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PREVALENCE OF CENTRAL OBESITY AND DYSLIPIDEMIA IN TYPE 2 DIABETICS

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ABSTRACT

Hyperlipidemia is a known complication of uncontrolled diabetes. The combination of Hypertriglyceridemia, low HDL-C and Central Obesity are the hall marks of diabetic dyslipidemia which occurs in 80% of type II diabetics.The present study assessed central obesity and dyslipidemia in Type 2 Diabetics. 100 Type 2 Diabetics Male-48, Female-52 were selected from Sunil's Diabetes Care n' Research Centre, Nagpur. Central obesity, Glycemic and Lipid profile was assessed by standard techniques. Data was compiled and statistically analyzed by students t test of significance.Mean age of males was 52.81±9.18 yrs and females 56.7±11.3yrs.Highly significant difference (p=0.0001) was observed between mean waist circumference of males (98.35±8.80 cms) and females (85.1±12.65 cms).81% of the male and 77% of female subjects were above normal waist circumference standards. Mean WHR in male (0.97±0.04) and females (0.87±0.08) indicated android obesity. Mean FBG of males (134±37.87 mg/dl) and females (139±87) differed insignificantly (p=0.68). Insignificant difference (p=0.86) was also observedin PPBG of males (203.59±77.15mg/dl) and females (199.45±80.57mg/dl). Hypertriglyceridemia was observed in 31% males and 27% females. 23% males and 25% of females had high LDL-C. 48% male and 54% female had low HDL-C. High WC, WHR, Triglycerides, low HDL-C were prominently observed in Type 2 Diabetics.

Keywords: FBG, PPBG, Dyslipidemia, Hypertriglyceridemia

INTRODUCTION

The number of people with Type 2 DM is increasing in every country, with 80% of people with diabetes living in low and middle-income countries. In economic terms, diabetes care uses 463 USD billion of health resources each year. Current and future forecasts indicate that the greatest burden is being laid on Asia and the Indian subcontinent. This is mainly due

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to the higher incidence of obesity and associated lifestyle changes worldwide. **(Marian E,et.al, 2013).**

The lipid profile in the vast majority of adults with increased visceral adiposity, metabolic syndrome and Type 2Diabetes Mellitus is characterized by a moderate elevation in triglyceride levels with low HDL-cholesterol and the presence of small, dense LDL particles**.(Ginsberg 2000).**

Hypertriglyceridemia is a common finding in visceral obesity, metabolic syndrome and diabetes. In these settings, modest elevations in triglycerides are associated with a decrease in HDL levels and increased small, dense LDL particles (**Subramanian S. and A. Chait 2011).**

Dyslipidemia is referred to the elevation of the lipids in the body due to the dietary and lifestyle changes. It can lead to atherosclerosis thus leading to cardiovascular diseases. The overall incidence of dyslipidemia in India as reported in several studies ranges from 10% to 37%, depending on age, area (rural vs. urban), socio-economic stratum (high vs. middle or low), diet and physical activity patterns. (**Misra A.et.al, 2004).**

A cross sectional study by **Joshi S.et.al,**carried out in 3 States and one Union territory of India reports 79% prevalence of at least one lipid abnormality of which prevalence of low HDL-C (72.3%) was highest followed by high Triglyceride(29.5%) and high LDL-C (11.8%) level.

Hypercholesterolemia was reported by**Gupta B.M. 2018**in a lower percentage of subjects viz 8.3 % in males and 7.7% in females, where as Hypertriglyceridemia was found in 31% males and 27% females. High LDL-C was found in 23% males and 25% of females and low HDL-C in 48% of males and 54% of females.

Overweight or obese patients with type 2 diabetes show inadequate glycemic, blood pressure, and lipid control and/or other obesity-related medical conditions are reported(**UKPDS Group.1990).**

Adverse lifestyle changes

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such as nutritional imbalance and stress has put the population at risk for developing Type2 Diabetes, Dyslipidemia, Chronic Heart Disease, Hypertension and Metabolic Syndrome. **(Misra A. et.al,2004)**

Diabetes Mellitus is a chronic lifelong disease with varied acute and chronic complications resulting in increasing disability and reduced life expectancy and an enormous health cost for our society. The present study was therefore taken up to study the prevalence of Central Obesity and Dyslipidemia in Type 2 Diabetics.

METHODOLOGY

The study was designed to assess the prevalence of Central Obesity and Dyslipidemia by selected anthropometric indices and biochemical analysis in 100 Type 2 Diabetic subjects. Male-48, Female-52 selected by purposive sampling from Sunil's Diabetes Care n' Research Centre, Nagpur. Central Obesity was assessed by measuring the Waist Circumference(WC), Hip Circumference and calculating the Waist Hip Ratio(WHR).

