JOURNAL OF TECHNIQUES

Journal homepage: http://journal.mtu.edu.iq

RESEARCH ARTICLE - MEDICAL TECHNIQUES

Studying the Role of C-Reactive Protein in Patients with Sleeve Gastrectomy in Baghdad

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Article Info.

Article history:

Received
09 January 2021

Accepted
05 March 2021

Publishing
31 March 2021

Abstract

Obesity and severe obesity are increasing serious health problems with an epidemic percentage in most countries. In Sleeve gastrectomy, a part of the stomach structure is removed, limiting its capacity by about two to three. A total of thirty blood samples were collected from patients with obesity and the result was compared with healthy person throughout the time from November 2019 to September 2020. Before sleeve gastrectomy and after more than 6 months of sleeve surgery, the sample was collected from the Medical City/Baghdad Teaching Hospital, the withdrawal was again taken at home to have pre and post sleeve gastrectomy, Patient age ranged between [20-46] years for obese patients and healthy control. Then the serum samples were obtained from patients and control group to screen for C-reactive protein by agglutination method. The result of the present study found that the positivity of CRP in pre-operation is higher than that of post-operative with high significance [P<0.005].

Keywords: Overweight; Obesity; C-Reactive Protein; Body mass index; Sleeve gastrectomy.

1. Introduction

Obesity is associated with chronic low-grade inflammation that is described by raising levels of systemic inflammatory markers such as C-reactive protein (CRP), interleukin-6(IL-6), interleukin-18(IL-18) and tumour necrosis factor-α (TNF-α). Obesity is associated with chronic low-grade inflammatory activity, which is charsacterised by elevated inflammatory marker level such as CRP [1]. Interestingly, plasma concentrations of IL-6, IL-18 and TNF-α stayed constant after gastric bypass [2]. Some studies have shown a decrease in the systemic low-grade inflammation following weight loss, Other studies have shown a decrease in low-grade systemic inflammation after weight loss [3]. The decreased BMI ratio is significantly correlated with changes in the plasma C-reactive protein (hs-CRP) [4]. Lipid and cytokine mediators are the primary inflammatory response modulators in arthritis, both of which are known to be involved in the development of joint inflammation, the development of arthritic pannus plays an especially critical role and contributes significantly to the production of pro-inflammatory cytokines and potent chemokines. such as IL-8, responsible for joint inflammation [5].

2. Materials and Methods

Patient's: This study was conducted over the period from December 2019 to September 2020, for this purpose, thirty obese patients with BMI >40 were selected from individuals attending in this period at Baghdad hospital in the Medical City. They ranged in age from 20 - 46 years. All planned investigations have been performed on 30 patients. These were compared with 20 subjects in the control group, for each patient the following tests were carried out:

Sample collection: For blood sampling, 5 ml of blood samples were collected from of each obese patient (BMI >40), as well as from apparently healthy individuals who did not have any disease.

Ethical Consideration: The study was approved by the local ethics committee that was obtained from the Research and Publication Committee of Baghdad`s Hospitals Health Directorate, and by the Hospital authorities at Baghdad Teaching Hospital. Each patient was informed about the objectives of the study by a written information sheet and a signed consent was obtained from them to participate in the study.

Qualitative method: The assay is performed by examining a suspension of coated latex particles with anti-human CRP antibodies against unknown serum. The presence of visible agglutination indicates an increase in CRP levels to a clinically significant level. One drop (40µL) of the latex reagent was added with using the dropper provided to each of the needed circles of the agglutination slide. With using the pipette stirrer provided, a drop of undiluted serum was placed on the circle of a slide for testing. The reagent and serum sample were spread over the whole area of the test circle and the test slide was gently tilled forwards and backwards approximately once every 2 seconds for 2 minutes. The results were interpreted directly after 2 minutes positive or negative result.

Statistical Analysis*:* All of the statistical analyses were done by using Pentium-4 computer through the SPSS program (version-10) and Excel application.

3. Results and Discussion

Thirty samples of obese patients were collected from Baghdad/medical city in Baghdad hospital, the result was compared with 20 apparently healthy individuals as a control.

3.1. Anthropometric Characters of Studies groups

Depending on age groups, the highest age group for patients and control was (30-39 years), and the lowest age group for patients and control were (<20 and ≥40 years) respectively. The differences between groups according to age groups was non-significant (P>0.05). According to sex, the female patient's percentage (53.3%) was more than the male percentage at (46.7%), with a non-significant difference (P>0.05) between groups. The positivity of family history for obesity and previous diseases in patients (83.3%) was more than that of the control group (0%) with a high significant difference between the study groups (P<0.05). In addition, the hypertension is recorded highest percentage (56.7%) among other chronic diseases compared to control with high significant differences between study groups (P<0.05). There are significant differences at (P<0.05) t among study groups. Finally, for previous diseases the result shows the highly significant differences between studies groups at (P<0.05) as shown Table 1.

