Original Article

Pathology

The Significance of C-Reactive Protein in Adult Obese and Centrally Obese Group

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ABSTRACT

Objective: To see the significance of C-reactive protein in adult obese and centrally obese groups
Study Design: Descriptive Study
Place and Duration of Study: This study was carried out from free camp for obesity in Clifton area and Punjab Colony, Karachi from November 2010 to April 2011.
Subjects & Methods: Overweight adults (20-40 years) were selected along with the history of Xanthomas, yellow coloration of eyes, and high blood pressure and cardiac arrest.100 samples were taken for lipid profile, and C-reactive protein (CRP). The Body Mass Index (BMI) and waist hip ratio was measured by following the criteria of the National Heart Lung And Blood Institute.
Results: Hundred patients were selected for the purposes of study. These patients were divided into two categories i.e. adult obese and centrally obese. Body mass index (BMI) was increases (M=31.27±1.2, F= 31.3±0.27) in both sexes of adult, whereas waist hip ratio was slightly increases in adult male (1.22 ±0.04) as compared to female (1.14±0.025). In comparison of centrally obese male and female, body mass index was high in females (34.1±0.67) as compared to male (31.68±0.53), but waist hip ratio was elevated in male cases (2.16±0.14) than female (2.16±0.14), when compared with control cases. Whereas C-reactive protein was high in female cases (27.8± 1.20) as compared to male (24.20± 0.86). In case of centrally obese, markedly increased level was observed in female (30.63± 2.57) as compared with male (28.9±2.35).
Conclusion: There is significant effect of inflammatory marker C-reactive protein in both male and female obese and centrally obese adult groups.
Key Words: C -reactive protein, Body mass index, waist hip ratio.

INTRODUCTION

C-reactive protein (CRP) is the major acute-phase protein. It is regulated by the proinflammatory cytokines including interleukin-1 (IL-1), tumor necrosis factor- (TNF), and especially interleukin-6 (IL-6).[1] It is associated with abnormal levels of metabolites, such as lipids, fatty acids and, cytokines from adipose tissue. Adipose tissue from obese individuals contains activated macrophages that together with adipocytes produce various cytokines.[2] These include inflammation-related adipokines such as leptin, adiponectin, tumor necrosis factor alpha (TNF-α), interleukin-1 (IL-1), interleukin-6 (IL-6), procoagulant substances such as PAI-1, vasoactive substances such as leptin, angiotensinogen and endothelin, and molecules that may contribute to insulin resistance such FFA, TNF-α and resistin. IL-1 signaling involves the type I Interleukin 1 receptor (IL-1R/IL-1R1), a Toll-like receptor that heterodimerizes with the IL-1R accessory protein (IL-1RacP). Interleukin 1 receptor antagonist (IL-1Ra) is an anti-inflammatory cytokine that binds to IL-1R in competition with the proinflammatory cytokine IL-1.[3]

Circulating C - reactive protein (CRP) only reflects the extent of nonspecific stimuli such as smoking, vascular injury, necrosis, infectious agents, and atherosclerosis. In Human, fat cells particularly those that form around the abdomen (belly), release the pro-inflammatory cytokine interleukin 6, and interleukin 6 induces low-grade systemic inflammation. It has been proposed that persons with excess body fat are likely to have higher levels of C-Reactive Protein (CRP).[4] High C-reactive protein (CRP) levels is better indicator than total cholesterol, low density lipoprotein predicting risk of a heart attack, as well as of death in the first month after cardiac surgery.[5, 6]

High CRP levels are better indicator than total cholesterol; low density lipoprotein cholesterol in predicting the risk of a heart attack. As individuals become obese and their adipocytes enlarge, the adipose tissue undergoes molecular and cellular alterations that subsequently affect systemic metabolism. First, macrophages accumulate within adipose tissue, leading to local inflammation. Several proinflammatory factors are produced in adipose tissue as obesity increases. When compared to lean individuals, adipose tissue in obese individuals shows higher expression of proinflammatory proteins, including TNF-α and IL-6.[7] Macrophage numbers in adipose tissue also increase with obesity[8] apparently acting as scavengers of apoptotic adipocytes. It also has been reported that there is a marked increase in these scavengers in obese subjects.[9] Macrophage accumulation and the subsequent local inflammation are believed to result in

numerous metabolic dysfunctions that accompany obesity, including systemic inflammation and atherosclerosis. Visceral fat secretes more cytokines than subcutaneous adipose tissue.[10]

SUBJECTS AND METHODS

The present study was carried out by arranging free camps for obesity in Clifton area, Punjab colony for adult (20-40 years), which is the major health problem in our society. For the purpose of socioeconomic status and dietary behavior subjects were categories into Upper class, middle class and lower class. For the upper class we selected area of Clifton, middle class selected area of Punjab colony and the lower class selected area of north Karachi. Dietary behavior was taken by history of their dietary schedule. Subjects were divided into adult obese, centrally obese groups.