Waist Hip Ratio =

$$\frac{\text{Waist circumference (cms)}}{\text{Hip circumference (cms)}}$$

The subjects were evaluated for central obesity by using the following classification given in Table 3.2

Table 2 Waist to Hip Ratio Chart

Waist to Hip Ratio Chart		
Male	**Female**	**Health Risk Based Solely on WHR**
0.95 or below	0.80 or below	Low Risk
0.96 to 1.0	0.81 to 0.85	Moderate Risk
1.0+	0.85+	High Risk

http://www.bmi-calculator.net/waist-to-hip-ratio-calculator/waist-to-hip-ratio-chart.php

Central Obesity was also assessed by comparing the WC measurements of the subjects with threshold for Asians (Men > 90cms, Women >80cms) **(Alberti KG., et.al, IDF 2006).**

Fasting and 2 hrs Post Prandial Capillary Glucose Test was done by One Touch Ultra 2 Glucometer of Life scan (Johnson and Johnson).

Fasting Lipid Profile was done on Micro lab Biochemistry Semi Auto-analyzer, Total Cholesterol was measured by Oxidase Peroxides method by End

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Point Chemistry, Triglycerides was done by GPO-PAP method, End point chemistry , HDL-C was done by Direct HDL-C Cholesterol method.

LDL-C was calculated by the formula = TC - HDL + { TG}
5

The data was complied and tabulated.Comparisons were drawn with the available standards. Student's 't' test of significance, was applied to the data and interpretation were tested at 1% (0.01) and 5% (0.05) level of significance.

RESULTS & DISCUSSION

The present study aimed to explore an optimal anthropometric indicator viz: Waist Circumference and Waist Hip Ratio for assessing Central obesity and Triglycerides and HDL-C levels for predicting dyslipidemia in 100 Type 2 Diabetic subjects. The age of the male subjects varied from 35 to 74yrs with a mean age of 52.81 ± 9.18 yrs and in females it varied from 33 to 75yrs with a mean age of 56.7 ± 11.3yrs.

Although imaging techniques can determine total body fat reliably. Anthropometric measurements remain important in clinical practice. Waist Circumference and Waist Hip Ratio are clinical tools enabling the evaluation of obesity.

The distribution of male and female subjects on the basis of WC is shown in Figures 1 and Figure 2 respectively.

The data presented in Figure 1&2 shows that 81% of the male subjects and 77% of female subjects were above the normal waist circumference thresholds. Overweight and Obesity are increasing problems in many countries related to cardiovascular risk factors

The mean waist and hip measurements of the subjects and the calculated WHR is given in Table1.

The mean waist measurement was 98.35±8.80cms in males and 85.1±12.65cms in females. It was high as compared to the standards for normal healthy weight individuals. WHO

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has suggested the limits of waist circumference to define abdominal obesity for Asians to be >90 cm and >80 cm in males and females, respectively, **(http:/ / www. Obesity asiapacific.com/ default. 2004).**

The mean Hip Circumference was 99.84+7.86mg/dl in males and 97.7+10.2mg/dl in females and differed insignificantly (p=0.2456).

The mean WHR in male subjects is more (0.97±0.04) as compared to females (0.87±0.08). A significant difference (p=0.0001) was observed in the WC, WHR of males and females. WHR >0.9 in men and >0.8 in women is an indicator of android obesity and a pointer towards increased risk of obesity related disease. Overweight and Obesity are increasing problems in many countries related to cardiovascular risk factors.

Table 2 presents data on mean glycemic and lipid profile of male and female subjects.

The mean glycemic control of the subjects was higher than ADA-2018criteria (FBG - 80 –110 mg/dl & 2 hr PPBG– 100 -140 mg/dl.). In males the FBG varied from 81 to 212 mg/dl with a mean of 134± 37.87 mg/dl and in females it showed a wide variation from 79-349 mg/dl with a mean of 138.7±58.37 mg/dl. Similarly PPBG showed variation from 86-466 mg/dl & 84-461 mg/dl in males and in females respectively with a mean of 203.59± 77.15mg/dl in males & 199.45±80.57mg/dl in females. Both FBG and PPBG levels between males and females showed insignificant difference (p=0.6456 and p=0.7939) respectively. The mean blood glucose values in both the group of subjects thus reflect uncontrolled diabetes.

The mean cholesterol was 163.8±42.39mg/dl males and 159± 28.4mg/dl in females and differed insignificantly (p=0.4992). Wide range was observed in triglycerides in males ranging between 65 to 618 mg/dl and 64 to 297 mg/dl in females with a mean of 167±113 mg/dl and

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131.6±58.22mg/dl respectively. A significant difference (p=0.0485) was observed in the Triglycerides levels of males and females. Recent studies have shown that post-prandial handling of TG rich lipoprotein is important for the propensity of endothelial dysfunction and atherosclerosis (**Sajida Rahman et.al**; **2012**).

