PREVALENCE OF PARVOVIRUS B19 INFECTION IN THAI YOUNG ADULTS

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Abstract. The prevalence of antibody to human parvovirus B19 in 128 Thai healthy young adults was measured. Antibodies of the immunoglobulin G (IgG) class were investigated in serum samples of 51 males and 77 females aged 18-24 years (mean 19.83; SD 1.07) by a commercial enzyme-linked immunosorbent assay (ELISA) using high specific recombinant parvovirus B19 antigen. Only 14 out of 128 (10.94%) sera were found positive, including 6 males and 8 females. No sex preponderance was observed. The amount of antibody calculated as antibody index was not statistically significant difference between genders.

INTRODUCTION

Parvovirus B19 is a member of the Family Parvoviridae, Genus *Erythrovirus* (Anonymous, 2000). It is a naked single-stranded DNA virus. It is the only known human pathogenic parvovirus. The infection commonly occurs in childhood and the most consistent symptom of current parvovirus B19 infection is erythema infectiosum, also called fifth disease or 'slapped-cheek' disease (Anderson, *et al*, 1984; 1985). However, it can cause a wide variety of clinical manifestations (Heegaard and Brown, 2002). Since the virus replicates in the nucleus of erythroid precursor cells, the infection is lytic and it causes a transient cessation of red blood cell production. So it leads to transient aplastic crisis in persons with underlying hemolytic disorders, while for other healthy persons there may be no major consequence (Anderson *et al*, 1982; Chorba *et al*, 1986). In the immunocompromised host, the infection can become chronic and result in pure red cell aplasia and chronic anemia (Azzi *et al*, 1993). Transmission usually occurs via respiratory route but intrauterine infection also be found which leads to fetal death *in utero*, hydrops fetalis or congenital anemia (Yaegashi *et al*, 1998).

There are a number of studies reveal the prevalence of parvovirus B19 infection which found to vary depending on geographic distribution from 9.78% up to 92% (Tsujimura *et al*, 1995; Alsaeid *et al*, 1996; Sodja *et al*, 1997; Rebon *et al*, 1998; Lim *et al*, 1999). In this study, the prevalence of parvovirus B19 infection in healthy Thai young adults was determined.

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MATERIALS AND METHODS

Study population

A total of 128 blood samples of undergraduate students, 64 from Chulalongkorn University (CU) in the year 1999, and another 64 from Bangkok University (BKU) in the year 2000, were randomly collected. They were all healthy person. The blood was taken 5 ml each and serum was kept at -20ºC until the assay was performed.

Parvovirus B19 IgG detection

The sera were tested for the presence of anti-parvovirus B19 IgG by enzyme linked immunosorbent assay (ELISA). The commercial Human Parvovirus B19 (recombinant) ELISA kit purchased from Genzyme Virotech GmbH, Germany, was used. The procedure followed the manufacturer's specifications. In brief, antibody specific to parvovirus B19 in the diluted serum

(1:101) will bind to recombinant parvovirus B19 antigen, which coats a well. The immune complexes were then detected by goat anti-human IgG conjugated with horseradish peroxidase. The enzymatic reaction was determined by adding substrate tetramethylebenzidine (TMB) and read at 450 nm by spectrophotometer. The antibody concentration was calculated as an index value according to the recommendation of the company. A positive reaction is determined when the index value is greater than 1.2, and a negative reaction is below 0.8. The grey zone is between 0.8-1.2.

Data analysis

This study was of descriptive design. Most of the data are presented as mean, range, percentage and frequency of the samples. Comparison of the amount of antibody between groups was done by using the *t*-test and Fisher's exact test. In groups with a normal distribution, ANOVA was used, whereas the Mann-Whitney test was used in groups with an abnormal distribution. Statistical significance was set at p-value < 0.05.

