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# Role of Non-Specific Esterases in the Incidence of Breast Cancer in Different Age Groups

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**ABSTRACT**

This study was designed to find the association in breast cancer and plasma levels of non-specific esterases in breast cancer patients. For study blood samples were collected from various diagnostic laboratories of Sargodha city. Levels of non-specific esterases were determined in the normal and breast cancer patients. The levels of non-specific esterases were higher in healthy individuals than the breast cancer patients. So, levels of non-specific esterases could be used as a marker for the diagnosis of breast cancer.

**Key Words:** Esterases, breast cancer, risk factors, diagnosis

## INTRODUCTION

Breast cancer is the most common types of cancer in females which cause 14 % deaths worldwide (Bayoumi *et al*., 2012). Occurrence of breast cancer is increasing and Pakistan showed highest prevalence (Naveed *et al.,* 2014) i.e., almost one out of nine women is suffering from this disease (Sohail & Alam, 2007). The oxidative stress is a key risk factor for breast cancer (Brown & Bicknell, 2001) and reactive oxygen species (ROS) are main cause of oxidative stress in cancerous cells (Brown & Bicknell, 2001; Hanahan & Weinberg, 2011). ROS damage the DNA, proteins and lipids and this damage is a major cause of the mutations that cause the initiation and progression of tumors (Wu *et al.,* 2004).

Esterases are enzymes that serve as a protective, metabolizing and clearing function for foreign substances (Mates & Sanchez-Jimenez, 2000). The esterases can be used as a reliable biomarker of physiological stress (Konduru, 2012) because the activity of various esterases and antioxidant defense system decreases during oxidative stress that is caused by ROS (Shreya *et al.,* 2012). The goal of present study was to find relationship between stress enzymes (non-specific esterases) and incidence of breast cancer in different age groups individuals. The association of some risk factors (family history and marital status) on the occurrence of breast cancer was also studied.

## MATERIALS AND METHODS

*Population studied*

The blood samples were collected in EDTA coated vials, from Niazi laboratory, Sahara laboratory and Rehman laboratory of Sargodha city, Punjab, Pakistan considering ethics and norms. Blood was collected from 200 individuals, half of them were patients of breast cancer *(n=100)* while half were age matched healthy individuals *(n=100)* and plasma was seperated by centrifuging fresh blood at 1300rpm for 5 minutes to estimate levels of alpha and beta esterases in cancer patients. A questioner was developed to record the data about risk factors of breast cancer patients such as age, stage of disease, family history, blood group, height and weight, was collected.

*Biochemical estimation of non-specific esterases* For estimation of esterases, α-napthyl acetate and β-napthyl acetate was used as substrate (Baker *et al.,* 1998). Initially, 0.1M substrate solution (20µl) and 100mM Phosphate buffer (150µl) was added to 20µl plasma and incubated at 37°C for 30 minutes. Further mixture of 1% FBB salt and 5% sodium dodecyl sulphate (SDS) (100µl) was added and absorption was recorded at the wavelength of 620nm (α-esterases) and 545nm (β-esterases). Reference mixture contained Phosphate buffer instead of plasma. Standard curve of alpha (α) naphthol and beta (β) naphthol were used for conversion of absorption

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values into the mM of product formed/min/mg of protein.

*Statistical analysis*

A nonparametric test was used for comparison of enzyme levels in breast cancer patients and healthy individuals. Difference was considered significance, if the p-value was < 0.05.

## RESULTS AND DISCUSSION

The level of alpha and β-esterase was significantly higher in healthy individuals than breast cancer patients (U=1684.5; P-Value =0.0103); (Fig. 1). While activity of α-esterases in healthy individuals was also high than breast cancer patients but statistically non-significant (U = 1069; P =0.2085); (Fig. 2). Lund-Pero *et al.* (1994) reported significant reduction of alpha esterase activity when malignant colon tissue from the cancer patients was compared with normal colon tissue from healthy individuals. According to Vora *et al.* (2012), there is increased oxidative stress in D-galactose stressed mice that possibly caused a significant decrease of activity of non-specific esterase.

Many risk factors are associated with breast cancer. In this study the main focus was on family history and marital status. The data showed that 78% breast cancer patients were married and 22% were unmarried. Furthermore most of the breast cancer patients had family history of cancer (Table 4). Previously, researchers have revealed that family history and marital status are implicated with breast cancer (Aizer *et al.*, 2013; Fakri *et al.* 2006; Naveed *et al.,* 2014;). There was positive association of family history and incidence of breast cancer. Married females are at high risk as compared with unmarried ones. The Gilani *et al.* (2006) investigated that consanguineous marriages doubled the chance of breast cancer as compared with the risk of being married out of family. Hussain *et al.* (2013) did not find any association between family history and breast cancer in females. Bulotiene *et al.* (2008) have reported that marital status is associated with breast cancer mainly due to increase in the stress conditions. Our results are in contrary to the Aizer *et al.* (2013), who found that unmarried females have higher risk of metastatic cancer as compared with married ones. However, according to Fakri *et al.* (2006), marital status and breast cancer are not correlated.

