The relationship of Adiponctin / Leptin ratio with metabolic syndrome

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Summary:

Background: Metabolic syndrome is a cluster of risk factors for atherosclerotic cardiovascular disease caused by abdominal obesity, such as hyperglycemia, hypertension, dyslipidemia, and insulin resistance.Adiponectin is a protein hormone that modulates a number of metabolic processes, including glucose regulation and fatty acidcatabolism. Adiponectin is exclusively secreted from adipose tissue into the bloodstream. Leptin, a hormone synthesized by fat tissue had been noted to regulate energy balance and metabolism.In this study investigated the relationships of adiponectin/leptin ratio with metabolic syndrome in apparently healthy Iraqi male adults.

Objective: This study was designed to investigate the relationship of adiponectin/leptin ratio with metabolic syndrome in apparently healthy Iraqi male adults.

Methods: Ninety male subjects were enrolled in study (mean age, 40.97 ± 7.94 years). Serum leptin level and adiponectin level were measured using an enzyme-linked immunosorbent assay. And the presence of metabolic syndrome was assessed.

Results: Mean leptinlevel was significantly higher (7.29 ± 0.38 ng/ml), whileadiponectin andadiponectin/leptinratio was significantly lower(4.78 ± 0.24 µg/ml; 0.74 ± 0.07) respectively in subjects with MS. With increasingnumber of metabolic syndrome components, the mean values of leptinincreased and the adiponectin andadiponectin/leptindecreased.

Conclusion: adiponectin/leptinratio correlated well with the presence and number of metabolic syndrome components in Iraqi male subjects.

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Introduction:

The metabolic syndrome (MS) is one of the leading publichealth issues around the world (1). The prevalence of MSis increasing in parallel with obesity and diabetes worldwide (2). Among the various criteria for the identification of MS, its major components are atherogenic dyslipidemia, insulin resistance, hypertension and abdominal obesity (3).MS is associated with an increased risk of coronaryarterydisease (CAD) and type 2 diabetes mellitus (DM). Itis also known that abdominal obesity and insulin resistanceplay a central role in MS.(4) In recent years, attention has focused on the visceral adiposetissue due to the presence of many adipocytokines synthesized and released from adipocytes(5,6).It is known that visceral adiposetissues functions as a paracrine and an endocrine organand secretes a number of adipocytokines which have eitherproinflammatory,atherogenic or protective effects includingleptin, adiponectin, tumor necrosis factor-α (TNF-α), resistin,interleukin-6, and fatty acid binding protein 4 (7). Twoadipocytokines, leptin and adiponectin, have been recognized as key regulators of various metabolic disorders (8). The ratio of adiponectin and leptin has also been reported to be associated with insulin resistance, which is considered to be one of the pathophysiological conditions underlying MS (9).

Adiponectin is an adipocyte-derived hormone with antiatherogenic,antidiabetic and anti-inflammatory properties. Itattenuates insulin resistance by increasing insulin sensitivity of the liver. In muscle, adiponectin enhances glucose utilizationand fatty acid oxidation. In addition, adiponectin increasesendothelial nitric oxide (NO) secretion and inhibitsmonocyte adhesion and smooth muscle cell proliferation inthe vascular wall (10). Leptin is an anorexogenic hormonewhich is predominantly produced in adipose tissue (11). Inaddition to its effect on neuroendocrine, immune and reproductivesystems, leptin regulates food intake, body weightand energy homeostasis (12). Increased adipositywas shown to be associated with hyperleptinemia whichsubsequently causes endothelial dysfunction, hypertensionand cardiovascular diseases (13). In this study, we investigated the relationships of A/L ratiowith cardiovascular risk factors, and the presenceof metabolic syndrome in apparently healthy Iraqi male adults.

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Materials and Methods:

Ninety apparently healthy, Iraqi middle aged men were recruited for the study during the period from 1st, December, 2010 to 1st, June, 2011.Subjects were classified into five groups:- Control group (n

=20) .First group (n =20) :- (obese). Second group (n =20) :- (obese + (↑ TG or ↓ HDL)) .Third group (n =20):- (obese +↑ TG + ↓ HDL). Fourth group (n =10):- (obese +↑ TG + ↓ HDL + hypertension). Serumleptinand adiponectin levels were measuredusing an enzyme-linked immunosorbent assay.The presence of metabolic syndrome was defined accordingto the American Heart Association/National Heart, Lung, andBlood Institute (AHA/NHLBI) diagnostic criteria (14).

