

# Association of Dyslipidemia and Obesity in Postmenopausal Bangladeshi Women

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## Abstract:

**Objectives:** Menopause is a natural process. After menopause the morbidity and mortality from cardiovascular disease in women is increased due to lack of oestrogen protection, aging effect, increased body weight, android pattern of body fat distribution, changes in metabolism and lipid profile.<sup>1,2</sup> So the present study is aimed at measuring the serum lipid profile and BMI in postmenopausal women of Bangladesh, thus detecting dyslipidemia and obesity to ascertain the relative risk of developing cardiovascular disease in this group.

**Methods:** A cross-sectional study was conducted at the Obst and Gynae Department of Green life Medical College Hospital among 150 otherwise healthy postmenopausal women from October 2017 to April 2018. Fasting blood obtained for testing lipid profile. Serum total cholesterol, triglycerides and high-density lipoprotein (HDL) cholesterol were measured using enzymatic procedures. Low-density lipoprotein (LDL) cholesterol concentration was estimated by Friedewald formula. Questionnaire-cum interview method was used to obtain relevant informations. BMI was calculated from weight in kg and height in cm by Metric BMI calculator. Dyslipidemia was identified based on serum lipid levels following the standard protocol proposed by the national guidelines.

**Result:** A total of 150 participants aged between 43 years to 70 years, were included in this study. Average age of the study subjects were 53.53±3.2 years. A mean duration of menopause was 7.23±0.92 years. The range BMI level was 19.1 to 36.6. Among them BMI <24.9, was found in 28.30% of women, BMI 25 to 29.9 was found in 49.5% women and 22.23% women had BMI of >30. According to standard guideline BMI <24.9 is considered normal, 25-29.9 is overweight and BMI more than 30 is obese. In this study among normal BMI group 59.4% had normal lipid profile and 29.7% had isolated hypertriglyceridemia and mixed dyslipidemia in 10.9% patients. In the group with BMI 25 to 29.9 (overweight) normal lipid level was in 52.3% women, isolated hypertriglyceridemia found in 17.6% women and dyslipidaemia was in 30.1% women. In the group with BMI >30 (obese) normal lipid level was in 5.8% of the women, isolated hypertriglyceridemia found in 29.4% women and dyslipidaemia was in 64.8% women. HDL-C level was low in 83.3% women of >30 BMI group and normal in 66.67% women of normal BMI group.

**Conclusion:** The prevalence of dyslipidemia, based primarily on the high cholesterol level and high LDL was observed among the overweight and obese group of study population. Therefore, it can be concluded that menopause leads to changes in lipid profile by increasing total and LDL cholesterol and by reducing HDL cholesterol which indicates menopause may be an additional risk factor for dyslipidemia causing cardiovascular disease in Bangladeshi women.

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### Introduction:

Menopause means cessation of menstruation in a woman's life, at the end of her reproductive period. It may be physiological or natural and surgical or artificial. All women who live long enough go through transition to menopause, but none of them welcome its onset. Women at their midlife and beyond experience a wide range of menopausal symptoms, and changing life style patterns. Many middle-aged women may lose their attractiveness and gain weight after menopause, may also suffer from the physical symptoms and metabolic changes due to lack of estrogen.<sup>3</sup> Not only estrogen deficiency but also aging effect, increased body weight, android pattern of body fat distribution are responsible for dyslipidemia and increase in cardiovascular morbidity and mortality.<sup>4</sup> The metabolic changes in menopausal women include an increased tendency for body fat deposition in the abdominal region suggested the insulin resistance on lipid metabolism with subsequent effects on circulating triglycerides. It may be the primary metabolic defects that leads to low HDL and increased LDL which are the key features of the atherogenic lipo-protein phenotype.<sup>5,6</sup> Moreover obesity is an independent risk factor for the cardiovascular disease including coronary artery disease, stroke and congestive cardiac failure. Cardiovascular disease remains the major cause of death in post menopausal women.<sup>7</sup> So it is important to study lipid abnormalities in postmenopausal women. In this regard this study was done in a hospital to explore the pattern of serum lipid abnormality in postmenopausal women, and to correlate the degree of severity of dyslipidemia with obesity in this group.

