

Serum Adiponectin and Leptin Levels in Obese and Non Obese Postmenopausal Women

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ABSTRACT

Background: Increased adiposity in postmenopausal women may be responsible for increased synthesis of leptin and decreased production of adiponectin.

Aim: To find out the levels of serum adiponectin and leptin levels as well as their correlation in obese and non obese postmenopausal women.

Study design: Cross sectional study

Methods: Study included 46 postmenopausal women with age > 50 years. Women were grouped as group A (Non obese), group B (obese). Women were chosen from Outdoor department of Lahore General Hospital Lahore. Level of serum leptin and adiponectin was estimated by the technique of ELISA. Women with BMI < 25 kg/m² were taken as non obese and with BMI >25 kg/m² were considered as obese.

Results: It is observed that mean age of both obese and non obese women is 59 year. Values of BMI were significantly increased in obese menopausal women in comparison to non-obese menopausal women. Level of adiponectin was significantly decreased and leptin levels was significantly increased in obese women with menopausal status in comparison to non-obese menopausal women. A significant negative correlation of adiponectin with serum leptin was observed in non obese women in comparison with obese menopausal women.

Conclusion: It is concluded that the reduced levels of serum adiponectin and increased levels of serum leptin may be the informative markers to evaluate the risk of hypertension, diabetes and dyslipidemia in obese postmenopausal women.

Keywords: Menopause, obesity, adipocytokines.

INTRODUCTION

The menopause is related with a tendency to weight gain due to impairment in fat deposition and body fat distribution due to decrease level of estrogen and it may be associated with increased risk of mortality¹. Obesity is also a type of the metabolic syndrome, which is identified as abdominal obesity, dyslipidemia, insulin resistance and hypertension and patient may have a risk of cardiovascular problems and type 2 diabetes².

The prevalence of obesity in women especially at the time of menopause is increasing in both developed and developing countries³. The prevalence of obesity in women with the age of 50-59 years is 72%⁴. Factors related with increased weight in menopause are, aging, increase in intake of food, sedentary life style and poor adaptation of the biological system⁵.

Obese menopausal women show an impaired secretion of leptin and adiponectin, which are bioactive substances secreted by immune cells and adipocytes. Increased adiposity, is responsible for increased synthesis of leptin and decreased production of adiponectin⁶.

A great number of genes have been discovered so far which are known to regulate the body weight. One of the obesity gene is of leptin hormone called *ob* gene. Alteration in *ob* gene may be associated with obesity and the system that controls balance of energy in the body⁷.

Leptin is an adipocytokine secreted by cells of adipose tissue. The main function of leptin is to

communicate to the brain the excess of energy depots and to control intake of food and encourage energy outflow. The lack of leptin hormone increases the appetite and increase in food intake results in obesity. It is proposed that the malfunctioning of leptin to encourage weight loss may be due to leptin resistance² as well as due to altered receptor signaling of leptin hormone⁸.

Another adipocytokine released from adipose tissue is adiponectin. It is exclusively produced in white adipose tissue and has a role in regulation of glucose and energy and catabolism of fatty acid⁹. Normally its level in humans is 2-20 µg/ml¹⁰. Decreased levels of serum adiponectin have been established in genetic and diet-induced obesity¹¹. Experimentally it is proved that the administration of adiponectin increases oxidation of fatty acid in skeletal muscle, and decreases the deposition of fat in the organ of liver, thereby decreasing fat content in muscle and liver and improving insulin sensitivity¹².

Number of studies have been carried out internationally correlating the level of leptin and adiponectin with obesity, but a few in Pakistan.

Our study is therefore designed to find out the levels of serum adiponectin and leptin levels as well as their correlation in obese and non obese postmenopausal women.

MATERIAL AND METHODS

Study was included 46 postmenopausal women with age > 50 years. Women were comprised as group A (Non obese), group B (obese). Women were taken from Outdoor department of Lahore General Hospital Lahore. Detailed history of women was recorded in proforma. Level of serum leptin and adiponectin was estimated by the technique of ELISA. Women with BMI < 25 kg/m² were taken as non

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obese and with BMI >25 kg/m² were considered as obese. BMI was calculated by formula⁴. Women with any other disease beside obesity were excluded from the study. Letter of consent was taken from each patient. Study was approved by Ethical Committee of PGMI Lahore.

Statistical Analysis: Data was entered in SPSS 20. Variables were expressed as mean±SD and analyzed by student 't' test. Correlation of variables was estimated by correlation coefficient. P<0.05 is taken as significant.