Results:

The mean levels of leptin increased significantly ($P<$ 0.01) while the A/Lratio andadiponectindecreased significantly ($P<$ 0.01,$P<$ 0.01) with an increasing number of MS components. As showed in table (1). The mean levels of leptin in subjects with MS were significantly higher than in those without MS (Table 2). In addition, subjects with MS (n = 30) showed a significantlylower A/L ratio compared with that of subjects without MS (n=60) values being (0.73 vs1.50; p= 0.0001).The mean level of adiponectin was significantlylower in subjects with MS compared with the subjects withoutMS(4.78vs7.05; p = 0.0001) (Table 2).

Table 1: (Mean ± SD) of, Adiponectin, Leptin and A/L ratio of the studied groups.

Variable	Groups					P-value
	Control n=20	G1 n=20	G2 n=20	G3 n=20	G4 n=10	
Adeponectin µg/mL	7.85 ±1.59	7.25 ±0.86	6.04 ±1.35	5.40 ±1.03	3.52 ±0.93	<0.01 **
Leptine ng/mL	3.95 ±0.94	5.33 ±0.79	6.19 ±1.63	7.05 ±2.44	7.78 ±1.01	<0.01 **
A/ L ratio	2.06 ±0.48	1.39 ±0.28	1.05 ±0.41	0.88 ±0.38	0.45 ±0.11	<0.01 **

ANOVA: MS groups vs normal control.
** (P < 0.01), NS: not significant. A/L: adiponectin/leptin ratio.

Table 2: The comparison of mean adipokine levels, A/L ratios according to the presence or absence of metabolic syndrome components.

	Adiponectin µg/mL	Leptin ng/mL	A/L ratio
With MS n=30 (33.33%)	4.78 ± 0.24	7.29 ± 0.38	0.74 ± 0.07
Without MS n=60 (66.67%)	7.05 ± 0.19	5.16 ± 0.19	1.50 ± 0.07
P –value	0.0001**	0.0001**	0.0001**

**highly significant differences (P <0.0001);A/L ratio: adiponectin/leptin ratio; MS: metabolic syndrome.

Discussion:

Metabolic syndrome (MS), a cluster of metabolic disorders such as obesity, hypertension, dyslipidemia, and hyperglyceridemia, increases the risk of developing atherosclerotic diseases such as cardiovascular disease (CVD) (15).In this study, A/L ratio was significantly higher in those with MS compared with that in participants without MS which is in agreement with few studies performed in Asian participants (16). Obesity is characterized by hyperleptinemia andleptin levels decrease considerably during weight loss and are positively associated with body mass index (BMI) (17). Obesity is also characterized by hypoadiponectinemia, because adiponectin is inversely correlated with BMI (18). In MS patients, the levels of serum adiponectin are decreased (19).In a study performed with 2,046 Chinese adults,leptin/adiponectin (L/A) ratio showed a higher odds ratio inpatients with MS and a higher area under the curve in patientswith MS compared with those of adiponectin or leptin alone,suggesting the possibility thatL/A ratio can be a better diagnosticmarker for MS than leptin or adiponectin individually(20). In a study performed on 60 Korean adults with type 2 diabetes,participants with MS showed a lower A/L ratio comparedto those without MS(21).Also *Yutaka, et al., 2010* study disclosed factors associated with the increase in serum leptin and adiponectin, he mentioned that serum levels of leptin may be associated positively with MS, whereas adiponectin levels are associated negatively with MS and CAD, even in patients with various coronary risk factors(22).The present study results are in linewith the previous studies in that the presences of MS lead to decreasedA/L ratio.Interestingly, the A/L ratio was significantly higher in patients with metabolic syndrome compared with its counterpart. A/L ratio decreased as the number of metabolic syndrome components increased (23). So these data support the association of this novel ratio as the prediction marker for MS in Iraqi people.Leptin and adiponectin are individually known to be involved in the pathogenesis of obesity and MS (24, 25). Under such an obesity-related condition, the leptin levels are higher and adiponectin levels are lower, and thus, the A/L can be relatively low (8). This fact seems to explain the results obtained in the present study. These datasuggest that A/L ratio decreased in subjects with MS and graduallydecreased according to the number of MS components,suggesting A/L ratio as the predictive marker for MS in the Iraqi population. Further research is needed on the confirmationof A/L ratio as the marker for insulin resistance indexand MS in various ethnic groups before application to clinicalpractice.

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