

New Insight into the Role of Serum Adiponectin in Obese and Non Obese Postmenopausal Hypertensive Women

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ABSTRACT

Background: Changes in menopause may be due to the reduced level of serum estrogen results in a shift of distribution of fat.

Aim: To find the role of serum adiponectin in obese and non obese postmenopausal hypertensive women and its link with obesity and risk of hypertension in postmenopausal women.

Methods: About 92 postmenopausal women with age 55-59 years were included in the study who have developed incident hypertension during a period of 5 year. Women with age > 50 years, stop menstruation from 1 year, BMI > and <25 kg/m², blood pressure > 140/90 mm Hg were included in the study. An equal number of age matched controls was also included. Women were grouped as obese and non obese. Level of plasma adiponectin was estimated by the technique of ELISA.

Results: Mean age of both normal and obese postmenopausal women is 59 years. Level of serum adiponectin was significantly decreased in obese women compare to normal. A negative correlation between systolic and diastolic blood pressure and serum adiponectin level was observed in both obese and normal postmenopausal women. However significant correlation is only observed in normal postmenopausal women with r value -0.48 and -0.63.

Conclusion: Women experiencing menopause need to upgrade in curative approaches to their hypertension and obesity in order to get better quality of life and avoid cardiovascular problems.

Keywords: Serum adiponectin, obesity, hypertension, menopause.

INTRODUCTION

Menopause is the most important period in the life of a woman and it also brings many physiological changes that influence the life of a woman enduringly. Women will spend one-third of lives with menopause¹. The striking change in menopausal women is also related with complications including obesity, osteoporosis, insulin resistance and cardiac problems².

It is proposed that changes in secretion of hormone in the period of perimenopause, may increase the risk of obesity, results in Psychological and physical morbidity³. Levels of plasma adiponectin are negatively related with BMI and percentages of body fat⁴. Obesity is therefore associated with social behavior, genetic and environmental factors⁵. It also increases the risk of many complication including hypertension, diabetes, cardiac problems etc⁶. Mechanisms that explain the role of menopause to increase the accumulation of abdominal fat is related with metabolism in adipose tissue due to imbalance of energy⁷.

Level of adiponectin is associated with different measures of fat of the body and metabolism of fatty acid⁸. Adiponectin may perform as a safe

autocrine/paracrine and endocrine factor to protect the problems associated with obesity⁶. It is proposed that serum adiponectin exist in different forms and affecting different systems via its receptors R1 and R2⁹. Its low level may stimulate obesity linked disease like hypertension, diabetes, cardiac disease etc¹⁰. In metabolic problems, alteration in gene expression is also related with the expression of adiponectin¹¹. Many studies suggest that adiponectin have an important role in menopause^{12,13}. Low levels of circulating adiponectin are related with increased occurrence of obesity, hypertension and diabetes particularly in postmenopausal women¹⁴.

In initial period of menopause, 30-50% of the women are at risk of developing hypertension and the beginning of hypertension cause a many problems characteristic of menopause¹⁵, which may be obesity, impair lipid metabolism and diabetes¹⁶. Obesity persuade pathophysiological pathways that may direct to high blood pressure¹⁷. Adiponectin also modulates many obesity-induced pathophysiological pathway involved in progress of hypertension¹⁸.

Study was designed to find the role of serum adiponectin in obese and non obese postmenopausal hypertensive women. Study also investigate the link between plasma adiponectin, obesity and risk of hypertension in postmenopausal women

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METHODS

About 92 postmenopausal women with age 55-59 years were included in the study who have developed incident hypertension during a period of 5 year. Women with age > 50 years, stop menstruation from 1 year, BMI > and <25 kg/m², blood pressure > 140/90 mm Hg were included in the study. Women visited out door department of Lahore General Hospital were included in the study. Women taking hormone replacement therapy, having cardiovascular disease, diabetes, hypothyroidism, renal failure were excluded from the study. An equal number of age matched controls was also included. Women were grouped as obese and non obese. Level of plasma adiponectin was estimated by the technique of ELISA. Letter of consent was taken from each subject. Study was approved by Ethical Committee of Post Graduate Medical Institute Lahore.