Table 1: Variation in age, BMI, levels of serum adiponectin and leptin in obese/non obese menopausal women

Variables	Non obese menopausal women(23)	Obese menopausal women(23)
Age (years)	59.93±4.50	59.17±4.62
BMI (Kg/m ²)	21.60±0.85	28.13±1.76*
Serum adiponectin (ng/ml)	9.11±1.49	5.80±0.79**
Serum leptin (ng/ml)	11.00±1.72	34.27±7.67**

*P< 0.05= Significant difference **P<0.001= Highly significant difference

Table 2: correlation of serum adiponectin and serum leptin in obese and non obese postmenopausal women

	Non obese(23)	Obese (23)
Correlation coefficient of adiponectin (r value)	-0.54*	-0.287
P value	0.05	0.018

RESULTS

Variation in age, BMI, levels of serum adiponectin and leptin in obese/non obese women is tabulated as table 1. It is observed that mean age of both obese and non obese women is 59 year. Values of BMI were significantly increased (P< 0.05) in obese menopausal women in comparison to non-obese menopausal women. Level of adiponectin was significantly decreased (P< 0.001) in obese women with menopausal status in comparison to non-obese menopausal women. However the level of leptin was significantly increased (P< 0.001) in obese women with menopausal status in comparison to non-obese menopausal women.

Table 2 shows the correlation of serum adiponectin and serum leptin in obese and non obese postmenopausal women. A significant negative correlation of adiponectin with serum leptin was observed in non obese women in comparison with obese menopausal women.

DISCUSSION

Studies have shown that adipose tissue is a vital endocrine tissue and have a major role in the incorporation of metabolic, endocrine and inflammatory indicators for the maintenance of energy balance. The adipocyte secrete a number of bioactive hormones/proteins into the blood circulation. These may include adipisin, adiponectin, resistin, leptin etc¹³.

It is observed that mean age of both obese and non obese women is 59 year. Values of BMI were significantly increased (P< 0.05) in obese menopausal women in comparison to non-obese menopausal women. According to a study there was a disparity in age at the state of

menopause in women. This study has found out that in some women the onset of menopause is 45-49 years and in some women it may appear late i.e. 50 or > 50 years. Study demonstrated that BMI is linked with the menopausal age and high BMI is related with increased menopausal age¹⁴.

Another study has demonstrated that menopause brings about changes in body fat composition. This shows an altered metabolism and increased risk of cardio metabolic factors. Thus, the obesity and menopause is the main indicator of metabolic alteration in women¹⁵.

Level of adiponectin was significantly decreased (P< 0.001) in obese women with menopausal status in comparison to non-obese menopausal women. It is reported that reduced levels of adiponectin has an important function in obesity-related insulin resistance and vascular biology¹⁶. Another study has demonstrated that visceral fat may destabilize the mRNA of adiponectin and this has shown an inverse strong correlation between the level of adiponectin and abdominal fat and it may be associated with insulin resistance of visceral fat¹⁷. However, a recent study reported that the level of serum adiponectin is not a predictor of increase in weight in future¹⁸.

We have observed an increased level of serum leptin in obese women with menopausal status in comparison to non-obese menopausal women. A study has found out that increased levels of leptin leads to leptin resistance. In fact, obesity activates different processes that lead to increased leptin signaling or increased leptin resistance of cells, which augments the degree of increase in weight gain induced by environmental and genetic factors⁷. Data of study demonstrated the level of leptin gradually rose with age especially in women and not related with BMI and other hormone. However there is a role of androstenedione and estrogen, which have an independent relation with serum leptin¹¹.

According to our study, a significant negative correlation of adiponectin with serum leptin was observed in non obese women in comparison with obese menopausal women. A study found that leptin in grouping with adiponectin completely turns around insulin resistance¹⁹. It is proposed that in brain, adiponectin can increase the effects of leptin²⁰. These proteins released from adipose tissue are dysregulated due to alteration in the mass of adipocyte²¹.

Another study observed that reduced level of serum adiponectin is inversely linked with inflammatory markers like leptin in obese people²². This makes obese women to have an increased danger of developing diabetes, cardiovascular problems and autoimmunity²³.

CONCLUSION

Low levels of serum adiponectin and increase levels of serum leptin may be the suggestive markers to evaluate the risk of hypertension, diabetes and dyslipidemia in obese postmenopausal women. Regular estimation of these adipocytokines may be helpful in the selection of proper treatment.

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