

The Molecular Detection of EBV Among Hodgkin and Non-Hodgkin Lymphoma in Iraqi Patients

Aya Raad Saleh

Department of Molecular and Medical Biotechnology, College of Biotechnology, Al-Nahrain University, IRAQ

Corresponding Author: aya.raad@nahrainuniv.edu.iq



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ABSTRACT

Objective: The study aimed to detect the molecular pattern of Hodgkin lymphoma and non-Hodgkin lymphoma (NHL) in Iraqi patients and identifying the most common kind of both among the female and male Iraqi patients. Epstein-Barr virus (EBV) infection is closely associated with many subtypes of malignant lymph nodes of both Hodgkin and non-Hodgkin lymphoma. Two of the most common hematological malignancies in the world are NHL and HL. Having a variety of biological and clinical characteristics, it originates from lymph tissue. **Method:** 359 specimens ranging in age from 25 to 75 years were gathered from the pathology departments of Al_Kadhymia teaching hospital/ hematology department. Our goal was to find out how common EBV is in NHL and HL. **Result:** The current study included 359 specimens (186 females and 173 males), which investigated the percentage of NHL in ladies was (35.1%), whereas HL's was (64.9%). HL with (43.2%) was detected in males, while NHL was (57.8%), which represent a higher differences ($P \leq 0.0001$) between NHL and HL in female and male.

Keywords- Epstein-Barr Virus (EBV); Hodgkin Lymphoma; Non-Hodgkin Lymphoma.

I. INTRODUCTION

Over 90% of people worldwide are infected with the Epstein-Barr virus. The World Health Organization (WHO) recognized EBV as a tumor virus in 1997, which are classified as either low-grade or aggressive tumors [1]. The rate at which aggressive tumors progress usually depends on the position of the lymph tissue and most patients display a number of other symptoms when they first arrive [2]. In order to receive chemotherapy, radiation, and other forms of treatment on a regular basis, it's important to note that the most NHL was associated with follicular lymphoma [3].

The B-cell cancer known as Hodgkin lymphoma (HL) is classified as five types: Nodular sclerosis, lymphocyte-rich, and lymphocyte-depleted [4]. The nodular lymphocyte-predominant HL (NLPHL) subtype consider the most common type [5]. The complex epidemiology of HL suggests that there are several contributing factors such as the genetic and environmental variables are likely to interact [5]. The EBV's role in the pathophysiology of HL is influenced by various factors, including the age group and the place of origin. Nearly half of all cases of Hodgkin lymphoma are caused by EBV, which plays a part in the disease's development [6]. The chronic antigenic activation and immunosuppression brought on by EBV infection are crucial elements of the neoplastic process; both the person's age at the time of the initial EBV infection and his genetic background seem to have a significant impact on how the illness manifests clinically [7]. The idea that the viruses could cause human cancers was discussed more than fifty years ago. The Epstein-Barr virus (EBV) is an old virus as it was identified in 1964 using electron microscopy of Epstein and Barr cells extracted from cancerous tissue for African patients with Burkitt's lymphoma [8]. The EBV is a DNA virus that encodes about 100 viral proteins. It is a member of the γ herpes virus subfamily, which is also referred to as "tumor viruses" because it spreads viral cancer genes and infected lymphocytes [9]. Additionally, EBV could be correlated to a number of malignant factors as gastric cancer, NK/T lymphoma, nasopharyngeal carcinoma, Hodgkin's lymphoma, and non-Hodgkin's lymphoma [10]. Similar to other virus types, EBV

requires a host in order to and spread before infecting the B cell. Out of all patients with lymphomas, 73% developed NHL and 27% developed Hodgkin lymphomas [11]. About 86% of the cells in the NHL are B lymphomas, such as the Diffuse large B cell lymphoma (DLBCL) which consider the most common B cells in NHL, accounting for 14% of the total, followed by follicular lymphoma (6%), lymphoblastic lymphoma and Burkett's lymphoma (4%) and other types (10%) [12]. NHL can be divided into two types based on clinic pathological characteristics, each of which has distinct histologic characteristics, aggressive and lethargic kind [13]. The hepatomegaly, cytopenia, splenomegaly, and slow-growing lymphadenopathy are all signs of indolent lymphomas. With a median survival of 10–20 years, indolent types of NHL have a rather good prognosis while it's incurable when detected at development stages [14]. The tumor appears quickly and is accompanied by several symptoms which include fever, sweating, weight loss, and elevated uric acid and lactate dehydrogenase enzyme.

