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RESEARCH ARTICLE

CORRELATION OF THE DURATION OF DIABETES WITH ANTHROPOMETRIC INDICES AMONG DIABETIC PATIENTS IN A TERTIARY CARE HOSPITAL.

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Abstract

Diabetes mellitus is one of the most common diseases in the world and is acquiring epidemic proportions. Its prevalence is growing in both developed and developing countries. Indians are genetically more susceptible to diabetes compared to other races.

Aims: To correlate the duration of diabetes with the waist-hip ratio (WHR) and thigh circumference in Type II Diabetic Mellitus patients.

Methods:A cross-sectional hospital-based case control study was done which included 50 subjects aged above 30 years, with a past history of diabetes mellitus. An equal number of age and sex matched subjects were included in the study as controls. The duration of the disease by history and anthropometric measurements like height, weight, waist circumference, hip circumference, and thigh circumference, were noted using standard procedures.

Results: There was a positive correlation between the duration of diabetes with Waist Hip Ratio and Thigh Circumference.

Conclusion: It is recommended that these parameters can be used on regular basis for early detection and timely intervention to prevent the complications in Diabetics.

Introduction:-

Diabetes mellitus is one of the most common diseases in the world and is acquiring epidemic proportions. Its prevalence is rapidly progressing in both developed and developing countries. India, China and the USA, will be the top countries affected by this epidemic by the year 2025 and also if early screening process is not strengthened in developing countries, almost 50% of the patients may go undiagnosed. The prevalence of diabetes is predicted to double worldwide from 171 million in 2000 to 366 million in 2030 with a maximum growth in India.[1]

Indians are genetically more susceptible to diabetes compared to other races.[2, 3] It is predicted that by 2030 diabetes mellitus may increase up to 79.4 million people. The causative factors for diabetes in India are multifactorial which include genetic factors, environmental influences such as obesity associated with the rising living standards, lifestyle changes, ageing of the population, and steady urban migration.[4]

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Anthropometric parameters are commonly used as research tools to assess the risk factors in the populations as they are inexpensive and easy to monitor at the community level. Various studies have shown that the useful indicators for predicting incidence of Type 2 diabetes in populations are the anthropometric parameters such as BMI, waist circumference (WC), waist hip ratio (WHR).[5]

Aims:-

To study relationship between the duration of Type-2Diabetes Mellitus with the waist-hip ratio (WHR) and Thigh circumference.

Methods:-

A Hospital-based case control study was done during September and October 2016 in ASRAM MEDICAL COLLEGE,ELURU which included 50 subjects aged 30 years and above, with a past history of diabetes mellitus. An equal number of age and sex matched subjects were included in the study as controls. Sample size was calculated using Epi Info Version 7 with a prevalence of Diabetes 16.6% in Hyderabad[6], at a confidence interval of 95%, Power 80% calculated to be 51 cases and 51 controls however data was collected from a pair of 50 cases and controls.

Prior to the study we have taken approval from the Institutional Ethical Clearance Committee and Informed consent from the study population was obtained. The duration of the disease by history and anthropometric measurements like height, weight, Waist Circumference, hip circumference and thigh circumference were recorded. Height was measured in meters using fixed Stadiometer, weight was measured using standard Bathroom weighing machine in Kilograms and various circumferences with a flexible measuring tape in centimeters. Body mass index was calculated using the formula: weight (Kg)/ Height $(m)^2$ and Waist Hip ratio calculated.

The Data was compiled and analyzed in Microsoft Excel 2013 & SPSS Software Version 11respectively. Student's 't' test for Significance was applied. Tabulation, Scattered Plots and Bar Diagrams were used to show the results.

