WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.074
Volume 7, Issue 7, 25-29. Research Article ISSN 2277– 7105

POLYUNSATURATED FATTY ACIDS INTAKE AND ITS ASSOCIATION WITH BREAST CANCER AMONG PATIENTS ATTENDING THE RADIATION AND ISOTOPE CENTER IN KHARTOUM STATE

Hafsa A. Elsafi[1]* and Hassan A/Aziz Musa[2]

[1]National Ribat University.

Article Received on
04 Feb. 2018,

Revised on 22 Feb. 2018,
Accepted on 15 Mar. 2018,

DOI: 10.20959/wjpr20187-11199

***Corresponding Author**
Hafsa A. Elsafi
National Ribat University.

ABSTRACT

Objective: To determine any association between dietary polyunsaturated fatty acids (PUFAs) intake by Sudanese women attending the Radiation and Isotope Center in Khartoum and the incidence of breast cancer (BC). **Methodology**: Sixty BC patients (mean age 44 years) and 60 controls (mean age 39 years) participated. Dietary PUFAs intake was measured by Platelet PUFAs. **Results**: Patients had higher platelets Linoleic Acid (LA) levels but lower Alpha Linolenic Acid (ALA), Eiocosapentaenoic Acid (EPA) and Decosahexaenoic Acid (DHA) levels compared with the controls; all differences were highly significant (P=0.000; 0.001; 0.000 respectively). **Conclusion**: High platelets LA and low ALA, EPA and DHA might be possible factors associated with BC among Sudanese women.

KEYWORDS: Linoleic acid, α-linolenic acid, eicosapentaenoic acid, docosahexaenoic acid, dietary intake, platelet levels.

INTRODUCTION

According to globocan 2012 from International Agency for Research on Cancer (IARC), an estimated 14.1 million new cancer cases predicted a substantive increase to 19.3 million per year by 2025 (IARC, 2013). Breast cancer continues to remain the most lethal malignancy amongst women across the world (Abdulrahman and Adebisi, 2012); with nearly 1.7 million new cases diagnosed in 2012 (second most common cancer overall) (IARC, 2013). The Radiation and Isotopes Center in Khartoum State reported increased cancer cases from 5286

in 2009 to 7630 in 2013 and breast cancer represent of the major cancers with high mortality rate (RICK, 2014).

The occurrence of cancer is one of the outcomes of the war between the host immune system and cancer cells. Cancer immune surveillance is considered to be an important host protection process to inhibit carcinogenesis cellular homeostasis. Failure of host immune surveillance to completely eliminate cancer cells will finally result in cancer (Razei, 2014). Cells involved in the mounting of an immune response that have been shown to be affected by n-3 PUFA include T cells (lymphocytes) DCs and macrophages; it's also affect lipid rafts composition and expression on surface molecules essential for T cell activation and communication with other immune cells; n-3 FAs enhanced cancer cell apoptosis and protected NK cells against degradation (Watson *et al.*, 2010; Gu *et al.*, 2013).

The aim of this study was to determine the association between high intake of dietary omega-3 fatty acids and protection of breast cancer among women attending RICK for treatment.

SUBJECTS AND METHODS

Women (60) under treatment at RICK for diagnosed breast cancer and matched controls (60) were investigated.

Methyl esters of linoleic acid (LA), α-linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid were prepared for the determination of dietary and platelet composition using a GLC model 2010 (Shimadzer Corporation); Sigma (2004) references were used.

RESULTS

The patients were older than their controls; mean ages were 44 and 39 respectively (Table 1). A family history of breast cancer was higher among patients compared with controls (15% vs 5%) but no significant difference was observed ($P>0.05$).

Between the two groups a majority of the patients were from western Sudan followed by those from the central and eastern regions.

The most predominant cancer (66.7%) was ductal carcinoma in sito (DCIS) with lower incidence of invasive ductal carcinoma (IDC), lobular carcinoma in sito (LCIS). Lump duration was mostly (85%) less than one year.

Table 1: Patients' background.

Parameter	Description	Controls - % (n)	Patients - % (n)
Age (years)	30-40	60.0 (36)	38.3 (23)
	41-50	36.7 (22)	31.7 (19)
	51-60	3.3 (2)	30 (18)
	Mean age	39	44
Region	West	-	36.7 (22)
	Central	-	28.0 (17)
	East	-	20.0 (12)
	South	-	1.7 (1)
Family history of BC	yes	5.0 (3)	15.0 (9)
BC types	DCIS	-	66.7 (40)
	IDC	-	18.3 (11)
	LCIS	-	11.7 (7)
	ILC	-	3.3 (2)
Lump duration (months)	0 - 12	-	85.0 (51)
	13 - 24	-	8.3 (5)
	24 - 36	-	1.7 (1)
	49 - 60	-	5.0 (3)

Patients platelet LA level was higher than that in the controls while levels of ALA, EPA and DHA were lower; the differences were highly significant (P=0.000) as shown in Table 2.