The Beers, Hodgkin lymphoma (HL), sometimes known as "Hodgkin's disease," is a malignant tumor that starts from B lymphocyte cells and germinates in lymph nodes in over 98% of cases but in rare cases it arises from T cells [15]. Thomas Hodgkin first described Hodgkin's lymphoma in 1832 and 30–50% of cases of HL were linked to Epstein-Barr virus [16]. The primary goals of this study is to detect the molecular pattern of Hodgkin lymphoma and non-Hodgkin lymphoma (NHL) in Iraqi patients and identifying the most common kind of both among the female and male Iraqi patients [17].

II. MATERIALS AND METHODS

Following a diagnosis of lymphoid cancer, 359 specimens ranging in age from 25 to 75 years were gathered from the pathology departments of Al_kadhymia teaching hospital/ hematology department. This study was aimed to detect the Epstein-Barr virus, and the DNA is extracted from specimens using the tissue protocol (Flavorgene/Korea) kit from the blood sample [18]. The PCR assay is then used to extract the DNA of lymphoma and control specimens using the primer sets.

III. THE RESULT AND DISCUSSION

According to this study, there was a higher differences in type's NHL and HL in all boys, females, and patients overall in the 25–75 age range as shown in (Table 3.1).

(Table 3.1) Compared the presence of EBV and types of lymphoma according to the age in male's patient

Gender	Types	NON-EBV	EBV	P.V
female	Non-hodgkin lymphoma	5	46	0.001
	Hodgkin lymphoma	15	120	
Male	Non-hodgkin lymphoma	3	132	0.001
	Hodgkin lymphoma	8	30	
Total	Non-hodgkin lymphoma	8	178	
	Hodgkin lymphoma	23	150	

According to a recent study, EBV is linked to a number of cancers, including Hodgkin lymphoma (HL) and non-Hodgkin lymphoma (NHL), which are both malignant neoplasms that affect the lymph nodes and other lymphatic tissues of the immune system as the heterogeneous groups of malignancies (85–90%) are caused by B, T, or natural killer cells [19] (Table 3.2).

(Table 3. 2) The frequency and percentage different types of Non-Hodgkin lymphoma (NHL) and Hodgkin lymphoma (HL) for the samples

Females						Males					
Total female	%	Total NHL	NHL %	Total HL	HL %	Total males	%	Total NHL	NHL %	Total HL	HL%
186	52	65	35	121	65	173	48	99	57	74	43

In order to identify the EBV genome in tissue from individuals with and without Hodgkin's disease, we employed in situ hybridization in our investigation [20]. (Table 3.3)

(Table 3.3) The PCR assay to extract the DNA

Primer	Nucleotides sequences	G-C %	product
Forward	CTAGCGACTCTGCTGGAAT-3-5	53%	337bp
Reverse	GAGTGTGTGCCAGTTAAGGT-3-5	50%	