Results:-

In the present study there were 26 male and 24 female subjects in the study group (cases) and 24 male and 26 female subjects in the control group [Fig. 1].The mean age of the subjects in the study group (cases) was 55.36 ±11.6 years and that of the subjects in the control group (controls) was 53.18 ±10.5 years. The mean height of the subjects in the study group was 1.56 ± 0.08 m and that of the subjects in the control group was, 1.56 ± 0.1 m. The mean weight of the subjects in the study group was 65.6 ± 16.5 Kg and that of the subjects in the control group was, 61.4 ± 11.4 Kg. The mean BMI of the subjects in the study group was 26.7 ±5.9 Kg/m2and that of the subjects in the control group was 25.2 ± 5 Kg/m2. The mean Waist Circumference of the subjects in the study group was95.34 ±11.2 cm and that of the subjects in the control group was90.18 ± 9.3 cm. The mean Hip Circumference of the subjects in the study group was 101.3 ± 14.9 and that of the subjects in the control group was97.3 ± 10.5 cm. The mean WHR of the subjects in the study group was 0.95 ±0.09 and that of the subjects in the control group was 0.93 ±0.01. The mean Thigh Circumference of the subjects in the study group was48.34±7.7 and that of the subjects in the control group was 47.54 ± 6 cm [Table1].There was a positive correlation between the duration of diabetes with both Waist Hip Ratio and Thigh Circumference [Fig 2 & 3].

Discussion:-

In the present study we found that mean waist circumference in the diabetic patients was significantly high with a p-value of 0.014 (i.e. <0.05) compared to those who were not diabetic, this was probably because waist circumference strongly correlates with the central obesity and as the amount of adipose tissue increases, the insulin resistance also increases thereby resulting in DM-II.[7, 8]

The values of weight, HC, TC, WHR and BMI were found to be higher in Diabetics when compared to that of the controls; however p-value is > 0.05 so not significant statistically. Whereas there was not much difference in the Height between the groups compared.

BMI varies depending on the height and weight of the person and may not correlate with the content of the adipose tissue in the body[9]and in this study as there is slight difference in Weight among the groups, the BMI is also higher in the cases.

There was an increase in the WHR with the increase in the duration of Diabetes.WHR being an independent predictor of central obesity is associated with the glucose intolerance, alteration in glucose homeostasis, reduced metabolic clearance of insulin and decreased insulin mediated glucose disposal.[10]

The hallmark of insulin resistance syndrome is impaired glucose uptake by skeletal muscle. In obesity, there is stimulation of sympathetic outflow to the kidneys, evident in increased rates of noradrenalin into the renal veins[11] and to skeletal muscle vasculature causing vasoconstriction and hypertensive changes leading to decreased blood flow .In addition, stimulatory action of Leptin released from adipose tissue, or from within the brain, resulting in the impaired glucose uptake into the skeletal muscles[12].Insulin resistance forces β-cells to produce more insulin, which ultimately results in exhaustion of insulin production secondary to deterioration of β-cell functions.

Sympathetic over-activity stimulates Renin-Angiotensin-Aldosterone (RAA) system activity, enhances sodium reabsorption, and increases heart rate, stroke volume and peripheral vascular resistance, thus causing hypertension and increasing cardiovascular risk.[13]

High WHR has been associated with a higher proportion of type II b muscle fibers and a lower capillary density at the thigh, which may be associated with decreased glucose transport as well as reduced insulin sensitivity.[14]

Mostly females have greater hip and thigh circumferences, could reflect increased Gluteal and Femoral subcutaneous fat respectively. These depots have a relatively high lipoprotein lipase activity and a relatively low rate of basal and stimulated lipolysis.[15, 16]

Adipose tissue in the thigh accumulates not only in subcutaneously but also below the Fascia Lata and within the muscle .There is a regional pattern of thigh adipose tissue distribution specifically in intermuscular compartment. There may be impaired muscle blood flow, decreased insulin diffusion capacity, increased local concentration of fattyacids, higher tricylglycerol and increased lipolysis within skeletal muscle. Thus there is a strong relation between increased muscle fat content and insulin resistance.[17]

Conclusion:-

The present study shows that the duration of diabetes mellitus has a positive correlation with the WHR and the thigh circumference probably due to poor physical activity and nutritional habits among the study population who consume more rice as staple food. They also consume higher amount of fat and non-vegetarian diet. Further research is needed to study the underlying mechanism that lead to the positive association of the thigh circumference with diabetes mellitus.

It is recommended that these anthropometric parameter scan be used on regular basis for early detection & timely intervention to prevent the complications in Diabetics.

Limitations of this study:-

Though the results are significant and have clinical relevance in the Indian scenario there are few limitations to this study. The sample size is small and the results would be more conclusive with a larger sample size.

Tables & Figures:

Table 1:- Comparison of various anthropometric measurements of the study subjects.

