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An Observational Study to Evaluate Correlation between Different Biochemical and Anthropometric Indicators to Assess Predictability of Diabetes

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Abstract **Original Research Article**

Objective and Aim: Development of diabetes among vulnerable group of population can be measured by some indirect and direct bio chemical and anthropometric indicators through providing a significant clue. The main objective of the study is to evaluate correlation between different biochemical and anthropometric indicators to assess predictability of diabetes in a tertiary clinical set up in Bihar. ***Methods:*** This observational and cross sectional study was mainly conducted at medical out Patient Department (OPD) at Katihar Medical College and hospital situated at Karim Bag, Bihar. Patients were screened and divided in three groups one obese subjects but without diabetes, second was obese subjects but with diabetes and other was control arm, all subjects were clinically examined at OPD and recent biochemical test were done in concerned medical laboratory at hospital. The data was recorded in a predesigned study proforma for further analyses. ***Result:*** It has been found that there was a significant established correlation between BMI and FBS, PPBS, HbA1c, HOMA IR respectively. It had been also observed that there was also a positive significant established correlation between W/H ratio and HOMA IR. ***Conclusion:*** From this observational cross sectional study it had been concluded that as prognostic predictor of diabetes either linked to obesity or not, may be treated by biochemical and anthropometric indicators.

Keywords: Diabetes, Obesity, biochemical and anthropometric indicators.

INTRODUCTION

Obesity is considered as metabolic dearrangement which itself a complex disorder and also involves some degree of over-consumption [1]. In previous days' adipose tissues were considered as a passive storage of visual fat but after intensive study now it was well established that it not only a deposit tissue but also plays an important role in metabolism [2].

India always faces a challenge of under nutrition despite being a highly dense population has been the major public health concern over the past several decades. A very little attention paid to obesity until recently, whereas obesity was considered as one of the biggest challenge in developing countries. As the obesity epidemic spreads, concern about the significant health and economic consequences has also grown. Overweight and obesity result from the interaction of many factors, including genetic, metabolic, behavioral, and environmental influences. The rapidity with which obesity is increasing suggests that behavioral and environmental influences, rather than biological changes, have fueled the epidemic. Increasing energy consumption, decreasing energy expenditure, or a combination of both has led to a positive energy balance and a marked increase in weight in our society.

There is a strong link between obesity and insulin resistance which has been confirmed all across the age level. Weight loss is associated with a decrease in insulin concentration and an increase in insulin sensitivity in adults and adolescents [3]. From 31.7 million in2000 to 79.4 million is the increase in prevalence which is expected in 2030 [4].

Development of diabetes among vulnerable group of population can be measured by some indirect and direct bio chemical and anthropometric indicators through providing a significant clue.

The main objective of the study is to evaluate correlation between different biochemical and anthropometric indicators to assess predictability of diabetes in a tertiary clinical set up in Bihar.

METHODS

This observational and cross sectional study was done on 450 patients and mainly conducted at medical out Patient Department (OPD) at Katihar Medical College and hospital situated at Karim Bag, Bihar. Patients were screened and divided in three group's one obese subject but without diabetes.

Second was obese subjects but with diabetes and other was control arm, all subjects were clinically examined at OPD and recent biochemical test were done in concerned medical laboratory at hospital. The data was recorded in a predesigned study proforma for further analyses. Written patients inform consent was taken before initiation of the trial and approval of local ethical committee obtains before patient requirement.

All anthropometric measurement including BMI was measured during patient's visit at OPD. The patients who were having documented cardiovascular disease, hypertension, insulin treatment, neurological disorder, chronic liver disease, renal abnormalities, carcinoma and immunological disorders were excluded from this study.

All data were analysed using SPSS 11.0 for Windows. The baseline characteristics of the study subjects are presented using descriptive statistics inclusive of mean±SD for continuous variables. ANOVA has been applied to assess the variance and correlation coefficients have been calculated to find out correlation between two quantitative variables. Significance level has been set as $P < 0.05$ with 95 % confidence level.