The association between different age groups and incidence of breast cancer was also investigated in the present study. The results of present study showed that the age of most of the patients was around 40-50 (Fig. 3). The present results are in accordance with Naveed *et al.* (2014). According to Hussain *et al.* (2013) the peak age for breast cancer is 50-59 years and it decreases in older age. Similarly Khan *et al.* (2004) reported that the prevalence of cancer was higher in age group of greater than 60 years and explained that it is significantly different in different age groups. According to Naeem *et al.* (2008) the middle age group (30-59years) women have high risk of developing breast cancer in local setup in various regions of Pakistan as reported in the present study. So it may be concluded that the above risk factors like family history and marital status and age are important in the pathogenesis of breast cancer. The association of the risk factors with frequency of breast cancer needs further study with large population size and in different ethnic groups. On the other hand the level of non-specific esterases like alpha and beta esterases have major role in the diagnosis of breast cancer.

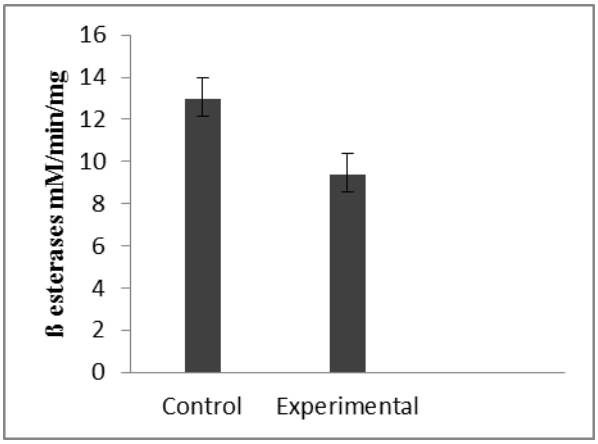


**Fig., 1:** *Activity of β esterases* (mM/min/mg) *in control group and breast cancer patients.*

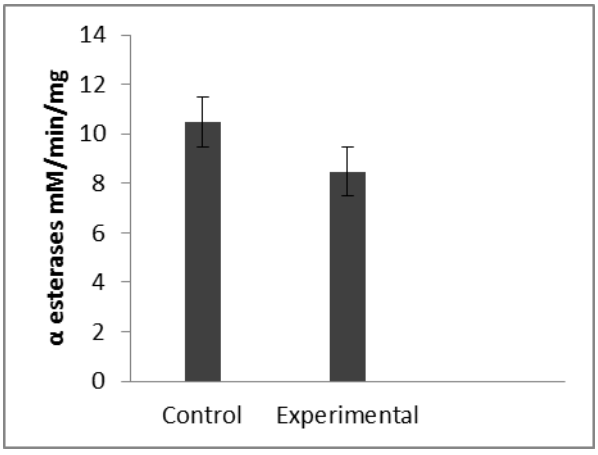


**Fig., 2:** *Activity of α-esterases (mM/min/mg) in control and breast cancer patients.*

**Table I: Different factors associated with incidence of breast cancer.**

| Factors | | Total number of individuals 92 | |
|---|---|---|---|
| **Marital Status** | **Status** | **Total** | **%age** |
| | Married | 72 | 78 |
| | Unmarried | 20 | 22 |
| **Family History** | Yes | 54 | 59 |
| | No | 38 | 41 |

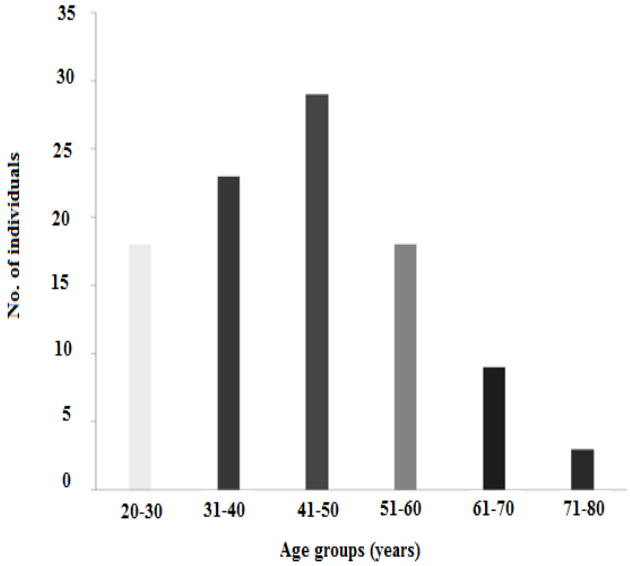


**Fig., 3:** *Prevalence of breast cancer in different age groups.*

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