Table 1. Frequency and percentage of anthropometric characters of studies groups

Characters			Groups		Total	P value
			Patients No*=30	Controls No=20		
Age groups (years)	<20	No	1	0	1	0.67
		%	3.3%	0%	2%	
	20-29	No	11	6	17	
		%	36.7%	30.0%	34%	
	30-39	No	12	12	24	
		%	40%	60%	48%	
	≥40	No	6	2	8	
		%	20%	10%	16%	
Sex	Male	No	14	8	22	0.71
		%	46.7%	40%	44%	
	Female	No	16	12	28	
		%	53.3%	60%	56%	
Family History of Obesity	Positive	No	25	0	25	0.001**
		%	83.3%	0.0%	50%	
	Negative	No	5	20	25	
		%	16.7%	100%	50%	

Chronic Diseases	Hypertension	No	17	0	17	0.004
		%	56.7%	0%	34%	
	Diabetic mellitus	No	1	0	1	
		%	3.3%	0%	2%	
	No	No	12	20	32	
		%	40%	100%	64.0%	
Previous Diseases	Positive	No	25	0	25	0.001**
		%	83.3%	0%	50%	
	Negative	No	5	20	25	
		%	16.7%	100%	50%	

*Number ** highly significant

The results of this study found that the majority of patients were 30-39 years of age, these findings were very consistent with [6] which suggested that the age range (30-39) years defined the common age for obese patients. In 2020[7] recorded that the majority of patients were elderly and this finding differed from our research. The reason for this variance may be due to variations in diet, type of specimens, physical exercise, economic characteristics and social, psychological factors, genetic factors, the health care program in western societies, and likely challenging climate factors, in addition to the stress caused by Iraq's war. All these agents can work together and enhance the development of the disease early. Familial obesity has also been identified as a major risk factor for childhood obesity, perhaps due to the combination of genetic, epigenetic, psychological and cultural factors. Young with two obese parents are at greater risk of obesity than those with one or no obese parent [8].

The findings of our study reported the positivity of obesity among females (53.3%) relative to males (46.7%). In comparison, in 2020, [9] found and varied from the findings of the positive effects of obesity in males (63.1%) to females (36.9%). Sexual variance can be related to the form of samples and other variables such as hormonal effectors.

Our research showed that obesity correlated with chronic diseases such as hypertension (56.7%) and diabetic mellitus (3.3%). Obesity and overweight are significant contributors to a number of chronic diseases, especially among women. Important evidence suggests that patients with obesity are at greater risk of developing a variety of the chronic diseases, which can contribute to more morbidity and mortality, with morbidity having a more pronounced implication [10]. These chronic illnesses include T2DM, CVD and cardiovascular risk factors, respiratory infections such as asthma, musculoskeletal conditions such as lower back pain, osteoporosis, depression and multiple tumors [11].

With regard to the family history of obesity, there was a strong positive family history (FH) in our sample (83.3%) and this is consistent with the findings of [12] which found more extreme obesity in younger children and the association between (FH) with metabolic disorders and cardiovascular and the incidence of obesity. Finally; our result showed that obesity is strongly positively linked to obesity (83.3%) and that these diseases include; strokes and heart attacks, hypertension and diabetes [12].

3.2. Positivity of CRP among study groups

The findings of our study explain the positivity of CRP recorded highest % at preoperation (83.33%) and lowest % at controls post operation (0%) with a high significant difference (P<0.05) among studied groups as shown in the result of Table 2 and Figure1.

Table 2. Positivity of CRP among studied groups

			Groups			
			Pre-operation	Post-operation	Controls	Total
CRP	Positive	No	25	2	0	27
		%	83.33%	6.67%	0%	33.75%
	Negative	No	5	28	20	53
		%	16.67%	93.33%	100.%	66.25%
Total		No	30	30	20	80
		%	100%	100%	100%	100%
P value			0.001			

