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Original Research Article

Evaluation and Correlation of Subclinical Inflammation and Fasting Insulin In Young Adults: An Institutional Based Study

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ABSTRACT

Background: A known association exists in literature among C- reactive proteins (CRP) and fasting insulin. This association has been observed in the past in terms of many anthropometric and biochemical parameters. Hence; we planned the present study to assess the correlation between sub- clinical inflammation and fasting insulin in young adults.

Materials & Methods: The present study included assessment of correlation of sub- clinical inflammation and fasting insulin in diabetic patients. ELISA kit was used for the measurement of serum high sensitivity – CRP (hs- CRP) levels. High values of body mass index (BMI), % Body fat (BF), waist circumference (WC), Waist –hip ratio (W- HR) and subscapular skinfold thickness was defined initially before starting of the study. Prior to blood sampling procedure, subjects were instructed for fasting for eight hours. Samples were taken and were sent to the central laboratory within one hour of sample collection in an insulated container. Measurement of fasting blood glucose (FG), total cholesterol (TC) and serum triacylglycerol (TG) was done on the same day. All the results were compiled and recorded and further analysed by SPSS software.

Results: The mean waist to hip circumference ratio was found to be 0.79. Fasting insulin and hs- CRP correlated significantly in terms of BMI, Triceps skinfold thickness (mm) and Subscapular skinfold thickness (mm). Fasting insulin positively correlated with serum triglycerides and total cholesterol levels.

Conclusion: Physical inactivity in some amount does affect the serum CRP levels.

Key words: C- Reactive Proteins, Inflammation, Insulin.

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INTRODUCTION

Irritation assumes a fundamental part in the movement of diabetic microvascular entanglements. Proinflammatory cytokines C-receptive protein (CRP), tumour necrosis factor (TNF) α, and interleukin (IL) 6 all exhibit expanded articulation in diabetes. In interminable hyperglycaemia, cytokines penetrate vascular tissues and restrain capacity and repair.[1-3] Obesity is a noteworthy hazard factor for diabetes and can instigate irritation by Toll-like receptor (TLR) enactment to select proinflammatory cytokines and chemokines. With the onset of diabetes, adipokines, for example, TNF-α and IL-6 may add to insulin resistance.[4,5] Adiponectin is at first upregulated to expand glucose take-up, and nitric oxide (NO) creation; in any case, proceeded with weight may diminish adiponectin prompting confusions seen in sort 2 diabetes. Stoutness is likewise connected with hyperlipidaemia with raised levels of cholesterol and triglycerides which may add to aggravation and diabetic retinopathy (DR).[6-8] The Fenofibrate Intervention and Event Lowering in Diabetes (FIELD) contemplate found no connection between serum lipid levels and DR. Fenofibrate is known to bring down lipid levels, however it can likewise enact peroxisome proliferator-activated receptors (PPARs) and smother irritation by restraining nuclear factor kappa B (NF-κB). As metabolic disorder and aggravation persevere, oxidative anxiety, hypoxia and propelled glycation finished products / receptor meet to intensify the issue.[9-11] Among young adults, the correlation of CRP and insulin resistance has acquired significant importance. Hence; we planned the present study to assess the correlation between sub- clinical inflammation and fasting insulin in young adults.

MATERIAL & METHODS

The present study was conducted in the department of general medicine, KPC Medical College and Hospital, Jadavpur, Kolkata, West Bengal (India) and included assessment of correlation of sub- clinical inflammation and fasting insulin in diabetic patients. All the patients belonged to the age group of 15 years to 26 years. Ethical approval was taken from institutional ethical committee

and written consent was obtained after explaining in detail the entire research protocol. In case of subjects below 18 years of age, informed consent was obtained from their parents/ guardians. A total of 100 subjects were included. In separate batches, fasting insulin assays were performed. Random sampling process was done for choosing subjects for batches. ELISA kit was used for the measurement of HS- CRP levels. High values of BMI, % BF, WC, WHR and subscapular skinfold thickness was defined based on criteria given previously in the literature[12], as shown in Table 1.

Table 1: High values of various parameters

Parameter	High values
BMI	> 23 kg/ m^2
% BF	> 28.5 %
WC	> 79 cm
W- HR	> 0.86
Subscapular skin fold thickness	> 21.9 mm

Prior to blood sampling procedure, subjects were instructed for fasting for eight hours. Samples were taken and were sent to the central laboratory within one hour of sample collection in an insulated container. In the laboratory, centrifugation of the samples was done and samples were stored in individual aliquots at – 700 degree centigrade.

Measurement of fasting blood glucose (FG), total cholesterol (TC) and serum triacylglycerol (TG) was done on the same day following the method given previously in the literature.[12] Highest quartile (> 126.6 pmol/l) value was used for defining Hyperinsulinaemia.[13]

All the results were compiled and recorded and further analysed by SPSS software. Chi – square test and uni-variate regression curve was used for the assessment of level of significance. Transformed values of hs-CRP (log) and fasting insulin (square root) were obtained as the values of hs- CRP and insulin were unevenly distributed. These log values were further used for obtaining Pearsons correlation coefficient (r) with various parameters.

