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THE RELATIONSHIP OF ANTHROPOMETRIC INDICES TO TYPE II DIABETES MELLITUS

KEYWORDS: Waist hip ratio, Type-2 diabetes mellitus, Anthropometry.

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ABSTRACT

Background: *With the increasing incidence of type-2 diabetes mellitus, there is an ever increasing need to study to assess the relationship of anthropometric indices to Type II Diabetes Mellitus in the Patients with the history of diabetes mellitus and admitted at tertiary care rural hospital.*

Aim:1)To study the correlation of body mass index with diabetes mellitus in the rural patients. 2)To study the correlation of other anthropometric measurements such as waist hip ratio, skin fold thickness with diabetes mellitus in rural patients.3)To find which anthropometric index is a better predictor of type II diabetes mellitus.

Settings & design: This was hospital based cross-sectional study which was conducted on 50 patients.

Material & Methods: *28 were Males and 22 were females who were already diagnosed with type 2 diabetes, were considered for study. The relevant history regarding the duration of diabetes with its duration was noted down. The anthropometric measurements like height, weight ,skin fold thickness, body mass index, waist hip ratio) were made by using standard procedures.*

Results: *There was a positive correlation between the duration of diabetes and the waist hip ratio and a negative correlation between the duration of diabetes and the thigh circumference.*

Conclusion: *Waist Hip Ratio is the best predictor for diabetes mellitus among all the anthropometric indices & hence proves higher value of waist hip ratio increases the chances of developing obesity and may lead to diabetes in future.*

INTRODUCTION:

Diabetes is a chronic metabolic disease that occurs when the human body is not able to produce enough of the hormone insulin or because cells do not respond to the insulin that is produced. High blood sugar produces symptoms of frequent urination, increased thirst and hunger. According to Diabetes Federation, approximately 285 million people worldwide (6.6%) in the 20-79 year age group have diabetes in 2010 and by 2030, 438 (78%)million people of adult population ,is expected to have diabetes ,unless urgent preventive steps are taken. It is estimated that 20 per cent of the current global diabetic population resides in the South-East Asia Region. The number of diabetic persons in the countries of the Region is likely to triple by the year 2025 [1]

Rapid urbanization and industrialization have produced advancement on the social and economic front in developing countries such as India which have resulted in dramatic lifestyle changes leading to lifestyle related diseases. The transition from a traditional to modern lifestyle, consumption of diets rich in fat and calories combined with a high level of mental stress has compounded the problem further. Recent data has illustrated the impact of socio-economic transition occurring in rural India. The transition has occurred in the last 15 years and the prevalence has risen from 2.4 per cent to 6.4 per cent. [5]

India is experiencing an epidemic of type-2 diabetes and related disorders [1], [2]. Several anthropometric indices have been devised to help the clinicians to predict the cardiovascular risk, including body mass index, waist circumference, hip circumference and the waist-hip ratio [3]. A higher waist-to-hip ratio, which can be due to a higher waist circumference, a lower hip circumference, or both, is associated with higher glucose levels and incident diabetes [4]. Both the waist circumference and the waist-to-hip ratio (WHR) are commonly used indicators of abnormal obesity [5], apart from body mass index

Anthropometric parameters are frequently used by physicians and health workers as a valuable instrument to define nutritional status, and assess the growth and development of children. WHO has recommended classifications of bodyweight that include degrees of underweight and gradations of excess weight or overweight that are associated with increased risk of some non-communicable diseases. [1,2] These classifications are based on body-mass index (BMI), calculated as weight in kilograms divided by height in meters squared (kg/m2). As a measure of relative weight, BMI is easy to obtain. It is an acceptable proxy for thinness and fatness, and has been directly related to health risks and death rates in many populations.