- Height and weight were recorded with help of height and weight scale. Standing height and weight measured with subject in length clothing and without shoes. Height recorded to the nearest cm and weight to the nearest 0.1 kg.
- Body mass index (BMI) was calculated by using formula given: BMI = weight in kg / height in m^2. Cut off body mass index was taken as normal subject < 25 kg/ m^2 and obese subject > 25 kg/m^2. Centrally obesity was defined on the basis of waist circumference in cm.
- Waist circumference measured at minimum circumference between the lower border of the ribs and iliac crest on mid axillaries' line. Cut off value for waist circumference was taken > 90 cm in men and > 80 cm in women.

Patients having history of Xanthoma, hypertension and cardiovascular disease (CVD) were included. Patines who have renal dysfunction and diabetes mellitus were excluded from the study. The measurement of BMI, and waist hip ratio and some biochemical parameters and C-reactive protein were included in this study. C-reactive protein was measured by agglutination method. All values expressed as mean±SEM of that mean and all parameters were statically analyzed by SPSS version 10. To evaluate the significance of the difference between the compared means, two–tailed paired student test was done. (P<0.001) was considered significant.

RESULTS

During studies it was observed that adult obese male, showed slightly increased level of body mass index (31.27±1.2) as compared with female obese (31.3±0.27).

Table No.1: Comparative study of body mass index (BMI) and waist hip (W/H) ratio in adult obese and centrally obese

Parameter	Female (20-40 yrs) (n=60)	Male obese (20-40 yrs) (n=60)	Female centrally (20-40 yrs) (n=22)	Male centrally (20-40 yrs) (n=20)	P value
BMI	31.3±0.27	31.27±1.2	34.1±0.67	31.68±0.53	P<0.001
W/H	1.14±0.025	1.22±0.04	1.64±0.17	2.16±0.14	P<0.001

P<0.001 (Highly significant)

Table No.2: Comparative study of C-reactive protein in adult obese and centrally obese

Parameter	Female (20-40 yrs) (n=60)	Male obese (20-40 yrs) (n=60)	Female centrally (20-40 yrs) (n=22)	Male centrally (20-40 yrs) (n=20)	P value
CRP	27.8±1.2	24.20±0.8	30.63±2.7	28.9±2.5	P<0.001

P<0.001 (Highly significant)

Whereas centrally obese adult female (34.1±0.67) showed increased body mass index as compared to male (31.68±0.53). An increase in waist hip ratio was observed in centrally obese female (1.64±0.17) and males (2.16±0.14) as compared to adult male & female obese (1.22±0.04 & 1.14±0.025) [Table 1].

For additional study, we also observed that there is significance effect (p<0.001) of inflammatory marker C-reactive protein in adult obese of the same age group of both sexes of adult obese (female 27.8± 1.20 & male 24.20± 0.86) and centrally obese (female 30.63± 2.57 & male 28.9± 2.35). (Fig 1) In adult we observed that, C-reactive protein was high in female cases, where as low in male obese while CRP was markedly increased in female Centrally obese as compares with male Centrally obese patients, which shows in (Table 2).

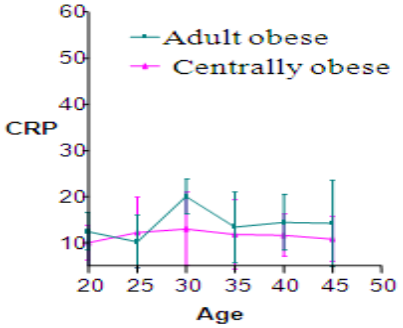

Figure No. 1: Significance of C-reactive protein in adult male obese and centrally obese

DISCUSSION

C-reactive protein is a major acute-phase protein associated with chronic systemic inflammation and has been suggested to predict chronic heart diseases.[11] This inflammatory marker is also strongly associated with the rupture of these lesions, which can lead to dangerous blood vessel clots. Athermanous plaques in diseased arteries typically contain inflammatory cells. Rupture of athermanous plaque is thought to be the mechanism for acute myocardial infarction and acute coronary syndrome.[12] The associations between CRP and the cluster of metabolic features of the insulin resistance syndrome, which is characterized by alterations in plasma glucose–insulin homeostasis and in the lipoprotein-lipid profile in the presence of abdominal obesity, could be explained by the action of cytokines, IL-6 can increase hepatic gluconeogenesis and TG synthesis.[13,14] Moreover, TNF-α, which induces IL-6 synthesis, has been also implicated in the pathogenesis of insulin resistance, and it inhibits lipoprotein lipase activity while stimulating hepatic lipogenesis.[15,16] Thus, our results and observation associated with the features of chronic inflammation, CRP, which would exacerbate chronic heart diseases (CHD) risk.[17]

CONCLUSION

In adult we observed that, C-reactive protein was high in female cases, where as low in male, whereas markedly increased in female centrally obese as compares with male centrally obese patients, It was also observed that there is significant effect of inflammatory marker C-reactive protein in both sexes of adults obese and centrally obese groups.

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