RESULT

Control group was consisting of maximum male patients whereas majority of females were in in other active arm which includes obesity with (33%) and without diabetes (40%) groups (Table 1). Mean age of control was 61.2± 10.45, whereas patient's groups who had obesity with diabetes mean age was 58.4± 9.82 and for patients group who were obese but not having diabetes mean age was 57.9± 9.95.

Table-1 : Distribution of subjects on the basis of gender

Groups	Age (Mean± SD)	Male		Female	
		Number	%	Number	%
Control (N=150)	61.2± 10.45	120	80%	30	20 %
Obesity with Diabetes (N=150)	58.4± 9.82	100	67%	50	33 %
Obesity without Diabetes (N=150)	57.9± 9.95	90	60%	60	40 %

BMI was comparatively high in obesity with diabetes (32.19±2.51) and obesity without diabetes group (32.11±2.87) as compare to control group (24.06±3.32). (Table 2) Distribution of different biochemical and anthropometric parameters were recorded in table 2.

Table-2 : Distribution of different anthropometric and biochemical parameters among subjects

Parameters	Control (N=150) (Mean± SD)	Obesity with Diabetes (N=150) (Mean± SD)	Obesity without Diabetes (N=150) (Mean± SD)	P value
BMI (Kg/m^2)	24.06±3.32	32.19±2.51	32.11±2.87	<0.005
Waist/hip	0.94±0.04	1.12±0.07	1.01±0.05	<0.005
FBS (mg/dl)	99.91±8.94	188.81±35.93	101.08±10.31	<0.005
PPBS (mg/dl)	111.82±13.32	297.67±55.59	109.94±10.01	<0.005
HbA1c (%)	5.71±0.4	9.23±1.5	5.82±0.5	<0.005
HOMA IR	3.72±1.04	9.83±5.1	4.52±2.1	<0.005

It has been found that there was a significant established correlation between BMI and FBS, PPBS, HbA1c, HOMA IR respectively. (Table 3)

Table-3 : Correlations of anthropometric parameters (BMI) with different biochemical predictor of obesity and diabetes

Anthropometric Parameters		FBS	PPBS	HbA1c	HOMA IR
BMI	Pearson Correlation	0.381	0.379	0.387	0.347
	P value	0.005	0.005	0.005	0.005
	N	450	450	450	450

It had been also observed that there was also a positive significant established correlation between W/H ratio and HOMA IR. (Table 4)

Table-4: Correlations of anthropometric parameters (W/H Ratio) with different biochemical predictor of obesity and diabetes

Anthropometric Parameters		HOMA IR
W/H Ratio	Pearson Correlation	0.131
	P value	0.021
	N	300

DISCUSSION

In this study only analysis of Anthropometric and biochemical parameters was studied and analyzed but there was no intervention with pharmacological aspect. In developing countries, particularly in the Middle East and North Africa, gender disparities in overweight and obesity are exacerbated among women. It has been reported in various clinical trial that obesity and overweight was more common in men than women at this also become an established fact [5, 6, 7]. In our study the above statement was observed Control group was consisting of maximum male patients whereas majority of females were in in other active arm which includes obesity with (33%) and without diabetes (40%) groups.

Globally obesity is become major epidemic risk factor which had greater impact on cardiovascular and metabolic disease which include hypertension, heart failure, myocardial Infraction, diabetes etc. and at the end it has a direct effect on patient's quality of life [8, 9].

In person study it was observed that, mean age of control was 61.2± 10.45, whereas patients groups who had obesity with diabetes mean age was 58.4± 9.82 and for patients group who were obese but not having diabetes mean age was 57.9± 9.95.

Body weight, body mass index (BMI), waist and hip circumferences, waist/hip ratio (WHR), triceps and subscapular skinfolds were all positively predictive of NIDDM independent of age and sex [10]. In our present study it was observed that BMI was comparatively high in obesity with diabetes (32.19±2.51) and obesity without diabetes group (32.11±2.87) as compare to control group (24.06±3.32).

In our study HOMA IR also associated with BMI levels and also positive correlation was found between W/H and HOMA IR. W/H ratio and MBI also a strong predict for diabetes development [11, 12].

CONCLUSION

From this observational cross sectional study, it had been concluded that as prognostic predictor of diabetes either linked to obesity or not, may be treated by biochemical and anthropometric indicators.

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