BMI cut-off points are also used clinically to identify high-risk individuals for screening; identify individuals for absolute risk assessment; determine the type and intensity of treatment; monitor individuals for effects of treatment over time; determine institutional policies on individuals, for example, insurance reimbursement; and increase awareness of risk for individuals. Factors to be considered, and a relevant clinical decision-making algorithm, were described by the 1997 WHO Expert Consultation.[5] For clinical applications, the cut-off points should be used with an individual's clinical history and with other clinical measurements, such as waist circumference and presence of other related risk factors. The associations of BMI and co-morbidities are probably not stable within populations over time. In the same way that there are environmentally determined differences in these associations across different population groups, these associations also vary within populations according to environmental changes and nutritional transitions. [7] Variation in socioeconomic status(as assessed by education) is associated with obesity and differ-

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ences in obesity are seen in the same population group by place of origin and migration status. [7] For example, at present in the USA there are low proportions of Asian Americans who are overweight according to the current classifications; this proportion will increase with more USA-born Asian Americans and with longer stays in the USA.[6]

Many studies have been published in which the association between BMI and the percentage of body fat was investigated. 25 Of the 15 data sets initially analyzed to assess the relation between BMI and the percentage of body fat in Asians, six sets were later excluded because the method used for assessment of body composition (bioelectrical impedance or anthropometry) was not deemed sufficiently valid for inclusion in a cross-population comparison of the association between BMI and body fat. As mentioned above, prediction equations for body composition based on anthropometry or bioelectrical impedance are generally not accurate and are population specific. Hence we have done a study to assess the relationship of anthropometric indices to Type II Diabetes Mellitus in the Patients with the history of diabetes mellitus and admitted at tertiary care rural hospital.

OBJECTIVES:

1. To study the correlation of body mass index with diabetes mellitus in the rural patients.

2. To study the correlation of other anthropometric measurements such as waist hip ratio, skin fold thickness with diabetes mellitus in rural patients.

3. To find which anthropometric index is a better predictor of type II diabetes mellitus.

MATERIALS & METHODS:-

Study Settings:- The study was conducted in Jawaharlal Nehru Medical College and Acharya Vinoba Bhave Rural hospital (A.B.R.H.), a tertiary care hospital of Datta Meghe Institute Of Medical Sciences University.

Study Duartion:2 Months (15/12/2015 to 16/02/2016).
Participants and sample size: The participants were the patients admitted at AVBR Hospital. overall 50 patients with the history of Diabetes Mellitus were included in the study.

Study tool: Participants were evaluated according to the pre-designed and pretested protocol questionnaire.

Inclusion criteria: Patients with the history of diabetes mellitus and admitted at A.V.B.R. Hospital.

Exclusion criteria: Patients who leave the study due to any reason and who had not given consent.

study technique: All the participants were examined only once on a single meeting. The participants were examined for various anthropometric parameters like height in cm, weight in kg, skin fold thickness, body mass index, waist hip ratio.

OBSEVATIONS AND RESULTS:-

The study comprised of 50 patients out of which 28 were Males and 22 were females. Maximum number of males i.e.5 (17.86%) lie in the age group of 45-49 and 55-59 yrs each while maximum number of females i.e. 5 (22.68%) lie in the age group of 50-54 yrs. [Table No-1].

Age	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84
Males	**3.57**	**7.14**	**10.71**	**17.86**	**10.71**	**17.86**	**10.71**	**10.71**	**7.14**	**3.57**	**0**
Females	**4.55**	**4.55**	**9.1**	**13.64**	**22.73**	**13.64**	**18.19**	**9.1**	**0**	**0**	**4.55**

Maximum number of males i.e. 8 (28.57%) lie in the height range of 161-165 cm and maximum number of females i.e. 7 (31.82%) lie in the height range of 156-160 and 161-165 cm each. Maximum number of males i.e. 8 (28.57%) belong to the weight range of 65-69 kgs while maximum number of females i.e. 7 (31.82%) belong to the weight range of 60-64 kgs. Among all the male diabetic patients 57.14% had BMI <25, 39.29% were overweight (BMI 25-29.99) and 3.57% were obese (BMI >=30). Among all the female Diabetic patients 72.73% had BMI <25, 22.73% were overweight (BMI 25-29.99) and 4.54% were obese (BMI >=30). Among the male patients 21 (75%) had Waist – Hip ratio equal to or more than 0.9 while 10 (45.45%) female patients had Waist – Hip ratio equal to or more than 0.9. Maximum number of male patients had triceps skin fold thickness between 6 to 12 units where as maximum number of female patients had triceps skin fold thickness between 8 to 12 units. [Table-2]