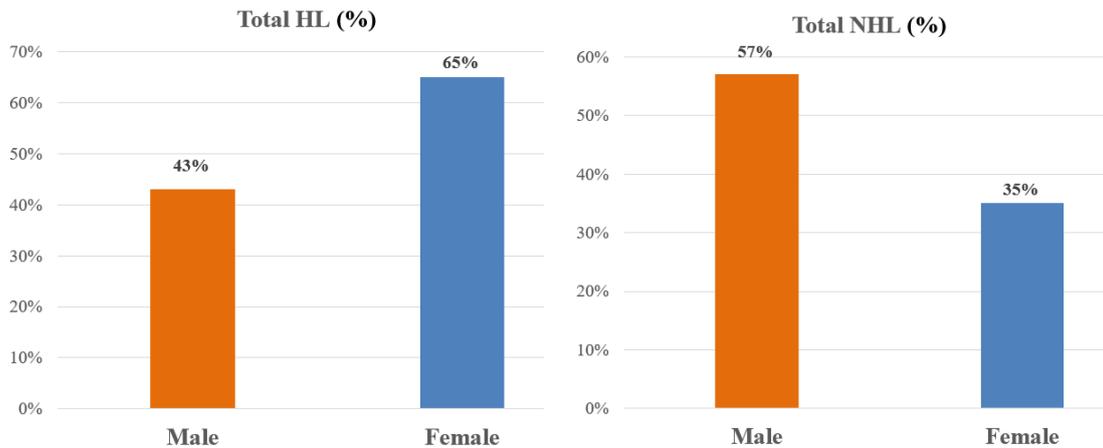


Figure 1 shows the differences between NHL and HL in male and female patients

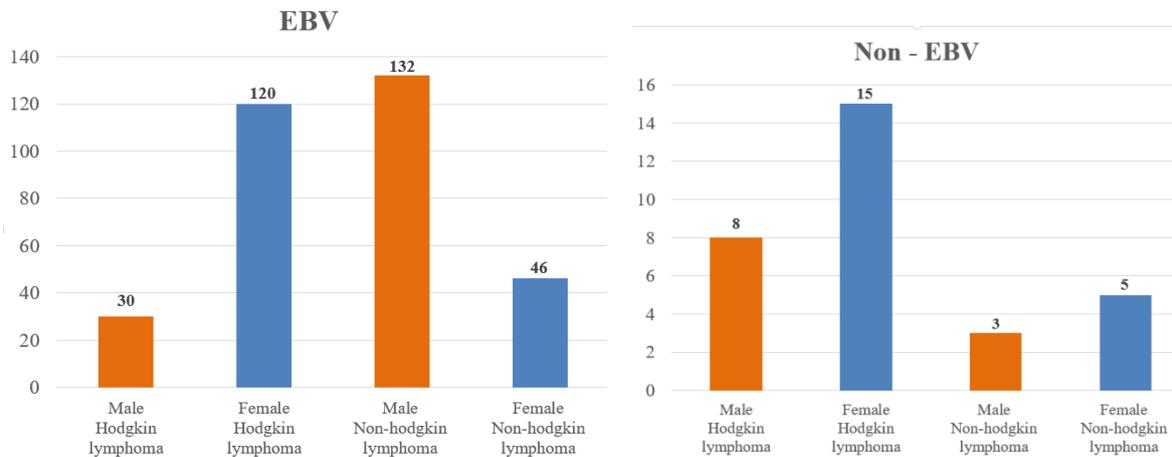


Figure 2 shows the differences between the male and female patients with NHL and HL with EBV and Non-EBV

Two theories have been proposed to explain how infection might lead to lymphoma. The first is that certain viruses, including EBV and human herpes virus 8 (HHV8), can directly infect lymphocytes and change them through the production of oncogenes [21]. Second, persistent lymphocyte activation and other forms of immune suppression brought on by various infections can raise the risk of lymphoma. One benefit of in situ hybridization is that it may reliably identify the RNA virus in the cancerous cells based on its morphology [22]. According to the 2010 Iraqi Cancer Registry, Hodgkin lymphoma accounts for 35% of malignant lymphoma cases, making it the third most common cancer in this nation [23]. The occurrence of HL in the Registry was 1.58 per 100,000 people in 2010. Over the past few decades, a number of research indicated the HL patient could be higher than the NHL patients in Iraq [24]. These conditions are more prevalent in developing nations where a number of factors, including genetic, environmental, and infectious factors, combine to speed up the development of these disorders. About fifty percent of the Non-Hodgkin lymphomas are more prevalent in men than in women [25]. The PCR amplification of EBV could be specific for the tumor cells, and this test is typically good for performance the connection between the virus and a specific tumor because latent EBV infection is existence in the majority of adults [26].

IV. CONCLUSION

The Females and males Iraqi patients had higher rates of lymphoma, according to current study, the males have a decrease in HL compared to female while the NHL is higher than the female and that all HL and NHL cases should be evaluated for EBV status by PCR detection for further supported.

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