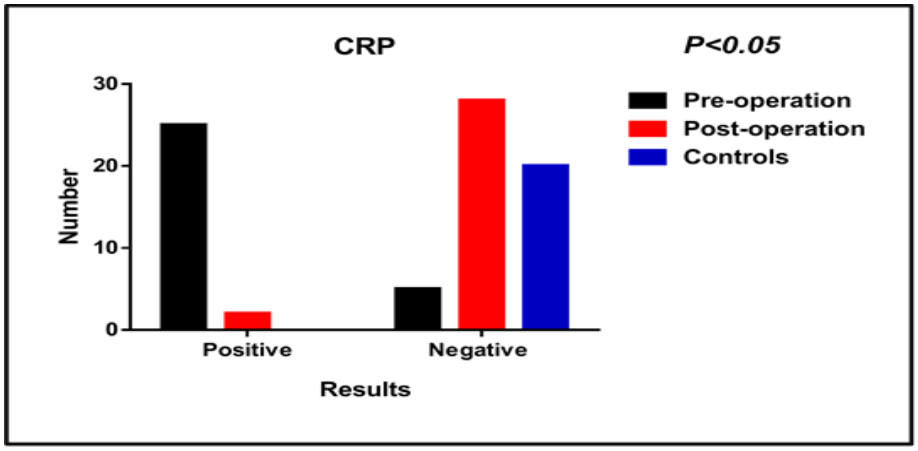

Fig. 1. Positivity of CRP among studies groups

The results of our study revealed that the highest positivity of CRP was at Pre-operation (83.33%) while the lowest positivity was at controls (0%) with a high significant difference (P<0.05). These results were quite compatible with the recent results of [13] who mentioned the highest positivity of CRP in obese patients. Sleep restriction also was associated with CVD since it was thought to increase CRP [14]. Obese patients are characterized by reduced chronic inflammation and also have higher inflammatory markers especially CRP in women [15], but also the other inflammatory markers, such as calprotectin [16], C3 and C4 complement factors and white blood cell counts are increased in obese individuals, all acute-phase proteins were dramatically improved [17]. CRP is used as a medical marker for inflammation, with increased serum levels being a good independent indicator of CVD in asymptomatic patients [18]. CRP has been related to prognosis in patients with atherosclerotic disease, congestive heart failure, atrial fibrillation, myocarditis, aortic valve disease and heart transplantation, indicating that it plays an active role in the pathophysiology of heart disease [19]. CRP is rapidly synthesized by liver cells after activation of IL-6 through inflammation. Maximum CRP levels were observed about 48 hours after the start of inflammatory reaction and sequential CRP tests act as an indicator and predictor for postoperative gastrointestinal infection and even for obesity and metabolic surgery [20]. Serum CRP rises post-operatively in all patients [21]. Obesity measurements are among the strongest correlations of CRP levels and the close association between inflammation and obesity may help to explain the increased burden of cardiovascular disease among obese patients.

3.3. Comparative pre-operation and post-operation CRP parameter with sex and age periods

Depending on pre-operation; the positivity of CRP in males (44%) was less than females (56%) with no significant difference (P>0.05). Based on age groups, the highest positivity of age groups was recorded at (30-39 years) while the lowest positivity recorded at (<20 years) with no significant difference (P>0.05) as the result in Table 4 show. According to post-operation, the positivity of CRP in males and females is equal (50%) with no significant difference (P>0.05). Depending on age groups the highest positivity of age groups was recorded at (20-29 and 30-39 years) while the lowest positivity recorded at (<20 and ≥40 years) with no significant difference (P>0.05).
The findings of our research have shown that there is no significant difference in CRP among males and females (table 3). Our findings were consistent with the results of [22] who showed that postoperative CRP increase did not vary between males and females. Other factors such as age, sex, cigarettes, and sedentary lifestyle, have been closely associated with CRP and systemic cytokine levels [23] among studied groups.

Table 3. Pre-operative and Post-operative CRP of studies groups according to sex and age groups.

Parameters			CRP					
			Pre-operation			Post-operation		
			Positive	Negative	P value	Positive	Negative	P value
Sex	Male	NO	11	3	0.52	1	13	0.92
		%	44%	60%		50%	46.4%	
	Female	NO	14	2		1	15	
		%	56%	40%		50%	53.6%	
Age groups	<20	NO	0	1	0.07	0	1	0.88
		%	0%	20%		0%	3.6%	
	20-29	NO	8	3		1	10	
		%	32%	60%		50%	35.7%	
	30-39	NO	11	1		1	11	
		%	44%	20%		50%	39.3%	
	≥40	NO	6	0		0	6	
		%	24%	0%		0%	21.4%	

In addition, elevated CRP levels can be associated with certain pathological conditions and used as a marker for more serious conditions; e.g. high levels of CRP among myocardial infarction can contribute to left ventricular systolic dysfunction [24]. This is an important concern for clinical practice [25]. It was found that sex differences were observed in the reduction of CRP after 6 months; only women had a statistically significant reduction of the inflammatory process marker CRP. Pertinently, no significant difference was observed when CRP was used as an acute inflammatory indicator. Women usually have higher levels of CRP than men, but the reasons for this finding are unclear [26]. One reason is that there are gender differences in the relationship between CRP and obesity, so that CRP rises to a greater extent with growing adiposity in women than in men [27].

3.4. Correlation pre and post- operation BMI with CRP

Depending on pre-operation BMI, findings of our study show positive correlation between BMI and CRP, the result are shown in Table 4.

Table 4. Correlation relationship between pre and post- operation BMI and CRP parameters by using pearson correlation

Parameters		BMI	
		Pre	Post
CRP	R	-0.200	-0.110
	P	0.288	0.564

r: regression p: person correlation

Rising incidence of reduced systemic inflammation was reported in overweight and obese persons relative to normal-weight persons. Depending on the pre-operation and post-operation BMI, Recent studies have shown an important positive association between BMI, and hs-CRP levels have been higher in overweight and obese people relative to those with average BMI.

4. Conclusion

This study reported that increasing levels of pre-operation BMI and C-Reactive Protein were positivity correlated, while the mean value was poor in post-operation of sleeve gastrectomy.

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