	Cases (n=50) Mean + SD	**Controls (n=50) Mean + SD**	**t value**	**p value (*= Significant)**
Weight (Kg)	65.6 + 16.5	61.4 + 11.4	1.47	0.14
Height (Meters)	1.56 + 0.08	1.56 + 0.1	-0.33	0.97
BMI (Kg/m Sq.)	26.7 + 5.9	25.2 + 5	1.33	0.185
Waist Circumference (cm)	95.34 + 11.2	90.18 + 9.3	2.51	**0.014***
Hip Circumference (cm)	101.3 + 14.9	97.3 + 10.5	1.57	0.12
Waist Hip Ratio	0.95 + 0.09	0.93 + 0.01	0.82	0.41
Thigh Circumference (cm)	48.34 + 7.7	47.54 + 6	0.58	0.56

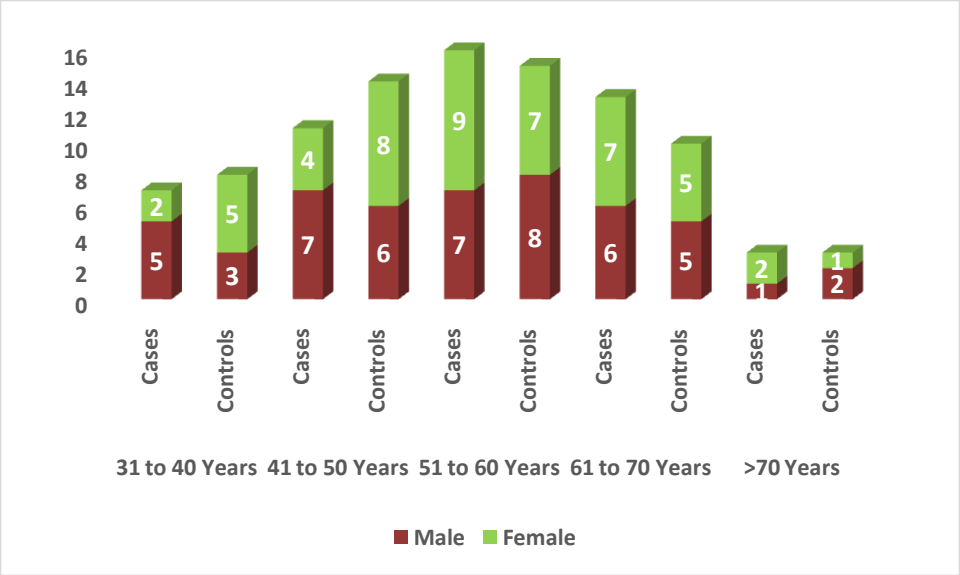

Fig 1:- Age wise distribution of cases and controls.

