

## ANTI EPSTEIN-BARR VIRUS ANTIBODIES IN THE VENEZUELAN POPULATION

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### ABSTRACT

Epstein-Barr virus (EBV) antibody titers were studied in 99 Venezuelan children and 98 adults of different ages and from both sexes. Antibodies to the viral antigens were determined by immunofluorescent assays. It was observed that primary EBV infection occur early in life as evident from an antibody frequency of 25% in males and 44.4% of females under one year of age. This antibody frequency increases to nearly 90% by 2-5 years. Antibodies were observed in 100% of the sera from adults subjects. Antibody titers were higher in children than in adults. The serological pattern observed in the Venezuelan population did not differ from that previously established in other parts of the world. The observed early EBV infections are probably the result of a low socioeconomical status and crowded living conditions of the studied population.

### INTRODUCTION

Epstein-Barr virus (EBV) is a lymphotropic herpes virus which has been shown to occur in all human populations even in the remotest parts

of the world (2). There are, however, variations in the time at which primary EBV infections develop, which depend on the hygienic standards and/or the degree of crowding of the population. In geographical areas with low socioeconomical status, antibodies to EBV are detected in almost all children by the age of three years with the primary infection remaining silent as a rule. In areas with improved living conditions acquisition of antibodies may be postponed and then, about 50% of these delayed primary primoinfection result in a self-limited lymphoproliferative disorder, i.e., infectious mononucleosis (4).

The humoral immune response to this virus is characterized by the presence of antibodies to virally determined antigens in the host cell membrane, the viral capsid antigen (VCA) and the early antigen membrane complex, the diffuse (EA-D) and the rugose (EA-R) patterns. An antibody response to a nuclear antigen (EBNA) is also present and its presence is postulated to be related to a previous release of the antigen by the cell-mediated attack to the virus infected cell. Since this virus is ubiquitous in nature almost all normal human populations are infected and manifesting serum antibodies. The serological pattern normally present is that of low antibody titers to VCA and EBNA antigens. Low frequency and titers of anti EA-R antibodies is also observed. Modifications of the normal serological pattern are associated to the malignant events caused by, or associated to, this virus, i.e., Burkitt's lymphoma and nasopharyngeal carcinoma.

We have recently described an unusual pattern of Epstein-Barr virus-specific antibodies in Venezuelan children affected by the Chediak-Higashi syndrome. This pattern resembles that seen frequently in Burkitt's lymphoma patients (3). However, the age at which primary infection takes place, as evident from antibody prevalence and serological pattern in Venezuela has not been previously documented. It was the purpose of this study to determine the seroepidemiological characteristics of Epstein-Barr virus in Venezuelan subjects.

## MATERIALS AND METHODS

Sera were obtained from 91 children 6 months to 5 years of age, 40 being males and 51 females who resided in various parts of the country (Distrito Federal, Aragua, Carabobo, Lara and Sucre States) were studied. The sera from children had been collected by the local Health Authorities to determine serum antibodies to poliovirus after a vaccination campaign. We also studied 98 serum samples from adult blood donors or random healthy individuals 30 to 60 years old, of whom 36 were

males and 62 females. All sera were of apparently healthy subjects living in the State Capital or cities in the countryside nearby and of low or middle socioeconomical status. Sera were stored frozen until use.

Antibodies to the EB viral capsid antigen (VCA) as well as the diffuse (D) and the restricted (R) components of the early antigen (EA) complex were determined by indirect immunofluorescence (4). Antibodies to the EBV-induced nuclear antigen (EBNA) were measured by the anticomplement immunofluorescence (5).

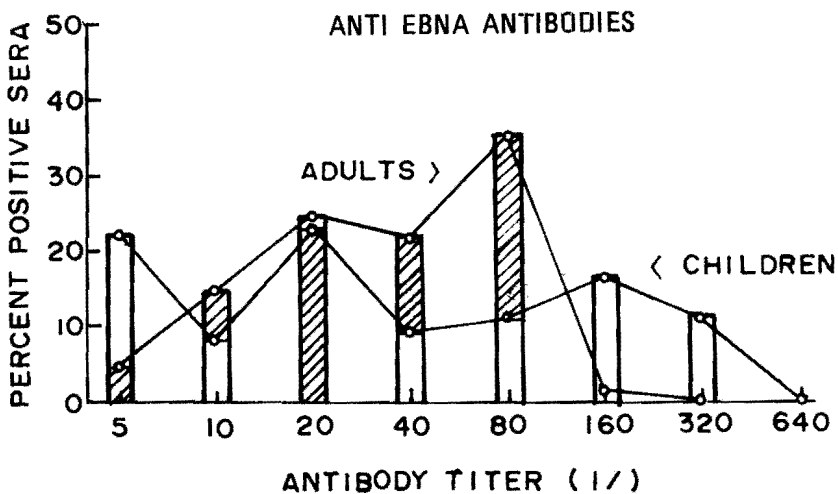
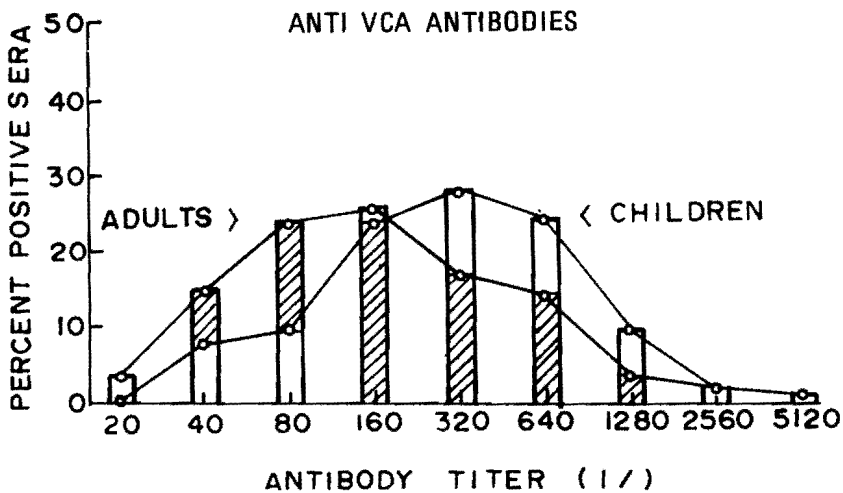
## RESULTS

