Relationship between Breast cancer and Vitamin A and Family history of Iraq women population

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Abstract
Breast cancer is the most prevalent malignant type all over the world including Iraq. Vitamin A is a fat-soluble vitamin that is also powerful antioxidant. The mean value ± SE of family history for control, benign, malignant and radiotherapic breast cancer showed a non-significant change in the comparison of groups according to the Duncan test. The levels of vitamin A showed significant differences ($p<0.05$) when compared with the radiotherapic group. Serum estimation used High Performance Liquid Chromatography (HPLC) assay. The aim of this study was to evaluate antioxidant vitamin A in the radiotherapy, malignant and benign groups related to the control group.

Keywords: Breast cancer, Vitamin A, Family history.

Introduction

Breast cancer is the most prevalent malignant type all over the world. Women, who have a family history of breast cancer, especially a first-grade (mother, sister, daughter, father or brother) are riskier of infection and the risk increases 5 -fold if more than one[1]. Vitamin A is a fat-soluble vitamin that is also powerful antioxidant. It plays a critical role in maintaining healthy vision, neurological function, healthy skin and many membranes. It is involved in reducing inflammation through fighting free radical damage. Consuming a diet high in antioxidants is a way to naturally slow aging[2]. More than 500,000 kids worldwide are blind each year because of deficiency of vitamin A in the diet[3].

Vitamin A is linked with growth, differentiation of cells and tissues, during pregnancy, during the breastfeeding time and has a significant role in healthy development of the fetus and newly born. Vitamin A protects skin and mucous membranes (especially front of eye and lining of digestive and respiratory tracts)[4].

Patients with a family history of breast cancer participated more frequently in screening procedures and had a higher rate of image-detected tumors with smaller size at initial diagnosis, compared to patients without affected family members. Breast cancer screening procedures were significantly associated with improved survival[5]. Approximately 12% of women with breast cancer had one affected relative and 1% had two or more. Risk ratios for breast cancer increased with increasing numbers of affected first-degree relatives[6].

Material and Methods

Patients were recruited in September 2016 to January 2017 within population-based case–control study on breast cancer in Iraq [90 cases divided into three groups (30 malignant, 30 benign and 30 radiotherapic) and 30 age-matched healthy controls]. Univariate and multivariate analyses were performed to evaluate the effect of family history and vitamin A on breast cancer risk, participation in screening procedures, tumor size and prognosis.

Results and Discussion

Family history is a hereditary factor, almost a quarter of women with breast tumor in the study have a direct relationship (mother, sister or daughter) however, not all of the cases have a family history of breast cancer (about three-quarters have a negative family history). There was a non-significant change in all groups ($p>0.05$) as shown in table 1.

Vitamin A (retinol in mammals) is a fat-soluble vitamin. Two kinds of vitamin A can take in provitamin A of plants and preformed vitamin A of animal source. Vitamin A shows significant differences ($p<0.05$) when compared to radiotherapic group with the benign group, while there was a non-significant change ($p>0.05$) when compared with the malignant, as that of benign and radiotherapic groups in relation to the control group. The mean values of vitamin A in sera of control, benign, radiotherapy and malignant breast tumor are respectively shown in table 2.

Patients with a family history of breast cancer participated more frequently in screening procedures and had a higher rate of image-detected tumors with smaller size at initial diagnosis, compared to patient's healthy family members. Breast cancer screening procedures are significantly associated with improved survival[4]. About 12 % of women with breast cancer had one relative affected and 1% had two or more. Risk ratios in breast cancer increased with increasing numbers of affected first-degree relatives[5]. In family breast cancer cases, the tumor cells typically contain a mutation in one allele and a deletion of the remaining allele in keeping with the long-standing "two-hit" hypothesis by Thorlacius[6].

Hereditary non-carcinomas are believed to result from the expression of weakly penetrate but highly prevalent mutation in various genes such as polymorphism was identified in genes associated to the metabolism of estrogens and / or carcinogens[7].

Table 1
Family history numbers for control, benign, malignant and radio therapic groups.

Parameters		Cont. N=30	Group 1 Rad. N=20	Group2 Mal. N=30	Group3 Ben. N=30
Family History	Positive family history	15	9	13	13
	Negative family history	15	11	17	17
	chi-sq.		0.123	0.069	0.069
	DF		1	1	1
	p-value		P>0.05	P>0.05	P>0.05
	chi-sq.			0.014	0.014
	DF			1	1
	p-value			P>0.05	P>0.05
	chi-sq.				1.067
	DF				1
	p-value				P>0.05

Table 2
Vitamin A (µg\dl) for control, benign, malignant and radio therapic groups.

Parameters		Groups			
		Cont. n=30	Group 1 Rad. n=20	Group 2 Mal. n=30	Group 3 Ben. n=30
Vitamin A (µg\dl)	Mean	58.2 ^{abc}	50.4 ^{ade}	57.9 ^{bdg}	62.6 ^{cfg}
	SE	3.3	4.9	3.0	2.9

►Similar letters: Non- significant difference (p> 0.05) between means.
►Different letters: Significant difference (p ≤ 0.05) between means.

However, in sporadic cancers, genetic changes take place after conception in a single cell and its descendants, therefore, it takes time for all of the changes and mutations to accumulate in one cell. That is probably why most non-hereditary cancers were diagnosed at older ages[8]. Most inherited cases of breast cancer are associated with two abnormal genes: BRCA1 (breast.cancer.gene.one) and BRCA 2, (breast cancer gene two). The function of the BRCA genes is to repair cell damage and keep breast, ovarian and other cells growing normally. However, when these genes contain abnormalities or mutations that are passed from generation to generation, the genes do not function normally and breast, ovarian and other cancer risk increases.

Abnormal BRCA1 and BRCA2 genes may account for up to 10% of all breast cancers, or 1 out of every 10 cases. Presence of abnormal BRCA1 or BRCA2 gene does not mean the case will be diagnosed with breast cancer[9]. Women who are diagnosed with breast cancer and have an abnormal BRCA1 or BRCA2 gene often have a family history of breast cancer, ovarian cancer and other cancers. Still, most people who develop breast cancer did not inherit abnormal breast cancer gene and have no family history of the disease. Changes in other genes are also associated with breast cancer. These abnormal genes are much less common. These genes are ATM, ATM, CDH1, CHEK2, MRE11A, NBN, PALB2, PTEN, RAD50, RAD51C, or TP53[10]. The genes investigated in this study are not among these genes.

Studies have indicated a decrease in the level of vitamin A after radiation therapy, especially when the stage of cancer is advanced and this is consistent with our study[11]. The use of radiation therapy in the treatment of cancer with cellular oxidation processes that reduces the antioxidants that threaten the safety and survival of adjacent natural cells[12]. The reduction is still unclear, but cancer cells use antioxidants more effectively than normal cells and these results are consistent with those of Elango et al[13] who reported significant reductions in the levels of vitamins A in cancer patients who received radiation therapy with those who did not receive radiation therapy in addition to its antioxidant role. It has been suggested that vitamin A improves blood flow which promotes normal tissue oxygenation and renders the tumors susceptible to radiation[14].

Administering high doses of vitamin A daily before irradiation and during the observation period produced a cure rate above 90% with breast cancer and enhanced the amount of radiation damage[15]. Other research has shown no correlation between vitamin A concentration and subsequent development of breast cancer, a number of prospective studies have shown a significant negative correlation

between serum vitamin A (retinol) concentrations and risk of cancer[16].

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