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# Association of Epstein Barr Virus (EBV) with Nasopharyngeal Carcinoma (NPC)

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## Abstract

**Aim:** To observe the frequency of nasopharyngeal carcinoma (NPC) and its association with Epstein Barr Virus (EBV) infection.

**Setting:** This study included consecutive cases of nasopharyngeal carcinoma, which were diagnosed in the Department of Pathology at the Aga Khan University Hospital, Karachi in the period of two Years (1996-97).

**Methods:** These tumors were initially evaluated on H&E stained sections. The tumors showing evidence of keratinization were excluded from the study. The Epstein Barr Virus was detected with the help of Polymerase chain reaction in formalin fixed, paraffin embedded tissue sections.

**Results:** During the study period, seventeen cases of nasopharyngeal carcinoma were diagnosed which comprised 0.3% of all malignant tumors. The age ranged from 5 years to 70 Years with male to female ratio of 2.4:1. The NPC was more prevalent in adults (71%) as compared to children (29%) under 15 years. Six cases (35%) exhibited positive signal for Epstein Barr Virus.

**Conclusion:** Nasopharyngeal carcinoma is an infrequent tumor. The prevalence of Epstein Barr virus infection in nasopharyngeal carcinoma is quite low as compared to other regions of the world (JPMA 50:182, 2000).

## Introduction

Nasopharyngeal carcinoma (NPC) is an infrequent type of cancer<sup>1,2</sup>. Marked variation in the prevalence of nasopharyngeal carcinoma (NPC) has been observed in the different regions of the world. For instance in Southern China, NPC is one of the most common type of malignant tumors in adults while in Northern Africa, its prevalence is quite high in children<sup>3,4</sup>. Whereas in USA, NPC is extremely uncommon in both children and adults<sup>3</sup>. A strong association between Epstein Barr Virus infection and nasopharyngeal carcinoma has been demonstrated with the help of immunologic and epidemiologic data<sup>5-8</sup>. The association of HLA types with nasopharyngeal carcinoma suggests the possibility of genetics as a predisposing factor<sup>9</sup>. The presence with LILA A<sup>2</sup> antigen has significant lower risk for the development of nasopharyngeal carcinoma as compared to those patients who have other antigens at A locus<sup>10</sup>. The aim of the study was to observe the frequency of nasopharyngeal carcinoma (NPC) and its association with Epstein Barr Virus (EBV) infection.

## Material and Methods

The study included seventeen consecutive cases of nasopharyngeal carcinoma, which were diagnosed in the Department of Pathology at the Aga Khan University Hospital, Karachi in the period of two years (1996-97). These tumors were initially evaluated on haematoxylin and eosin stained sections. The tumors showing evidence of keratinization were excluded from the study. The immunohistochemical staining was performed whenever required. The antibodies used in immuno-histochemical staining included Cytokeratins (CK CAM 5.2, CK AE1/AE3, CK MNF), Epithelial membrane antigen (EMA) and Leukocyte common antigen (LCA) by employing Peroxidase Anti-peroxidase technique. The Epstein Barr Virus was detected in formalin fixed, paraffin embedded tissue sections with the help of Polymerase chain reaction. Thirty-five blood samples as control were analyzed from healthy

individuals.

## Results

A total of 5517 malignant tumors were diagnosed in the Department of Pathology in the period of two years (1996-97) that included 17(0.3%) cases of nasopharyngeal carcinoma. The age of patients ranged from 5 to 70 years with male to female ratio of 2.4: 1. The NPC was more prevalent in adults (71 %) as compared to children (29%) under the age of 15 years. All cases of NPC were evaluated for EBV with the help of polymerase chain reaction. Six cases (35%) exhibited positive signal for Epstein Barr Virus. All blood samples taken from healthy adults as control revealed no evidence of EBV infection.

## Discussion

The analysis of frequency and prevalence of the disease in the different regions demonstrates the geographic and ethnic variation of the disease. Such observations help in the identification of factors which can provide the clues to the etiology and pathogenesis. Change in the incidence of the disease in a region provides information regarding the preventable associated risk factors.

Nasopharyngeal carcinoma (NPC) is not a common type of cancer but high prevalence rate has been observed in certain regions such as Southern China and Northern Africa<sup>11</sup>.

In our series the nasopharyngeal carcinoma comprised 0.3% of all malignant tumors which is in accordance with another series in which nasopharyngeal carcinoma constituted 0.5% of total malignant tumors<sup>12</sup>. In the present series, the nasopharyngeal carcinoma comprised 1.9% of all malignant solid tumors in children below the age of 15 years. This figure is slightly higher than the data reported in the others series<sup>13,14</sup>

Low frequency of nasopharyngeal carcinoma in our region can be attributed to genetic or environmental factors. A protective association between HLA A2 antigen and nasopharyngeal carcinoma has been observed<sup>10</sup>. A study of HLA frequencies in Pakistani population groups revealed that HLA A2 was one of the common types in all Sindhi, Punjabi, Urdu and Pushto population groups<sup>15</sup>. This factor could be one of the reasons for the less frequent occurrence of nasopharyngeal carcinoma in our population. In our series, Epstein Barr Virus was detected in only 35% of cases of nasopharyngeal carcinoma with the help of polymerase chain reaction. This association is quite low as compared to other regions of the world<sup>16</sup>. All thirty five control specimens of blood from healthy persons also failed to reveal any evidence of Epstein Barr Virus infection. In conclusion, NPC is not a very common tumor and its association with Epstein Barr Virus infection is not high in Pakistan as compared to the other regions.

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