Graph 1: Descriptive mean values of various parameters in all the subjects

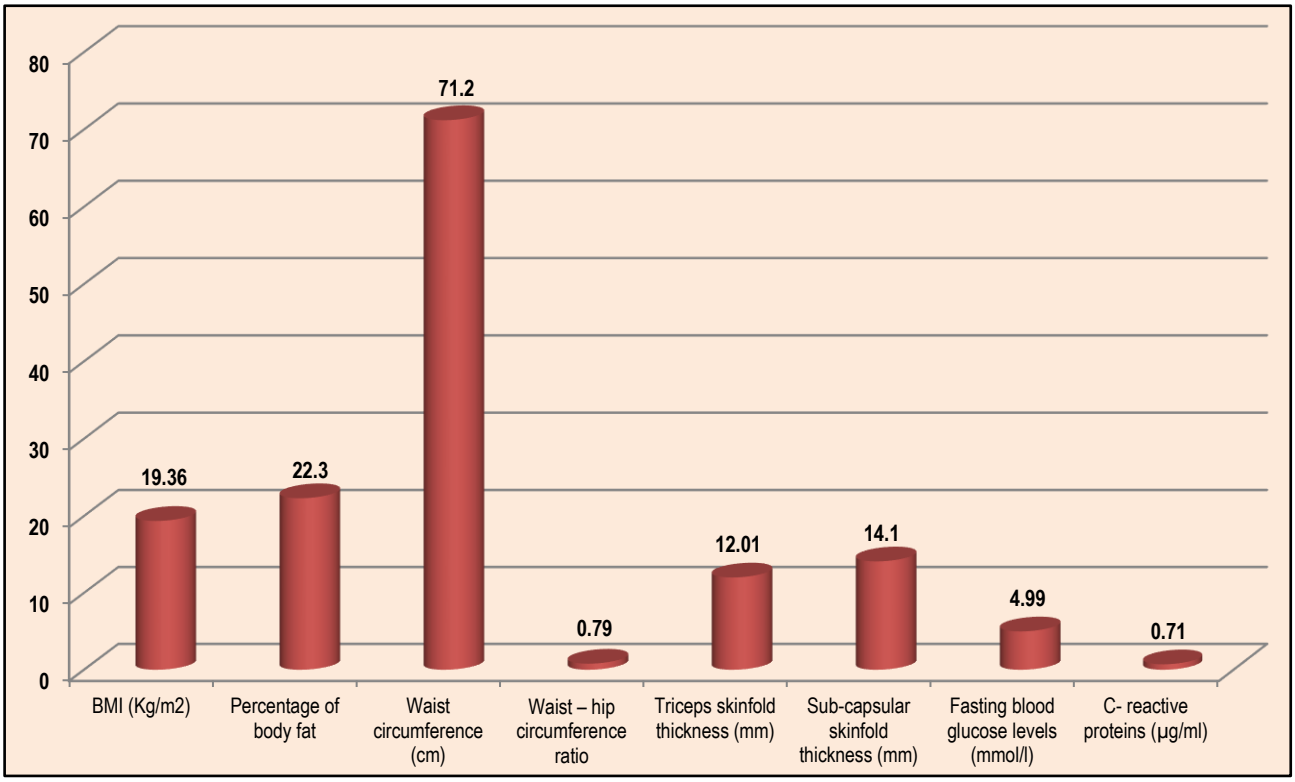

Table 2: Association of fasting insulin and hs- CRP

Parameter	Fasting insulin square root	Log CRP
BMI (Kg/m^2)	0.21*	0.12
Percentage of body fat	0.32*	0.05
Waist circumference (cm)	0.16	0.16
Waist – hip circumference ratio	0.06	0.15
Triceps skinfold thickness (mm)	0.26*	0.10*
Subscapular skinfold thickness (mm)	0.25*	0.18*
Fasting insulin square root	-	0.01
Log CRP	0.01	-
Total cholesterol	0.10*	- 0.01
Serum triglycerides	0.18*	0.06

*: Significant

RESULTS

Graph 1 shows the mean values for various parameters observed in present study. The mean BMI observed in the subjects in the present study was 19.36 Kg/ m^2. Percentage of body fat and waist circumference was found to be 22.3 percent and 71.2 cm respectively. The mean waist to hip circumference ratio was found to be 0.79. Triceps skinfold thickness and Subscapular skinfold thickness was found to be 12.01 and 14.1 mm respectively. Levels of CRP were found to be 0.71 µg/ml. Table 2 shows association of fasting insulin and hs-CRP in relation to various parameters. Fasting insulin and hs- CRP correlated significantly in terms of BMI, Triceps skinfold thickness (mm) and Subscapular skinfold thickness (mm). Fasting insulin positively correlated with serum triglycerides and total cholesterol levels.

