# A STUDY ON BODY COMPOSITION AND LIPID PROFILE IN POSTMENOPAUSAL WOMEN

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**Abstract**

The interactions between the various physiological risk factors for cardiovascular disease are complex in women, the risk increases markedly after menopause and eventually becomes equivalent to that of men. This observation has suggested, but has not proven, that estrogens have a protective effect against cardiovascular disease

This study was done to find out the body composition and lipid profile in postmenopausal women of North-West Karnataka, and any variation in early and late postmenopausal women. The present study was conducted in the department of physiology, Al-Ameen medical college, Bijapur. Sixty nine postmenopausal women attending the hospital were selected and divided into two groups. Group-I: 32 Early postmenopausal women (up to 5years of postmenopausal duration) Group-II: 37 Late postmenopausal women (> 5years of postmenopausal duration). Then the body composition parameters were measured by classical anthropometry and skin fold calipers and lipid profile parameters were analyzed by enzymatic method.

The statistical analysis was done by student's unpaired 't' test. The mean values of Wt, BMI, BSA, WC, HC, FM, FFM, FMI and MM were more in Group-I compared to Group-II and WHR and BF% were more in Group-II compared to Group-I. These variations were not statistically significant. The lipid profile parameters i.e. TC, TG, HDL-C, LDL-C, VLDL-C, TC/HDL in Group-II subjects were found to be statistically non significant higher when compared to Group-I subjects. There was no statistically significant difference in body composition and lipid profile parameters in early and late postmenopausal women. In conclusion changes in most of these parameters occur during menopausal transition due to hormonal changes and depend on physical activity, life style, diet, smoking, alcohol consumption, ethnicity and genetic makeup of individual rather than on duration after menopause.

**Keywords:** Cardiovascular disease, Post menopause, physiological parameters, lipid profile

## 1. Introduction:

Cardiovascular disease is a leading cause of mortality in men and women in industrialized world. Menopause is a natural event in the ageing process and signifies the end of reproductive years with cessation of cyclic ovarian functions as manifested by cyclic menstruation. It is heralded by menopausal transition, a period when the endocrine, biological and clinical features of approaching menopause begins. The hormonal changes associated with menopause i.e. low plasma levels of estrogen and marked increase in LH and FSH levels exerts a significant effect on plasma lipids and lipoproteins[1].

There was no difference in total body fat-free or appendicular skeletal muscle mass in healthy premenopausal women and early postmenopausal women. In contrast, total body fat mass was 28% higher and percentage fat 17% higher in postmenopausal women compared with premenopausal women. Postmenopausal women had a 49% greater intra-abdominal and a 22% greater abdominal subcutaneous fat area compared to premenopausal women. The menopause related difference in intra-abdominal fat persisted after statistical adjustment for age and total body fat mass, whereas no difference in abdominal subcutaneous fat was noted. A similar pattern of differences in total and abdominal adiposity was noted in sub samples of pre- and postmenopausal women matched for age or fat mass.[2]

In healthy women, during the time from premenopausal to first year Postmenopausal examinations, the changes in LDL-C, TG, and BMI were larger than those between first and fifth year Postmenopausal examinations.[3]

There have been studies regarding the effect of menopause on body weight, fat distribution, total fat%, and also on lipid profile, but most of the studies are conducted on western population. As Indian population differs in body composition and lifestyle, this study was undertaken to evaluate the effect of duration of menopause on body composition parameters and lipid profile parameters in postmenopausal women of North West Karnataka.

## 2. Materials and methods:

**2.1** The present study was conducted in the department of physiology, Al-Ameen medical college, Bijapur. Sixty nine postmenopausal women attending Al-Ameen medical college hospital, Bijapur were selected and divided into two groups.

**Group-I:** 32 Early postmenopausal women (up to 5years of postmenopausal duration)[4].

**Group-II:** 37 Late postmenopausal women (> 5 years of postmenopausal duration)[4].

**2.2 Inclusion criteria**: All healthy postmenopausal women, who attained menopause by natural means

**2.3 Exclusion criteria:** postmenopausal women who have undergone hysterectomy, diabetic, hypertensive, on hormone replacement therapy, lipid lowering drugs & with H/O Gynecological & hormonal disorders.