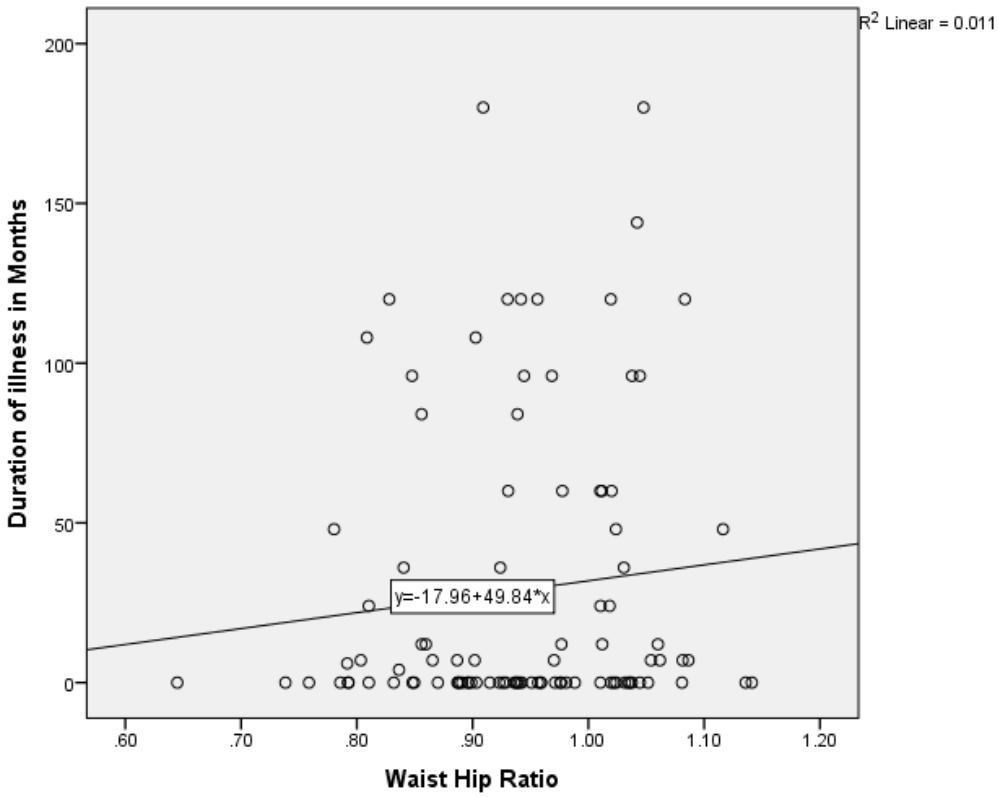

Fig 2:- Correlation between duration of Diabetes and Waist Hip Ratio among the study subjects.

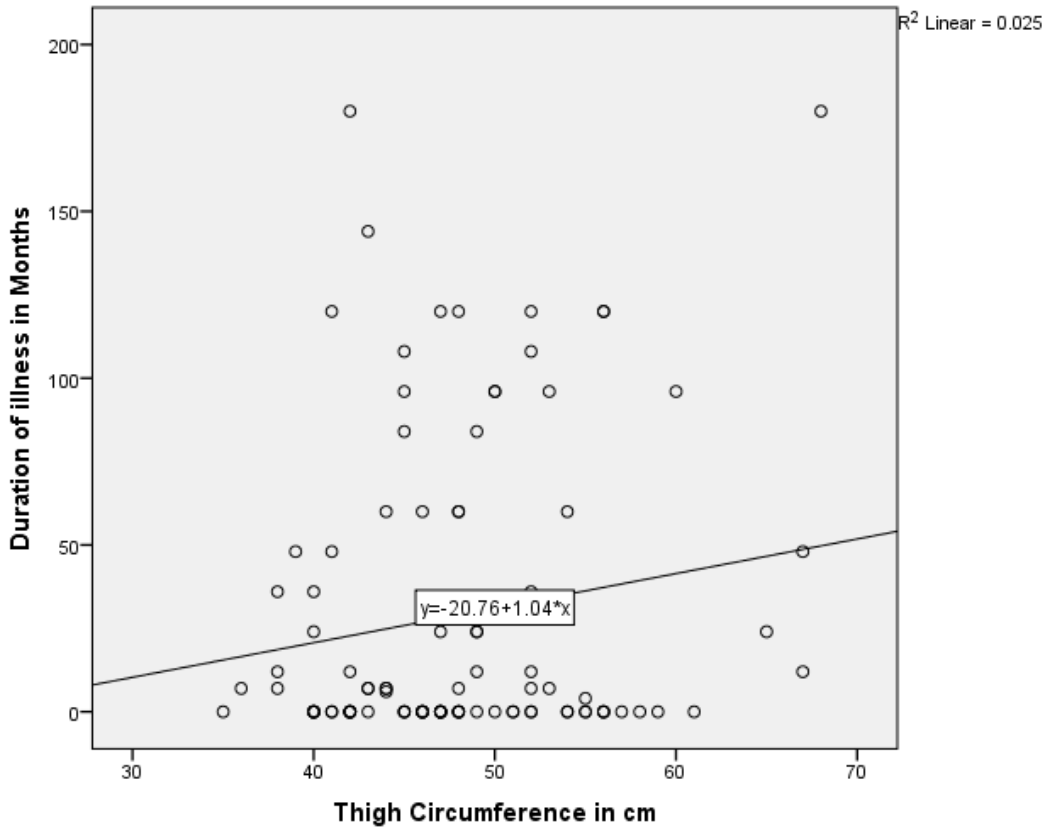

Fig 3:- Correlation between duration of Diabetes & Thigh Circumference among the study subjects.

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