Characteristics	Sex	
Height	**Males**	**Females**
141-145	*0*	*4.54*
146-150	*0*	*13.64*
151-155	*3.57*	*9.09*
156-160	*17.86*	*31.82*
161-165	*28.57*	*31.82*
166-170	*14.29*	*9.09*
171-175	*25*	*0*
176-180	*10.71*	*0*
Weight	**Males**	**Females**
45-49	*3.57*	*9.1*
50-54	*7.14*	*18.2*
55-59	*10.71*	*18.2*
60-64	*17.87*	*31.75*
65-69	*28.57*	*9.1*
70-74	*14.29*	*4.55*
75-79	*7.14*	*0*
80-84	*10.71*	*4.55*
85-89	*0*	*0*
90-94	*0*	*0*
95-99	*0*	*4.55*
BMI	**Males**	**Females**
< 25	*57.14*	*72.73*
25-29.99	*39.29*	*22.73*
>= 30	*3.57*	*4.54*
Triceps Skin fold Thickness	**Male**	**Females**
5	*3.57*	*4.55*
6	*7.14*	*0*
7	*7.14*	*4.55*
8	*7.14*	*9.09*
9	*25*	*27.2*
10	*28.5*	*9.09*
11	*7.14*	*22.7*
12	*7.14*	*13.6*
13	*3.57*	*0*
14	*3.57*	*0*
15	*0*	*4.55*
16	*0*	*0*
17	*0*	*0*
18	*0*	*4.55*

DISCUSSION:-

A group of 50 patients with the history of diabetes, admitted at Acharya Vinoba. Bahave Rural.Hospital. constituted the study group. The anthropometric parameters measured in the study were height in cm, weight in kg, skin fold thickness, body mass index and waist hip ratio. Out of the total 50 diabetic patients 56% (28) were males while only 44% (22) were females. Among these 28 males 28.57% (8) had weight in the range of 65-69 kg and among 22 females 31.82% [7] had weight in the range of 60-64 kg. This shows a positive relation of the increasing weight and its association in becoming an increasing risk factor to develop diabetes mellitus. Similar study was done by Graham A Colditz, Walter C Willett et al in the year 1995.

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Among all the male diabetic patients 39.29% were overweight i.e. had BMI in the range 25-29.99 and 3.57% were obese i.e. had BMI >30 while among all the female diabetic patients 22.73% were overweight and 4.54% were obese.

The cut off for the waist hip ratio (WHR) for both males and females to define obesity is 0.9. In this study out of 28 males 21(75%) had WHR more than 0.9 while only 10 females had WHR more than 0.9. Thus male patients showed a positive relation of the increasing WHR and its association in becoming an increasing risk factor to develop diabetes mellitus[4].

A study by Graham A Colditz, Walter C Willett et al in the year 1995 showed the relative risk for diabetes mellitus among women who had a weight gain of 5.0 to 7.9 kg was 1.9 (95% CI, 1.5 to 2.3). The corresponding relative risk for women who gained 8.0 to 10.9 kg was 2.7 (CI, 2.1 to 3.3). In contrast, women who lost more than 5.0 kg reduced their risk for diabetes mellitus by 50% or more and this also showed among 28 males 28.57% [8] had weight in the range of 65-69 kg and among 22 females 31.82% [7] had weight in the range of 60-64 kg. This shows a positive relation of the increasing weight and its association in becoming an increasing risk factor to develop diabetes mellitus.

A study by Archana Dambal, Anita Herur, Samata Padaki et al in the year 2011 the mean age of the subjects in the study group (cases) was 52.74 years and that of the subjects in the control group (controls) was 51.93 years. The distribution of the subjects into different age. There were 22 male & 08 were female subjects in study group whereas & 20 male & 10 female subject in the control group. [12]

CONCLUSION :-

Thus WHR is the best predictor for diabetes mellitus among all the anthropometric indices. This proves that a higher value of WHR increases the chances of developing obesity and thus diabetes in future. Similar co-relation was found in the study of Wang Z et al in the year 2007 and also by Schmidt MI et al who concluded that central obesity, as measured by the WHR, is importantly and independently associated with NIDDM. The positive association of height with diabetes is observed in case of male patients while female patients show random distribution of the range of height and their relation to diabetes.

RECOMMENDATION:- The findings of the present study suggest the need of monitoring diabetes status of obese persons. Health care providers, therefore have an important role to play in educating families and children about approaches that are useful in preventing diabetes mellitus. Losing weight and increasing physical activity is of great importance in lowering the risk of developing type II diabetes mellitus.

If a person already have type II diabetes, losing weight and exercising, along with a healthy diet helps to control blood sugar levels, may delay or even prevent complications and also allow to reduce or even eliminate persons need for diabetes medication.

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