DISCUSSION

The rising rates of diabetes, weight, atherogenic dyslipidaemia, and cardiovascular sickness force genuine medical issues overall.[13] Youngsters and youthful grown-ups are particularly helpless against complexities of these scatters and are by and large less occupied with wellbeing advancing and checking programs. In this manner, measures intended for averting and treating heftiness, dyslipidaemia, and hypertension in youngsters, teenagers, and youthful grown-ups with diabetes are crucial.[14] Hence; we planned the present study to assess the correlation between sub- clinical inflammation and fasting insulin in young adults. In the present study, we observed positive correlation of hs- CRP and fasting insulin with physical parameters. Similar results were obtained by Vikram NK et al who contemplated the relationship of serum high-affectability C-reactive protein (hs-CRP) with fasting insulin and insulin resistance in urban immature and youthful grown-up men in north India. In this cross-sectional examination 324 men, 14-25 yr of age were chosen arbitrarily and their clinical and anthropometric profile, rate of muscle to fat ratio ratios (%BF) and biochemical (fasting blood glucose, lipoprotein profile, fasting insulin and hs-CRP) parameters were recorded. Insulin resistance was evaluated by the homeostasis model of assessment (HOMA-IR). Fasting insulin and hs-CRP levels associated altogether with body mass index (BMI), midriff outline, and triceps and subscapular skinfold thickness. Fasting insulin additionally corresponded with % BF, and hs-CRP associated with waist-to-hip circumference ratio (W-HR). No connection was seen between hs-CRP and fasting insulin levels or insulin resistance. In various strategic relapse investigation distinctive free hazard factors for hyperinsulinaemia and hoisted hs-CRP levels were watched; hypercholesterolaemia, overweight and high subscapular skinfold thickness for the previous, and high triceps skinfold thickness for the last mentioned. Absence of relationship between's hs-CRP and surrogate markers of insulin resistance and distinctive hazard factors for each, in youthful Indian guys are remarkable perceptions of their examination.[14]

Misra A et al examined the connections of insulin resistance with summed up and stomach stoutness, and muscle to fat ratio ratios designing in urban postpubertal Asian Indian youngsters. Fasting insulin associated fundamentally with body mass list (BMI), %BF, abdomen outline, focal and fringe skinfold thicknesses and aggregate of four skinfold thicknesses (Sigma 4SF) in both genders, and with systolic pulse and waist-to hip circumference ratio (W-HR) in guys as it were. Steady increment in fasting insulin was noted with expanding estimations of focal skinfold thickness at each percentile of fringe skinfold thickness, WC, and %BF. Focal skinfold thickness corresponded with fasting insulin even in the wake of modifying for WC, W-HR, and % BF. The chances proportions of hyperinsulinemia (fasting insulin focuses in the most elevated quartile) were 4.7 in overweight subjects, 8 with high % BF, 6.4 with high WC, 3.7 with high W-HR, 6.8 with high triceps skinfold thickness, 8 with high subscapular skinfold thickness, and 10.1 with high Sigma 4SF. In step-wise numerous strategic relapse investigation, % BF and Sigma 4SF were free indicators of hyperinsulinemia, like insulin resistance evaluated by HOMA (homeostatic model of appraisal) in the examination. A high predominance of insulin resistance in postpubertal urban Asian Indian youngsters was related with abundance muscle to fat quotients, stomach adiposity, and overabundance truncal subcutaneous fat. Essential aversion systems for coronary illness and diabetes mellitus in Asian Indians should concentrate on the irregular body synthesis profile in youth.[15]

Aburawi EH et al examined sets of inflammatory, endothelial, and adipocyte biomarkers in 79 type I diabetic and 55 type II diabetic patients and 47 controls. Patients with diabetes had larger amounts of cytoadhesive atoms (sICAM-1 and sVCAM-1, $p<0.001$), adiponectin, and haptoglobin. Their heart rate fluctuation appraisal uncovered lower standard deviation of beat-to-pulsate interims and lower add up to control, reflecting self-ruling anxious brokenness. Hemoglobin A1c >8.0% was related with higher adiponectin and corpulence was related with bring down adiponectin; in this way, heftiness damped the impact of hyperglycaemia on adiponectin. Heftiness was related with higher sICAM-1, tumour rot factor-α (TNFα), interleukin-6 (IL-6), and high-affectability C-receptive protein, $p<0.001$. Additionally, high-thickness lipoprotein (HDL) <1.02 mmol/L was related with higher sICAM-1, TNFα, IL-6, and hsCRP and lower adiponectin. Adiponectin corresponded contrarily with the fiery biomarkers in patients with diabetes. Subclinical irritation and endothelial brokenness are regular among youthful patients with diabetes. Poor diabetes control is related with higher adiponectin. Weight and dyslipidaemia are related with bring down adiponectin and higher fiery and endothelial biomarkers. Instinctively, these indicators of cardiovascular sickness are manageable to appropriate glycaemic control, healthful decisions, and normal exercise.[16]

CONCLUSION

From the above results, the authors conclude that physical inactivity in some amount does affect the CRP levels. However, future studies with larger sample size are directed for better results.

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