### Materials and method:

A cross-sectional study was conducted among 150 otherwise healthy postmenopausal women from October 2017 to April 2018. Subjects were physiological postmenopausal women, who were selected by purposive sampling. Inclusion criteria were otherwise healthy postmenopausal women, age more than 45 years and with no medical disorders. Exclusion criteria were age more than 70 years, those who did not give consent, with acute medical disorders like acute MI, acute stroke, history of taking drugs which may impaired lipid metabolism like HRT, steroid, thiazides, beta blockers and surgical menopausal women. After taking history and doing

physical examination, BMI was calculated and 4 ml of fasting venous blood was drawn from all the subjects. Individual with BMI between 25 and 29.9 are overweight and BMI  $\geq 30$  defined as obese.

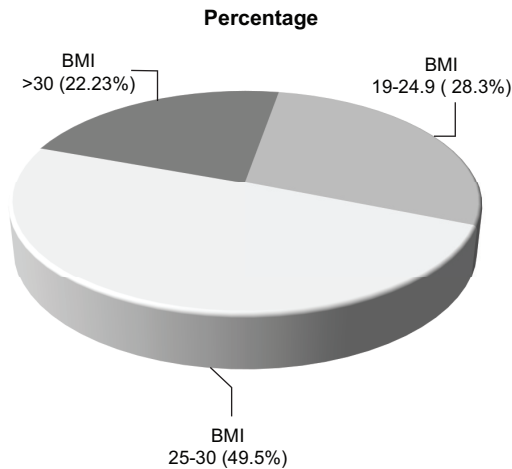
Weight was measured with a spring balance that was kept on a firm horizontal surface. Height was measured with a tape to the nearest centimeter. BMI was calculated from weight in kg and height in cm by Metric BMI calculator from internet. After 12 hours overnight fasting 4 ml of venous blood sample was collected from the median cubital vein by disposable plastic syringe with all aseptic precaution. Serum total cholesterol, triglycerides and high-density lipoprotein (HDL) cholesterol were measured using enzymatic procedures. Low-density lipoprotein (LDL) cholesterol concentration was estimated by Friedewald formula. Questionnaire-cum interview method was used to obtain relevant information. Dyslipidemia was identified based on serum lipid levels following the national standard protocol.

**Data Collection and Analysis-** The history, physical examination and investigation findings were recorded after informed consent from all the patients. All data were collected in individual case record form. The investigation reports were collected and recorded in the data collection sheet. Collected data were scrutinized and analyzed using computer with statistical package for social science SPSS (Version 12.0). Results were expressed as percentage and mean + SD

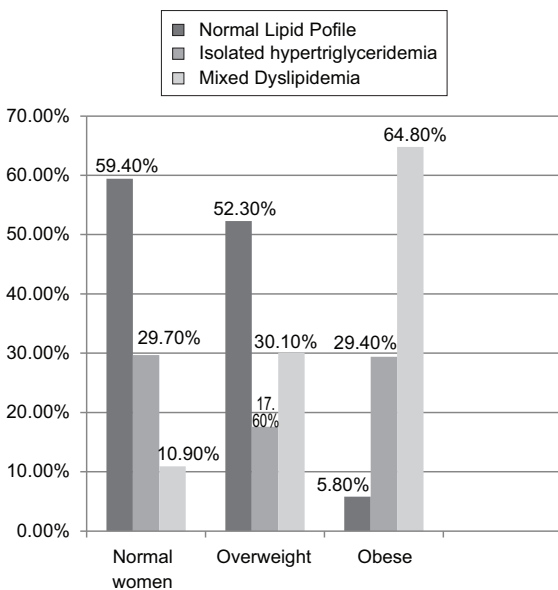
### Result:

A total of 150 participants aged between 40 years to 70 years, were included in this study. Their mean age (SE) was  $53.53 \pm 3.2$  years. Average duration of menopause was  $7.23 \pm 0.92$  years. The BMI was found between 19.1 to 36.6 and among them BMI  $< 24.9$  (normal) was found in 28.30% of women, BMI 25 to 29.9 (overweight) was found in 49.5% women and 22.23% women had BMI of  $> 30$  (obese). Fig-I

In normal BMI group lipid profile was normal in 59.4%, isolated hypertriglyceridemia in 29.7% and mixed dyslipidemia was found only in 10.9% women. In the overweight group normal lipid profile was observed in 52.3%, isolated hypertriglyceridemia in 17.6% and mixed dyslipidemia is found only in 30.1% patients. While in obese group mixed dyslipidemia found in 64.8% women, isolated hypertriglyceridemia in 29.4% and normal cholesterol level found only in 5.8% women. Fig-II



**Fig.-1:** *distribution of BMI among study subjects*



**Fig.-2:** *Distribution of lipid profile among normal, overweight and obese women.*

HDL-C level is not up to satisfactory in majority of women (66%) include both dyslipidemia group and normal women.

