

ASSOCIATION BETWEEN CRP AND BMI OF NEWLY DIAGNOSED BREAST CANCER PATIENTS

H.M.K. Akalanka*^{1,2}, S. Ekanayake² and K. Samarasinghe²

¹Faculty of Medicine, South Asian Institute of Technology and Medicine, Malambe

²Faculty of Medical Sciences, University of Sri Jayewardenepura

*Corresponding author (email: kasuniakalanka@gmail.com)

Introduction

C-reactive protein (CRP) is a phylogenetically highly conserved plasma protein, which participates in the systemic response to inflammation. During inflammation the CRP concentration in serum increases [1]. Chronic inflammation is a key contributor in the development and progression of carcinogenesis. Recently an association between breast cancer and inflammation has emerged as a hallmark of cancer [2]. In overweight and obese females, high sensitive CRP levels are reported to be correlated with obesity indices [3]. CRP is also a prognostic marker for long-term survival in breast cancer patients, independent of race, tumor stage, and body mass index [4].

Breast cancer is one of the most common carcinomas among women in the world [5] and the most common carcinoma and the leading cause of carcinoma death in Sri Lankan women [6]. No research data is available on CRP concentrations or its association with body weight of Sri Lankan breast cancer patients. Hence the objectives of the study were to analyze serum CRP concentrations and BMI of newly diagnosed breast cancer patients and to compare the BMI and CRP concentrations with apparently healthy age matched females.

Materials and Methods

Newly diagnosed breast cancer patients (n=155) in the age group of 25-75 years, who have not undergone treatment for breast cancer (chemotherapy, radiotherapy, surgery etc.) were selected from National Cancer Institute, Maharagama. Apparently healthy age matched women (n=75) were enrolled as controls. Informed written consent was obtained from each participant prior to the enrolment to the study.

Serum CRP concentrations were measured using biochemical analyzer (Kone, 20XT). Weight and height of participants were measured and BMI calculated. Ethical approval for the study was obtained from Ethics Review Committee, Faculty of Medical Sciences, University of Sri Jayewardenepura. Data were statistically analyzed using descriptive statistics and independent sample t test using SPSS version 16.

Results and Discussion

Breast cancer patients had significantly higher ($p < 0.05$) serum CRP concentrations when compared with apparently healthy females irrespective of the menopausal status (Table 1).

Table1. CRP concentrations of breast cancer patients and apparently healthy females

	Breast cancer patients (n= 155)	Apparently healthy females (n = 75)
	Median CRP (IQR)	Median CRP (IQR)
Premenopausal women	4.5(5.7) ^a	2.2(1.8) ^b
Postmenopausal women	4.8(5.2) ^a	2.5(2.3) ^b
All	4.8(5.6) ^a	2.4(2.9) ^b

IQR- Inter Quartile Range, Different superscripts along a row indicate significant differences at 95% confidence interval; ¹Manual on Standard operation procedure, sample collection and reference range for clinical chemistry, World health Organization, Ministry of Health and the Department of Biochemistry, Medical Research Institute, Sri Lanka. Reference range <6 mg/L

Among breast cancer patients, the CRP distribution was skewed towards the upper limit of normal. More than one third (37%) of breast cancer women had CRP levels above the upper limit of normal (6 mg/L). However, serum CRP concentrations of apparently healthy females had a normal distribution and were within the normal reference range.

Considering the cutoff values introduced by WHO to the Asia-Pacific region, nearly one third (30.3%) of newly diagnosed breast cancer patients were overweight (BMI> 23 kg/m²) and 45% were obese (BMI> 25 kg/m²). Majority (80%) of apparently healthy females were having BMI in the normal reference range (BMI 18.5-22.9 kg/m²). Fifteen percent of healthy females were overweight. The BMI was significantly higher (p<0.05) among breast cancer patients when compared with apparently healthy females (Table 2). The association between CRP and BMI among breast cancer patients in the study group was significant (r=0.1, p<0.05) and such association was not observed among apparently healthy females (p> 0.05).

Table2. Anthropometric measures of breast cancer patients and apparently healthy females

	Breast cancer patients (n= 155)	Apparently healthy females (n = 75)
	Mean ± SD	Mean ± SD
Weight (kg)	57 ± 11 ^a	54 ± 7 ^a
Height (m)	1.51 ± 0.1 ^b	1.51 ± 0.1 ^b
BMI (kg/m ²)	25.1 ± 4.4 ^c	23.6 ± 2.5 ^d

Different superscripts along a row indicate significant differences at 95% confidence interval, BMI= Body Mass Index

Obesity is considered as a state of chronic inflammation. Among obese, adipocytes increase in size and have a greater number of macrophages that secrete a number of inflammatory molecules including CRP [7]. This might also have contributed to higher serum CRP concentrations among breast cancer patients than in apparently healthy females.

Conclusions and Recommendations

CRP concentrations of breast cancer patients were significantly higher than in apparently healthy females. Further studies with high sensitive CRP in breast cancer patients can be recommended for inclusion of CRP to the panel of biomarkers of breast cancer. Similarly the BMI of the breast cancer patients were significantly higher in comparison to healthy controls. The study also highlights the importance of maintaining body weight in the normal range.

Acknowledgement

Financial assistance by the University grants ASP/06/RE/MED/2012/20 and ASP/06/RE/MED/2013/30.

References

- [1] S. Black, I. Kushner, and D. Samols, "C-reactive protein," *Journal of Biological Chemistry*, vol. 279, no. 47. pp. 48487–48490, 2004.
- [2] S. B. Asegaonkar *et al.*, "C-Reactive Protein and Breast Cancer: New Insights from Old Molecule," *International Journal of Breast Cancer*, vol. 2015. 2015.
- [3] Z. Sanip *et al.*, "Obesity indices and metabolic markers are related to hs-CRP and adiponectin levels in overweight and obese females," *Obesity Research in Clinical Practice*, vol. 7, no. 4, 2013.
- [4] B. L. Pierce *et al.*, "Elevated biomarkers of inflammation are associated with reduced survival among breast cancer patients.," *Journal of Clinical Oncology*, vol. 27, no. 21, pp. 3437–44, 2009.
- [5] K. A. Ban and C. V. Godellas, "Epidemiology of Breast Cancer," *Surgical Oncology Clinics of North America*, vol. 23, no. 3. pp. 409–422, 2014.
- [6] National cancer incidence data, Sri Lanka, 2008.
- [7] E. J. Gallagher and D. LeRoith, "Epidemiology and molecular mechanisms tying obesity, diabetes, and the metabolic syndrome with cancer.," *Diabetes Care*, vol. 36 Supplement 2, pp. S233–9, 2013.