Hypercholesterolemia is found in a lower percentage of subjects viz 8.3 % in males and 7.7% in females, where as Hypertriglyceridemia was found in 31% males & 27% females. The increased risk of atherosclerosis might be related to the higher postprandial lipemia **(Kumar V. et.al;2009).**

Mean LDL was high in both sexes (males 92.6+_32.4 & females 94.25+_24.17). The difference was insignificant (p=0.7724).Mean HDL-C (40.8± 3.9mg/dl) showed insignificant difference (p= 1.0000) in males & females

Adela Brahimaj et.al; 2016 reportedfrom their studies a high LDL-C in 23% males and 25% of females. Moreover 48% of male & 54% of female had low HDL-C. A low level of HDL cholesterol (HDL-C) is a known risk factor for type 2 diabetes (T2D) that heads the onset of the disease.

The prevalence of dyslipidemia was reported in diabetic population with high serum cholesterol >240 mg/dl in 15%, serum triglycerides >160 mg/dl in 42.41%, raised LDL >130 mg/dl in 45.26%, and low levels of HDL-C <40 mg/dl were seen in 52.27%**(Agrawal R.P.et.al, 2006).**

CONCLUSION

Thus Central Obesity and lipid profile abnormalities are very common in type 2 diabetes and it has great influence on CAD. Hence, suitable preventive and treatment modalities should be implemented.

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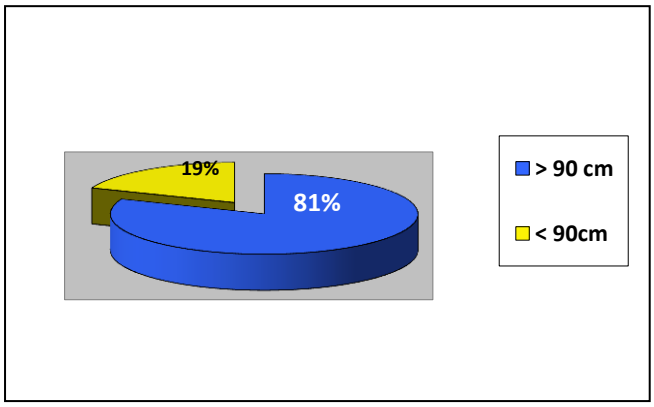

Figure 1.Distribution of male subjects based on WC

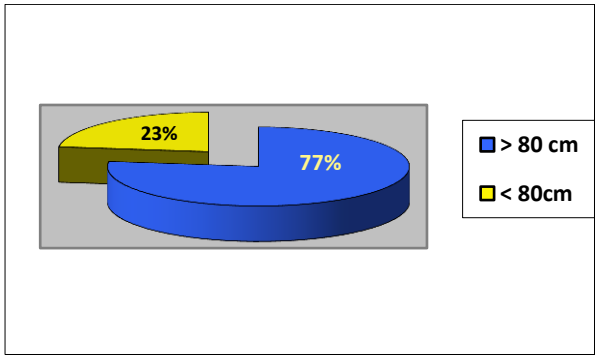

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Figure 2.Distribution of female subjects based on WC

Table 1. Mean Waist, Hip measurements and WHR of subjects

Sr. No.	Variables		Male	Female	P Value
	Total - 100		N-48	N-52	
1	WC (cms)	**Mean**	98.35	85.1	0.0001*
		SD	± 8.80	± 12.65	
		Range	84 -119	72-108	
2	Hip(cms)	**Mean**	99.84	97.7	0.2456
		SD	±7.86	±10.2	
		Range	82-115	72-119	
3	WHR	**Mean**	0.97	0.87	0.0001*
		SD	±0.04	±0.08	
		Range	0.91-1.11	0.73-1.04	

*** Significant**

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Table 2. Mean of Glycemic and Lipid Profile of Subjects

Sr. No.	Variables		Male	Female	P Value
	Total - 100		N-48	N-52	
1	FBG (mg/dl)	**Mean**	134.12	138.7	0.6456
		SD	± 37.87	± 58.37	
		Range	81 - 212	79 – 349	
2	PPBG (mg/dl)	**Mean**	203.59	199.45	0.7939
		SD	± 77.15	± 80.57	
		Range	86 - 466	84 – 461	
3	Cho (mg/dl)	**Mean**	163.86	159	0.4992
		SD	± 42.39	± 28.4	
		Range	145 -380	114 –260	
4	Tg (mg/dl)	**Mean**	167.16	131.64	0.0485*
		SD	± 113	± 58.22	
		Range	65 - 618	64 – 297	
5	LDL (mg/dl)	**Mean**	92.6	94.25	0.7724
		SD	± 32.4	± 24.17	
		Range	23 - 230	68-168.8	
6	HDL (mg/dl)	**Mean**	40.8	40.8	1.0000
		SD	± 3.9	± 8.28	
		Range	33 - 52	32 – 46.8	

***Significant**

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