



Evidence of Epstein–Barr Virus in Female Breast Cancer

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Dear Editor-in-Chief

Breast cancer is the most frequent malignancy in women worldwide. It is ranked first among malignancies of women in Iran and accounts for 24.6% of cases of cancer in Iranian women (1).

The Epstein–Barr virus (EBV) is a ubiquitous herpes virus. Infections with EBV usually occur in early childhood, with most EBV infections being subclinical (1, 2). In healthy carriers, EBV remains in memory B cells without any serious consequences. However, in some carriers EBV is associated with a number of malignancies, including Burkitt's lymphoma, non-Burkitt's lymphoma, nasopharyngeal carcinoma, etc. (3).

The aim of this study was to investigate the EBV *EBER* gene in 80 paraffin-embedded malignant breast cancer tissue samples and 80 samples with benign breast lesions. Deparaffinization and DNA extraction was performed using protocol mentioned in previous study (2). The *EBER* region of the EBV genome was used as the primer for the detection of EBV in all samples by PCR (4).

EBER-1 and *EBER-2* are small non-coding RNAs. They have a high expression in the three forms of latency in EBV-infected cells. Their possible effects in carcinogenesis include up regulation of interleukin-10 and insulin-like growth factor (IGF-1) production and inhibition of IFN- α mediated apoptosis (5).

The role of the viruses in breast cancer is controversial. Studies, of association and presence of EBV in breast cancer, have had inconsistent results: varying from 0% to 50% positive in breast cancer specimens from different studies (3, 6). Labrecque et al were the first to report the association of EBV and human breast cancer. They have detected *BamHI* major EBV in 21% of 91 breast cancer samples using PCR (7). Some studies reported the presence of the virus in human breast cancer (8, 9). However, another study reported the absence of EBV in breast cancer (10).

In our study, *EBER* gene of EBV was detected in 11.2% (nine out of 80) of breast cancer tissues and none in the non-cancerous tissues (Fig. 1).

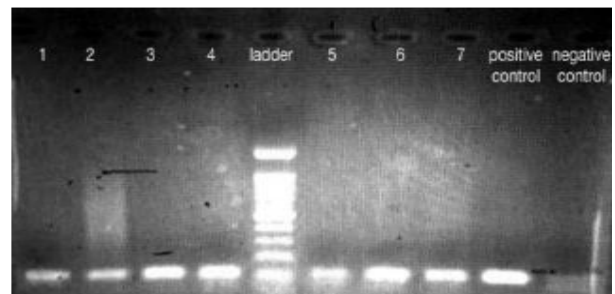


Fig. 1: Agarose gel electrophoresis EBV – DNA. 1–4, 5-7; positive breast cancer samples, DNA Ladder; Molecular weight: Gene Ruler TM 100-bp; Positive control: B95 cell line, negative control



The highest frequency of EBV – *EBER* in breast cancer samples was observed in IDCII (Invasive Ductal Carcinoma II) (10.9%) and in ≤ 50 age group (13.2%) (Tables 1, 2). This finding suggest

that these patients are infected with EBV at an early age, that the virus remains in their bodies, and that it may have contributed to cancer progression.

Table 1: Age group and histopathological characteristics in breast cancer cases (n= 80) and control groups (n=80)

<i>Variable</i>	<i>Case%</i>	<i>Control%</i>
Age group(yr)		
≤ 50	66.3	82.5
50<	33.7	17.5
Histopathological characteristics	IDCI ^a (3.8)	
	IDCII (57.5)	
	IDCIII (7.5)	
	ILCI ^b (2.5)	
	ILCII (7.5)	
	Phyllodes tumor (0.6)	
	Metastatic tumor (0.6)	
	Mucinous carcinoma (0.6)	
	Invasive carcinoma (3.1)	
		Fibroadenoma (15)
		Lipoma (3.8)
		Fat necrosis (1.3)
		Epidermal cystic (3.8)
		Lymph node (3.8)
		Ruptured epidermal cystic (1.3)
a: Invasive Ductal Carcinoma, b:Invasive Lobular Carcinoma		
b:Invasive lobular carcinoma		

Table 2: Frequency of EBV between histopathological characteristics and age group in cases with breast cancer

<i>Variable</i>	<i>EBV- EBER</i>		<i>Total</i>
	<i>Positive</i> <i>No,%</i>	<i>Negative</i> <i>No,%</i>	
Age group(yr)			
≤ 50	7(13.2)	46(86.8)	53(100)
50<	2(7.4)	25(92.6%)	27(100)
Total	9(11.2)	71(88.8)	80(100)
Histopathological characteristics	IDCI	0(0.0)	11(100)
	IDCII	5 (6.25)	41(89.1)
	IDCIII	1(1.25)	5(83.3)
	ILCI	1(1.25)	1(50)
	ILCII	2(2.5)	4(66.7)
	Phyllodes tumor	0(0.0)	1(100)
	Metastatic tumor	0(0.0)	1(100)
	Mucinous carcinoma	0 (0.0)	1(100)
	Invasive carcinoma	0(0.0)	5(100)
	Total	9(11.25)	71(88.8)

Our results showed a potential role of EBV infection in breast cancer. However the controversy remains. Additionally, the exact mechanism of

the potential role of EBV in breast cancer is yet to be elucidated.

Conflict of interest

The authors declare that there is no conflict of interests.

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