**2.4 Method of collection of data**: The study protocol was explained to the subjects, who volunteered for the study. Informed consent was obtained from each of the participant. A detailed history of subjects was taken. The physiological parameters pulse rate & blood pressure were recorded. The height, weight, body surface area, body mass index, waist circumference, hip circumference, waist hip ratio were recorded by standard method. Body fat percentage was recorded by skin fold calipers[5]. Fat mass was calculated by formula (FM=Wt/100XBF %) and expressed in kilograms. Fat free mass was calculated and expressed in kilograms by using the formula (FFM=Weight-fat mass)[6]. Fat mass index was calculated from fat mass in (kg)/Height in $(m^2)$[7]. Muscle Mass was calculated by using fat free mass (MM=50% of FFM)[6].

Lipid profile parameters: After overnight fasting, 2ml of venous blood sample was collected from each subject. Clear unhemolyzed serum was obtained by centrifuging blood at 3000rpm for 15min, and lipid profile was done by semi-automated analyzer (Erba star 21 plus) using enzymatic method. Lipids analyzed were Triglyceride, Total-cholesterol, HDL-C, LDL-C, VLDL-C and TC/HDL, HDL/LDL were calculated[8].

**2.5 Statistical Methods**: The student's unpaired 't' test was used to analyze the variations in body composition and lipid profile between early and late postmenopausal women.

## 3. Results:

**Table 1: Comparison of body composition parameters of subjects of Group I and Group II**

| Parameters | Group-1(n=32) | | Group-II(n=37) | | t-value | p-value |
|---|---|---|---|---|---|---|
| | Mean±SD | SEM | Mean±SD | SEM | | |
| Weight | 50.91±11.35kg | 1.991 | 49±8.2kg | 1.3 | 0.8086 | >0.05 |
| BMI | 23.3±4.86kg/mt$^2$ | 0.85 | 22.42±3.60kg/mt$^2$ | 0.59 | 0.8618 | >0.05 |
| BSA | 1.4±0.10mt$^2$ | 00 | 1.4±0.10mt$^2$ | 00 | 0.0000 | >0.05 |
| WC | 75.31±12.20cm | 2.141 | 75±9.1cm | 1.5 | 0.1206 | >0.05 |
| HC | 95.6±11.30cms | 1.98 | 94±8.6cms | 1.4 | 0.6667 | >0.05 |
| WHR | 0.79±0.07 | 0.01 | 0.8±0.1 | 00 | 0.4739 | >0.05 |
| BF% | 29.5±5.82% | 1.02 | 30.1±3.77% | 0.62 | 0.5148 | >0.05 |
| FM | 15.6±6.46kg | 1.13 | 15±3.91kg | 0.64 | 0.4738 | >0.05 |
| FFM | 35.4±5.28kg | 0.93 | 34.2±4.91kg | 0.81 | 0.9776 | >0.05 |
| FMI | 7.12±2.86kg/mt$^2$ | 0.5 | 6.85±1.8kg/mt$^2$ | 0.30 | 0.4926 | >0.05 |
| MM | 17.7±2.66kg | 0.47 | 17.1±2.46kg | 0.4 | 0.9730 | >0.05 |

Values expressed are (mean ± SD), *p<0.05 Significant.BMI: Body mass index, BSA: Body surface area, WC: Weight circumference, HC: Hip circumference, WHR: Waist hip ratio, BF%: Body fat percentage, FM: Fat mass, FFM: Fat free mass, FMI: Fat mass index, MM: Muscle mass

