## Discussion

The results of the present study that compare between the pre-menopausal and the post-menopausal women (Table 1) reveals clearly that changes in sex hormones is the most important factor which differentiates between these two stages. However studying the relation of these hormones to other measured parameters showed that only E2 was significantly negatively associated changes in BMI in the pre-menopausal women only (Table 1 and Figure 1). This could be explained by the fact that E2 is scarce in the post-menopausal stage and may have no, or, negligible physiological effect; Moreover changes in serum lipids, and oxidative stress status observed in this study may be due to the increase in body weight (high BMI or WC) which may be triggered by the drastic reduction in E2.

Aging, on the other hand, appeared to have an effect on serum lipid concentrations presented by significant increase in TC, LDLC and TG with a significant reduction in HDLC and consequent increase in AI. This is evident in the different BMI sub- groups of the postmenopausal women who showed significant age difference (Table 3), while no such difference could be noticed in the BMI subgroups of the pre-menopausal women of the present study who showed no significant age difference (Table 2). However it should be kept in mind that age difference was associated with changes in sex hormones and accordingly it is probable that changes in serum lipids were due to the combined effects of age and sex hormones.

A recent study showed that fat mass and WC were higher in postmenopausal women compared with the premenopausal women and that weight gain during aging would occur predominantly in the abdominal region [7]. Furthermore, it is known that after menopause WC and visceral adipose tissue accumulation increases beyond the effect of aging. This predisposition processes are more likely to be associated with the time since the menopause than with biological age [8].

So it could be proposed that reduced E2 effect in the post-menopausal women of the present study had resulted in a significant increase in the body weight, presented by high BMI, or high WC, which was positively associated with dyslipidemia and increased Ox-LDL (Table 1 and Figure 2).

In the post-menopausal women aging has been associated with increased concentration of TC, TG, VLDL-C, and LDL-C, and decreased concentration of HDL-C, all of which contributed to a more atherogenic lipid profile (Tables 1 and 4). The cardio-protective effect of estrogen has long been related to its beneficial effect on cholesterol metabolism and deposition, contributing to inhibition of athero-sclerotic plague formation in the arterial walls [9]. Estrogen was reported to lower LDL-C by up regulating LDL receptors in the liver and enhancing LDL catabolism [10]. This could be attributed to the reducing action of estrogen on the activity of adipose tissue lipoprotein lipase which results in less rapid hydrolysis of the circulating triglyceride rich (chylomicrons and VLDL particles), and has been reported to decrease hepatic TG lipase activity [11]. In addition, estrogen is believed to enhance hepatic B/E receptors mediated lipoprotein uptake, and it appears to promote the hepatic synthesis and secretion of apo-A-I. Also Estrogen is thought to enhance the production of larger, less dense and presumably less atherogenic LDL particles [12]. This may explain the presence of higher Ox-LDL concentration in the obese post-menopausal women than their counterpart of the pre-menopausal group (Table 4) with the presence of a positive correlation between OX-LDL levels and obesity measures such as BMI and WC (Figure 3).