The percentage of positive sera and the geometric mean titers of EBV-specific antibodies are presented in Table I. As can be seen, overall

**TABLE I**  
ANTI-EBV ANTIBODIES IN VENEZUELAN POPULATION  
PERCENT OF POSITIVE SERA

Age (Years)	Sex	n	VCA		EA-D		EA-R		EBNA	
			%	GMT	%	GMT	%	GMT	%	GMT
Children										
All	Total	91	57.1	275	0	23.1	25	57.1	33	
	Male	40	67.5	275	0	32.5	28	67.5	41	
	Female	51	49.0	263	0	15.7	23	49.0	26	
<< 1	Total	21	33.3	145	0	9.5	28	33.3	9	
	Male	12	25.0	202	0	8.3	20	25.0	6	
	Female	9	44.4	113	0	11.1	40	44.4	12	
1-2	Total	23	60.9	385	0	43.5	26	60.9	22	
	Male	9	77.8	431	0	66.7	28	77.8	26	
	Female	14	50.0	320	0	28.6	25	50.0	18	
2-5	Total	47	66.0	263	0	19.1	23	66.0	50	
	Male	19	89.5	231	0	31.6	25	89.5	60	
	Female	28	50.0	301	0	21.4	22	50.0	40	
Adults										
	Total	98	100.0	154	6.1	24.5	33	97.9	35	
	Male	36	100.0	122	2.8	13.9	13	86.1	31	
	Female	62	100.0	177	8.1	30.7	33	96.8	35	

GMT: geometric mean titer



**Fig. 1.— Anti VCA and EBNA antibody titer distribution in Venezuelan children and adults. A tendency to higher antibody titers in children is observed and due to more recent primary EBV infections.**

57.1% of the children showed antibodies to VCA and EBNA. The percentage was higher in males (67.5%) than in females (49%). 23.1% of the sera showed antibodies to the EA-R membrane antigen and none to the diffuse form of this antigen complex. The age distribution showed that 25% of the males and 44.4% of the females under one year of age had already been exposed to EBV, and this percentage increased to 66% of the children in the 2 to 5 year age group. Anti EBV antibodies were more frequently observed in the male group (89.5%). Antibodies to VCA and EBNA antigens were detected in all of the sera from adults of both sexes, to EA-R antigen in 24.5% of the sera, and 6.1% showed antibodies to the diffuse (EA-D) form of the early membrane antigen.

The distribution of antibody titers is presented in Figure 1. As can be observed the peak of the antibody titers of the children was higher (shifted to the right) than that in adults. Accordingly, the geometric mean antibody titers were higher in children as compared to the adults (Table I).

## DISCUSSION

The results herein reported are indicative, as evident from the presence of serum antibodies, of early exposure in live to this virus in the tested Venezuelan populations. This is probably a result of either low socio economical status or crowded conditions as those seen at the margin of the cities, or both. There was a difference between males and females children in the percent of positive samples, being this difference similar to that observed in other populations. In adults anti EBV antibodies to VCA were detected in all of the sera, and low percentage showed antibodies to the rugose or diffuse forms (EA-R, EA-D) of the early membrane antigen complex. This observation is similar to that of other latitudes and due to the ubiquity of the virus.

The observation that antibody titers and the geometric mean titer were higher in children than in adults is due to more recent primary EBV infections in the young, and in agreement with previous observations in East Africa (2).

### Acknowledgment

This work was support by grants from FundaVargas, FundaPolar and Funda-Ciencia (F.M.) and research grant RO-CA33324 from the National Institutes of Health, U.S. Public Health Service (W.H.).

## RESUMEN

**Anticuerpos antivirales Epstein-Barr en la población venezolana.** Merino, F. (Depto. de Medicina Experimental. IVIC. Caracas 1010-A. Venezuela), Henle W., Jaimes E. *Invest Clín* 24(4): 147-152, 1983.— La prevalencia y títulos de anticuerpos al virus de Epstein-Barr fueron estudiados en 99 niños y 98 adultos venezolanos de edades diferentes y de ambos sexos. Técnicas de inmunofluorescencia fueron usadas a tal fin. Se observó que la infección primaria por este virus ocurre temprano en la vida y como fue apreciado por una frecuencia de 25% de positividad en los varones y 44.4% en las hembras menores de 1 año de edad. El 100% de los adultos presentaron anticuerpos séricos. Los títulos de anticuerpos fueron mayores en los niños que en los adultos. El patrón serológico observado no difirió de los establecidos previamente en otras partes del mundo. La infección temprana por virus de Epstein-Barr es probablemente el resultado de bajo nivel económico y/o condiciones de vida de la población estudiada.

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