**Discussion:**

Menopause is defined as absence of menstruation at least for 12 months after the last menstrual period and marks as the end of menstrual cycles. It is the result of a depleted pool of follicles in gonads and is the consequence of decline in estrogen production. Menopause is usually a cause of many concerns among women. One of the most important is the fear of weight gain. In fact, it is well known that obesity

and metabolic syndrome are found in women in this period of their life three times more than before menopause.<sup>8</sup>

Overweight and obesity according to the definition of the World Health Organization (WHO) are considered as an abnormal or excessive fat accumulation that may impair health (WHO, Obesity and overweight, fact sheet, updated June 2016). The Polish Society of Endocrinology (PSE) describes obesity as a chronic disease characterized by excessive accumulation of fat tissue, increasing the risk of so-called civilization diseases: cardiovascular, metabolic and cancers (Diagnostic and therapeutic algorithms of PSE, 2014). Obesity may reduce life expectancy for overweight people.<sup>9, 10</sup>

Menopause tends to be associated with an increased risk of obesity and a shift to an abdominal fat distribution with associated increase in health risk.<sup>11, 12</sup> Weight gain, increased central adiposity, adverse changes in body fat distribution and body composition may be due to hormonal changes occurring during the menopause transition.<sup>13</sup> Obesity should be seen as one of the most important disturbances associated with the menopause, being not only a medical but also a social and economic point of view.

The incidence of obesity in the United States among women between 40 and 65 years is calculated as 65%, and among women over the age of 65 as almost 74%.<sup>14</sup> According to the Healthy Women Study, the average weight gain in perimenopausal women was about five pounds; however, 20% of the population gained 10 pounds or more. The reasons for increasing obesity in menopausal women are not clear. Some researchers argue that the absence of estrogens may be an important obesity-triggering factor. Estrogen deficiency enhances metabolic dysfunction predisposing to type 2 diabetes mellitus, the metabolic syndrome, and cardiovascular diseases. Estrogen plays a vital role in fat storage and distribution. Another factor contributing to weight gain in perimenopause may be the increased appetite and calorie intake which occur in response to hormone changes.

The increasing prevalence of dyslipidemia has become a worldwide public health problem, though it is one of the major modifiable factors for the development of type 2 diabetes,<sup>15,16</sup> atherosclerosis,<sup>17,18</sup> stroke<sup>19,20</sup> and cardiovascular diseases<sup>21,22</sup>. Multiple lines of evidence have

consistently shown an association between increased CHD risk and abnormal levels of lipoproteins.<sup>23</sup> While elevated levels of LDL-C and triglycerides and low levels of HDL-C are independent risk factors for atherosclerotic heart disease.<sup>24</sup> One researcher found that prospective transition to post menopause was associated with a 16% increase in TG, 11% increase in LDL, and 9% decline in serum HDL level.<sup>9</sup> Our study is similar with this observation. The mean serum HDL-C level is found to be significantly low and mean serum TG, mean serum LDL, and serum TC level is found to be significantly high in obese women compared to those postmenopausal women with normal BMI. This finding also supports other similar studies.<sup>2</sup> Both TC and LDL level were significantly correlated with BMI, regardless of the effects of menopause on body weight and body composition.<sup>25</sup> In our study it was found that there was significant positive correlation between serum isolated hypertriglyceridemia levels with the BMI and there was also significant relationship between TC, LDL, and HDL level with obesity. In our study we have found that there is very close association of mixed dyslipidemia in overweight and obese postmenopausal women. Isolated hypertriglyceridemia is prevalent in all 3 groups, similar from a study conducted in India.<sup>26</sup>

Awareness and effective intervention is necessary to prevent or at least improve the adverse lipid profile during menopausal transition, or during postmenopausal period which in turn improve the cardiovascular risk profile in this stage of life. Current cardiovascular disease prevention guidelines for women recommend lifestyle modification as the initial treatment for women with dyslipidemia. Healthy lifestyle goals to reduce cardiovascular risk in women include smoking cessation, moderate-intensity physical activity on most days of the week for at least 30 minutes per day, and to achieve and maintain a desirable weight.

#### **Conclusion:**

The prevalence of dyslipidemia, based primarily on the presence of high cholesterol and high LDL, was observed in this study population mostly in the overweight and obese group. Therefore, it can be concluded that menopause leads to changes in lipid profile by increasing total and LDL cholesterol and by reducing HDL cholesterol which indicates that menopause may be an additional risk factor for dyslipidemia leading to cardiovascular disease in Bangladeshi women.

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