

**SEX HORMONE PROFILES AND ANTHROPOMETRIC PARAMETERS OF
POST MENOPAUSAL BREAST CANCER PATIENTS**

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Introduction

Breast cancer (BC) is the most common carcinoma among women in Sri Lanka. According to the Cancer Registry 2007, the incidence of BC in Sri Lankan women is increasing since past few decades and the crude BC incidence is 19 per 100,000 population. It is found that mammary gland proliferation is increased with oestrogen, thus is reported to be associated with risk for BC (Enderson and Feigelson 2000; Russo et al 2000). Studies have shown that testosterone is found to enhance mammary tumor growth. Nevertheless progesterone and BC risk is grossly studied but results remain controversial. It is also reported that post-menopausal women being overweight and obese have the risk of BC due to adiposity related increase in levels of endogenous oestrogen concentrations (Bianchini et al. 2002; Lahmann et al. 2004).

Thus in the present study, serum sex hormone concentrations of newly diagnosed post-menopausal BC women were determined and data correlated with anthropometric parameters of each patient as no related data among Sri Lankan BC women exist. This study was conducted to (i) determine serum estrogen, testosterone and progesterone concentrations of newly diagnosed post-menopausal BC patients, (ii) measure/calculate anthropometric parameters (weight, height, body mass index (BMI), waist circumference (WC), hip circumference (HC), waist: hip ratio (WHR) mid upper arm circumference (MUC)) of BC patients and (iii) study possible correlations between serum estrogen, testosterone and progesterone concentrations and anthropometric measures.

Materials and Methods

Consent was obtained from newly diagnosed post-menopausal Sri Lankan BC patients (n=75) from National Cancer Institute Maharagama for the participation of the study. Serum total 17- β estradiol, total testosterone and progesterone concentrations were measured using an enzyme immunoassay

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competition method with final fluorescent detection methodology with immunoanalyzer (VIDAS Progesterone Ref 30409 assay kits, VIDAS Testosterone Ref 30418 assay kits and VIDAS estradiol II Ref 30431 assay kits (Biomerieux, France).

Weight, height, BMI, WC, HC, MUC and WHR of each BC patient was measured/calculated. BMI ≥ 23 and >25 were considered as overweight and obese respectively. Over 80 cm of WC and WHR of ≥ 0.80 were considered as risk category and significances were analyzed.

Descriptive statistics, K independent sample test (Kruskal Wallis) and Spearman correlations were determined using the statistical software SPSS version 16 (Ethical approval Number- 651/12).

Results and Discussion

Mean age of menopause of the study population was 50 (± 3) years and mean (\pm SEM) testosterone, estrogen and progesterone concentrations of the study sample were 0.22 ng mL^{-1} (± 0.16), 27.8 pg mL^{-1} (± 0.52) and 0.57 ng mL^{-1} (± 0.15), respectively. The average hormone concentrations according to the age category are stated in Table 1. Accordingly, 43 %, 40 % and 17 % of BC women were present in each age category respectively.

Table 1. Testosterone, estrogen and progesterone concentrations of BC women according to the age

Age Category (Years)	Testosterone \pm SEM (ng mL^{-1})	Estrogen \pm SEM (pg mL^{-1})	Progesterone \pm SEM (ng mL^{-1})
51-60 n= 32	0.25 ± 0.03 (0.09-0.61)	29.69 ± 9.24 (0.89-210)	0.52 ± 0.13 (0.24-3.60)
61-70 n=30	0.17 ± 0.02 (0.09-0.64)	23.54 ± 7.19 (0.89-183)	0.27 ± 0.01 (0.24-0.63)
71-79 n= 13	0.19 ± 0.03 (0.09-0.43)	12.25 ± 1.24 (8.9-22.4)	0.51 ± 0.20 (0.24-2.87)
Reference range	0.1-0.9	< 58	< 0.41

Among the total group, 88 % had testosterone below half of the recommended upper value (0.9 ng mL^{-1}) and among them, 26 % had levels below the lower reference margin (0.1 ng mL^{-1}). None of the participants had testosterone above the recommended upper value. Twenty two percent of the study group had progesterone above the upper limit (0.41 ng mL^{-1}). From the total group, 47 % had progesterone below half of the recommended upper limit. Only 9 % had oestradiol II above 58 pg mL^{-1} (upper limit of normal). From the total group, 87 % had oestradiol II below half of the recommended upper

value. Significant differences in serum hormone concentrations with respect to age was not observed ($P>0.05$).

Among the patients, 64 % had BMI greater than 23 and 40 % among them were obese. According to WC, 67 % of women were in the risk category. With respect to WHR, 90 % belonged to the risk category. The mean values of anthropometric parameters are given in Table 2.

Table 2. Anthropometric parameters of BC patients

Anthropometric parameter (Unit)	Mean	Minimum	Maximum
Weight (kg)	56.0± 1.41	34.00	90.00
Height (m)	1.51± 0.01	1.38	1.70
BMI (kg m ⁻²)	24.8± 0.50	17.00	35.60
Waist (cm)	84.0± 1.50	33.00	116.00
Hip (cm)	91.0± 2.70	0.88	121.00
WHR	0.87± 0.60	0.76	0.99
MUC (cm)	28.4± 1.80	21.00	40.00

Oestrogen showed significant positive associations with BMI($r=0.3$, $p=0.02$), MUC ($r=0.4$, $p=0.00$) and weight ($r=0.4$, $p=0.00$). Progesterone showed significant positive associations with BMI($r=0.3$, $p=0.02$), MUC ($r=0.3$, $p=0.03$) and weight ($r=0.3$, $p=0.01$), even though oestradiol II was closer to lower limit of normal in most of the individuals. However, testosterone showed a significant association($r=0.28$, $p=0.02$) only with BMI. WC, HC or WHR were not significantly associated with oestrogen, progesterone or testosterone.

Even though testosterone and oestrogen are reported to be positively associated with BC, majority of participants had estrogen and testosterone below half of the recommended upper value while one fifth of the study population had elevated serum progesterone concentrations.

Conclusions and Recommendations

Majority of the patients were either overweight or obese and had low oestrogen which may have contributed to the high BMI, WC and WHR irrespective of the positive correlations observed with oestrogen.

References

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