Statistical Analysis: Data was analyzed using SPSS 20. Variables were expressed as mean \pm SD. Student 't' test was applied to compared the parameters. Pearson correlation was applied to observe correlation between quantitative variables. P<0.05 was expressed as significant.

RESULTS

Age, BMI and level of serum adiponectin in a group of obese and non obese postmenopausal women is tabulated as table 1. It is observed that mean age both normal and obese postmenopausal women is 59 years. BMI of non obese women is non significantly decreased compared to obese women. Level of serum adiponectin was significantly decreased in obese women compare to normal.

Table 1: Age, BMI and level of serum adiponectin in a group of obese and non obese postmenopausal women.

Variables	Non obese	Obese
Age (years)	59.93 \pm 4.50	59.17 \pm 4.62
BMI (Kg/m ²)	21.60 \pm 0.85	28.23 \pm 1.76
Serum adiponectin (ng/ml)	9.11 \pm 1.49	5.80 \pm 0.79

Table 2: Correlation of blood pressure with serum adiponectin levels in obese and normal controls

	BP (mmHg)	Obese (46)	Normal (46)
Correlation coefficient (r value)	Systolic BP(mmHg)	-0.218	-0.489*
Correlation coefficient(rvalue)	Diastolic BP(mmHg)	-0.257	-0.633*

*correlation is significant at the 0.5

Correlation of blood pressure with serum adiponectin levels in obese and normal controls is tabulated as table 2. A negative correlation between systolic and

diastolic blood pressure and serum adiponectin level was observed in both obese and normal postmenopausal women. However significant correlation is only observed in normal postmenopausal women with r value -0.48 and -0.63.

DISCUSSION

A number of multifaceted causes observed between age at menopause and environmental and behavioral exposures, genetic factors and hormonal role etc¹⁹.

According to our study mean age of both non obese and obese postmenopausal women is 59 years. BMI of non obese women is non significantly decreased compared to obese women. A study on women health found that weight gain of women in perimenopausal stage was approx 5-10 pounds and it is progressively increased depending on genetic and environmental factor. It is suggested that decrease in expenditure of energy or decreased physical activity may be a factor of increasing body weight. However it is found that in some women there is mild gaining of body weight^{20,21}.

Estrogen plays an important role in storage and distribution of fat. It is stated that in menopause, the decrease level of estrogen leading to increase in body fat and high on abdomen²². It is stated that in menopause drop of estrogen hormone is usually related with metabolic alteration including accumulation of adipose tissue, insulin resistant and dyslipidemia which inturn increased the risk of hypertension and cardiac problems^{7,23}. Estrogen also has a role to appetite control. Its low level in menopause may alter the function of neuropeptide y and leptin hormone²⁴.

We observed that the level of serum adiponectin was significantly decreased in obese women compare to normal. A negative correlation between systolic and diastolic blood pressure and serum adiponectin level was also observed in both obese and normal postmenopausal women. It is suggested that decreased level of plasma adiponectin is related with increased occurrence of metabolic syndrome associated diseases like obesity, hypertension, diabetes and cardiovascular problems particularly in postmenopausal women¹⁴.

A study demonstrated that the increase in systolic blood pressure with ageing in menopausal women is due to imbalance of hormones¹⁵. Besides there is a role of hormone-linked factors is also seen in raising the blood pressure during the period of menopause²⁵. Additionally it is reported that decrease ratio of androgen/estrogen decrease the vassals relaxation effects of estrogens on the wall of vessel and stimulate the synthesis of factors associated with vasoconstriction like endothelin²⁶.

A study demonstrated that adiponectin may control blood pressure via endothelium/brain mediated mechanisms²⁷. The decreases in the level of adiponectin in menopausal women is related with greatly increase in systolic blood pressure and insulin resistance²⁸. Findings of a study showed that menopausal status effect on the correlation of level of plasma adiponectin with Mets associated traits (with exception of diastolic blood pressure¹⁴.

CONCLUSION

Women experiencing menopause need to upgrade in curative approaches to their hypertension and obesity in order to get better quality of life and avoid cardiovascular problems.

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