Table 2: Platelet PUFAs Levels (1µg/5ml blood) among patients and controls.

Fatty acid	Controls	Patients	P-value
LA	2.29±5.54	23.69±10.23	0.000
ALA	14.04±14.8	0.364±0.24	0.000
EPA	5.49±11.51	0.224±0.603	0.001
DHA	14.53±21.75	0.125±0.316	0.000

DISCUSSION

NCI (2006) reported more breast cancer cases in women older than 55 years compared with those younger than 45 years, however, in this study the majority were 30-40 years old. Most of the patients were migrants especially from western and eastern regions. Thus incidence of breast cancer is increasing at a younger age in Sudan due to rural urban migration resulting in lifestyle and behavioral changes, unhealthy dieting and lack of physical activities (Mohamed *et al*, 2012).

When the immune system is functioning normally, harmful entities are recognized and the host is protected from external attack by pathogens and internal attack by cancers (Parham, 2014). Maclean and his co-workers stated that amongst 43 risk ratios calculated across the 19 cohort for 11 different types of cancers and 5 different ways of assessing omega-3 fatty acid

consumption {fish, total omega-3, alpha- linolenic acid (ALA), decosahexaenoic acid (DHA), and eiocosapentaenoic acid (EPA)}, significant association was found between omega-3 consumption and reduced incidence of breast cancer were reported (Maclean *et al.*, 2005). Robinson et al, investigated that dietary LCPUFA n-3 increased NK cell cytotooxicity in both healthy and tumor- bearing rates, and suggested that n-3 supplementation may prevent tumor induced suppression of NK cells cytotoxicity (Robinson *et al*, 2002). Also, Vitro and ex vivo study established by the East Carolina University Brody School of Medicine in USA tested the relationship between n-3 polyunsaturated fatty acids (PUFAs) and modification of T-cell activation. In vitro, EPA and DHA improved the membrane n-6/n-3 PUFA ratio. Ex vivo result highlights that high-fat n-3 PUFA diets can promote pro-inflammatory responses (Rockett *et al.*, 2010).

The dietary intake of LA, ALA, EPA and DHA was reflected in the platelet levels as patients had higher levels of LA and lower levels of ALA, EPA and DHA compared to the controls.

In conclusion, the study showed high intake of LA and low intake of ALA, EPA and DHA in association with breast cancer among Sudanese women attending RICK; it is recommended that those who do the voluntary test for breast cancer should be given dietary counseling which may help to decrease the possibility of acquiring the disease.

REFERENCES

1. Abdurahman, G.O. and Adebisi, G. Epidemiology of Breast Cancer in Europe and Africa, *Journal of Cancer Epidemiology*. doi: 10. 1155/ 915610. 2012.
2. Gu, Z.; Subuin, J. and Chen, Y.Q. Mechanism of Omega-3 Polyunsaturated Fatty Acids in Prostate Cancer Prevention. *Biomed Res Int Journal*. Doi: 10.1155/ 2013/ 824563. 2013.
3. IARC. International Agency for Research on Cancer. The Global Burden of Cancer. www.iarc/fr/ en/ media-center/ pr/ pdfs/ pr223-E. pdf. 2013.
4. MacLean, C.H.; Newbrry, S.J. and Moijca, W.A. Effect of Omega-3 Fatty Acids on Cancer, Summary: Evidence Report Technology Assessment: Number 113. Agency for Healthcare Research and Quality (AHRQ). 2005.
5. Mohammed S, Hamad K, Almobarak A, Elhoweris M. Sudan First International Conference on Breast Cancer, *Sudan Med J*, 2012, April; 48(1): 58.
6. National Cancer Institute (NCI), what you need to know about cancer: risk factors, www.cancer.gov, 2006.

7. Parham, P. The Immune System. 4th edition. Garland Science Publishment. USA. 2014.
8. Rezaei, N. Cancer Immunology: Translational Medicine Context. Springer Press. USA. 2014.
9. RICK. Annual Report. Radiation and Isotopes Centers in Khartoum. 2014.
10. Robinson, L.E.; Thomas, M. and Field, C.J. The Role of Dietary Long-chain N-3 Fatty Acids in Anti-cancer Immune Defence and R3230 AC Mammary Tumor Growth in Rats: Influence of Diet Fat Composition, Breast Cancer Research, and Treatment., 2002; 78: 145- 160.
11. Rockett, B.D.; Salameh, M.; Carraway, K.; Morrison, K. and Shaikh, S.R. N-3 PUFA Improves Fatty Acid Composition, Prevents Palmitate-Induced Apoptosis and Differentially Modifies B cell Cytokine Secretion in Vitro and Ex Vivo. *The Journal of Lipid Research*., 2010; 51(6): 1284-97.
12. Watson, R.R. Zibadi, S.h. and Preedy, V.R. Dietary Components and Immune Function. Humana Press. UAS. 2010.