**Table 1: Comparison of lipid profile parameters of subjects of Group I and Group II**

| Parameters | Group-1(n=32) | | Group-II(n=37) | | t-value | p-value |
|---|---|---|---|---|---|---|
| | Mean ±SD | SEM | Mean ±SD | SEM | | |
| TC | 194±28.44 | 4.99 | 205±38.59 | 6.33 | 1.359 | >0.05 |
| TG | 189±55.07 | 9.66 | 194±51.1 | 8.38 | 0.3910 | >0.05 |
| HDL-C | 44.7±6.78 | 1.19 | 46.13±6.05 | 0.99 | 0.9258 | >0.05 |
| LDL-C | 112±26.76 | 4.7 | 120.17±35.86 | 5.88 | 1.0585 | >0.05 |
| VLDL-C | 37.6±10.81 | 1.9 | 38.88±10.23 | 1.68 | 0.5049 | >0.05 |
| TC/HDL | 4.49±0.93 | 0.16 | 4.56±1.10 | 0.18 | 0.0404 | >0.05 |
| HDL/LDL | 0.42±0.12 | 0.021 | 0.42±0.14 | 0.023 | 0.0000 | >0.05 |

Values expressed are (mean ± SD), *p<0.05 Significant. TC: Total cholesterol, TG: Triglyceride, HDL-C:High density lipoprotein cholesterol, LDL-C- low density lipoprotein cholesterol, VLDL-C- Very low density lipoprotein cholesterol,

## 4. Discussion:

**4.1 Physiological parameters:** The pulse rate, systolic and diastolic blood pressures in both the groups were found to be within physiological limits for that age and sex in present study.

**4.2 Body composition parameters:** The mean values of Wt, BMI, BSA, WC, HC, FM, FFM, FMI and MM were more in Group-I compared to Group-II and WHR and BF% were more in Group-II compared to Group-I but not statistically significant.

All the body composition parameters were within physiological limits in both the groups except BF% and FM which were found to be above the normal range.

Insignificant difference in body composition parameters between Group-I and Group-II is similar to the study by Quinglong wang, Christian Hassager, Pernille Ravn, Shuling Wang, and Claus Christiansen[9].

Increase in BF% and FM above physiological limit in both groups is similar to the study by Douchi T, Yamamoto S, Yoshimitsu N, Andoh T, Matsuo T, Nagata[39]. Other body composition parameters were within physiological limit is supported by Edith T, Kevin P D, Douglas R S[10].

- Body fat and fat distribution are more dependent on age than on menopause, changes in fat free mass; including a postmenopausal decline in both soft lean tissue mass and bone mass are mainly menopause related[9]. So in our study increase in BF%, FM above normal range in both the groups may be age related rather than duration of menopause and menopause itself.

The previous studies have proved that lean body mass does not change in premenopausal women and decreases after the menopause and correlates with years since the onset of menopause. However studies proving these data used modern sophisticated methods such as dual-energy X-ray absorptiometry or computed tomography for lean mass, bone and muscle mass assessment and not the classical anthropometry[11]. Body composition parameters also depend on physical activity, life style, dietary habits[10], ethnic group and genetic makeup of individual. This may be the reason for most of body composition parameters to be within physiological limits in our study.

**4.3 lipid profile parameters:** In Group-I subjects TC, HDL-C, VLDL-C, TC/HDL were normal, LDL-C was above normal and TG was borderline high whereas in Group-II subjects HDL-C, VLDL-C were normal LDL-C was above normal and TC, TG were borderline high and TC/HDL was also high.

However it was found that lipid profile parameters in Group-II subjects were found to be statistically non significant higher when compared to Group-I subjects. In our study no relation between lipid profile parameters and time since menopause i.e. duration after menopause could be established. This may indicate that the determining factors of lipid profile in postmenopausal women are physical activity, life style[10], diet, smoking, alcohol consumption[12], ethnicity and genetic makeup of individual rather than duration after menopause. The changes in lipid profile occur at menopausal transition itself under the influence of hormonal change[13].

**Conclusion**

The mean values of Wt, BMI, BSA, WC, HC, FM, FFM, FMI and MM were more in Group-I compared to Group-II and WHR and BF% were more in Group-II compared to Group-I but not statistically significant. All the body composition parameters were within physiological limits in both the groups except BF% and FM which were found to be above the normal range. In Group-I subjects TC, HDL-C, VLDL-C, TC/HDL were normal, LDL-C was above normal and TG was borderline high whereas in Group-II subjects HDL-C, VLDL-C, were normal LDL-C was above normal and TC, TG were borderline high and TC/HDL was also high. However it was found that lipid profile parameters in Group-II subjects were found to be statistically non significant higher when compared to Group-I subjects.

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