kg/m^2 and in group B was 23.48±0.32kg/m^2. It was concluded that no significant statistical difference was found between the mean BMI of the two studied groups (p = 0.123). Mean waist circumference of group A was 89.41±1.33 cm and of group B was 83.16±1.07 cm. Waist circumference of group A was found markedly higher than that of the group B (p = 0.003).Mean waist to hip ratio in group A was 0.89±0.01 and in group B was 0.83±0.01. Mean waist to the hip ratio was markedly higher in group A as compared to the group B (p = 0.022). Mean systolic blood pressure in group A was 114±1.47 mm of Hg and in group B was 111±1.2 mm of Hg. Mean diastolic blood pressure in group A was 73.0±0.87 mm of Hg and in group B was 68.0± 0.96 mm of Hg. Data difference between systolic blood pressure of the two groups was non-significant statistically (p = 0.211) but mean diastolic blood pressure of group A was found to be higher markedly than that of the group B (p = 0.01).

Comparison of age, anthropometric parameters and blood pressure of groups A and B

Anthropometric parameters	Group A	Group B	p-value
Age (years)	30.76 ± 0.65	29.02 ± 0.70	0.216
BMI (Kg/m^2)	24.62 ± 0.65	23.48 ± 0.32	0.123
Waist circumference (cm)	89.41±1.33	83.16±1.07	0.003*
Waist to the hip ratio	0.89 ± 0.008	0.83 ± 0.011	0.022*
Systolic blood pressure (mm of mercury)	114 ± 1.47	111±1.2	0.211
Diastolic blood pressure (mm of mercury)	73.0 ± 0.87	68.0 ± 0.96	0.01*

Values are expressed as mean ± SEM
 * $p \leq$ 0.05 is considered statistically significant

DISCUSSION

Type 2 diabetes mellitus has strong genetic predisposition. Normoglycemic and having normal BMI children of type 2 diabetics are insulin resistant in comparison with those of the controls. Insulin resistance results in hyperinsulinemia[7,8]. Insulin is an anabolic hormone. It promotes the synthesis and deposition of triglycerides in fat reservoirs. Increased deposition of central fat can further worsen the insulin resistance. Worsening of insulin resistance will result in pre mature onset of T2DM[8,9]. The present study was aimed to compare the waist circumference and waist to hip ratio of non-diabetic children of type 2 diabetics with those of the non-diabetics. Both of these are predictors of central obesity[10,11]. They were significantly higher in non-diabetic children of type 2 diabetics in comparison with those of the controls. Although both groups were BMI matched, still central obesity parameters were on higher side in subjects having strong family risk of type 2 diabetes. In a study previously published revealed that serum insulin levels and insulin resistance of these subjects were significantly higher in comparison with those of the controls[12]. Increased central fat may result from anabolic actions of insulin on fats. In insulin resistant subjects vicious circle sets in. Hyperinsulinemia results in deposition of triglycerides in adipose tissues around abdominal visceras[13,14]. These central adipose tissues are rich in Beta 2 receptors. Due to increased sympathetic activity in these subjects there is excess release of adrenal hormones. These hormones break the triglycerides into fatty acids and fatty acids further worsen the insulin resistance[15-17]. One limitation of the study is that both groups were not having identical diet plans. Although questions regarding dietary habits were asked about fat and other nutrients for the last 6 months but still dietary plans could not be compared strictly.

CONCLUSION

Increased central fat deposition, as predicted by relatively higher waist circumference and waist to hip ratio, in children of type 2 diabetics, whether consequence or cause of insulin resistance must be determined as this may further worsen the insulin resistance in persons already having the risk of T2DM.

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