RESULTS

In this study, the sera were collected from healthy young adults who were students of two universities, 64 samples from CU and 64 samples from BKU. They were all assayed for the presence of specific IgG for parvovirus B19. Table 1 defines the characteristics of these 2 groups. There were 51 males and 77 females, whole ages ranged from 18 to 24 years (mean ± SD = 19.83± 1.07). The prevalence of anti-parvovirus B19 IgG was 10.94% (14/128). Among the 64 CU students, the mean age was 19.61 years and the prevalence 9.38% (6/64). The prevalence in males (10%, 3/30) was higher than in females (8.82%, 3/34). Similar findings were found in 64 BKU students, with a mean age of 20.05 years and prevalence of 12.50% (8/64). Moreover, the prevalence in males (14.29%, 3/21) was also higher than in females (11.63%, 5/43). However, no significant sexual preponderance was observed (p=0.197). The amount of anti-parvovirus B19 indicated as antibody index was 4.10±2.98 in all positive cases and 0.40±0.14 in all negative cases (Table 1). The antibody indices observed in all positive cases were compared (Table 2). The mean antibody index of the BKU group was greater than the CU group (5.08±3.29 *vs* 2.80±2.09). The amount of antibody was high in the CU male group compared to the CU female group (4.33±1.99 *vs* 1.27±0.005), while the contrary observation was found in the BKU group (4.506±1.405 *vs* 5.42±4.187) (Table 2). In the CU group, the amount of antibody between male and female was statistically significantly different (p=0.1), whereas the BKU group was not (p=0.655). However, there was no significant difference in antibody indexes between genders in those positive cases (p=0.354, 4.42±1.54 *vs* 3.86±3.82; Table 2).

DISCUSSION

Since the first discovery of parvovirus B19 in 1974, during evaluation of assays for hepatitis B surface antigen (Cossart *et al*, 1975), the preva-

Table 1
Characteristics of the studied population.

	Studied group (number of sample)		
	CU (64)	BKU (64)	Total (128)
Male: female (number of cases)	30:34	21:43	51:77
Age range (Years)	18-22	18-24	18-24
Mean age±SD (Years)	19.61±0.83	20.05±1.23	19.83±1.07
(+)Anti-parvovirus B19 IgG	9.38% (6/64)	12.50% (8/64)	10.94% (14/128)
Male	10% (3/30)	14.29% (3/21)	11.76% (6/51)
Female	8.82% (3/34)	11.63% (5/43)	10.39% (8/77)
Antibody index: Mean±SD			
(+) cases	2.80±2.09	5.08±3.29	4.10±2.98
(-) cases	0.45±0.14	0.35±0.13	0.40±0.14

Table 2
Samples seropositive for anti-parvovirus B19 cases in CU and BKU (14 cases).

Group	Male		Female	
	Age (years)	IgG index	Age (years)	IgG index
CU	19	5.128	20	1.269
	20	2.07	21	1.269
	20	5.792	19	1.278
Mean±SD	19.67±0.58	4.33±1.99	20±1	1.27±0.005
BKU	20	4.167	21	9.092
	20	3.049	20	1.617
	20	5.852	20	10.765
			21	2.961
			20	2.655
Mean±SD	20±0	4.506±1.405	20.4±0.55	5.42±4.187
Total	19.83±0.408	4.42±1.54	20.25±0.71	3.86±3.82

lence of parvovirus B19 infection has been reported in various parts of the world, varying according to the geographic distribution from 9.78% up to 92% (Tsujimura *et al*, 1995; Alsaeid *et al*, 1996; Sodja *et al*, 1997; Rebon *et al*, 1998; Lim *et al*, 1999). The age of peak exposure to parvovirus B19 also varied, such as 10-15 years in Kuwait, less than 10 years in Great Britain and more than 20 years in Singapore (Matsunaga *et al*, 1994; Alsaeid *et al*, 1996; Cohen and Buckley, 1988). The prevalence of anti-parvovirus B19 increases with age.

Poovorawan *et al* (2000) studied 129 sera samples in 3 distinct groups (30 healthy children, 64 children with acute unrelated illness and 35 voluntary blood donors). They reported an overall prevalence of 20.16%. The prevalence specified to age groups rose from 11.9% (5/42) in children 0-6 years, 19.05% (8/42) and 25.0% within age groups 7-12 and 13-19 years, respectively, to 30.3% (10/33) in the age group 20-51 years. In addition, Suandork *et al* (2000) reported that the seroprevalence of parvovirus B19 in immunocompromised children aged below 14 years old was 16%. In the present study, the prevalence of parvovirus B19 infection in the age group 18-24 years was only 10.94%, lower than those previous studies. This difference may be due to differences in the sample groups. However, this figure showed a low prevalence of parvovirus B19 among the Thai population, which was similar to the prevalence observed in Singapore (10.3%; Matsunaka *et al*, 1994).

Moreover, the prevalence of infection was slightly high in males (Table 1); however, there was no statistically significant difference between genders (p=0.197). The amount of antibody determined by antibody index showed that the negative cases were all below 0.8, whereas the positive cases had different amounts of antibody, ranging from 1.269 to 10.765 (Table 2). A difference in antibody index between CU and BKU was found, but no statistically significant difference between genders was shown (p=0.354). Although our present data may not accurately represent the prevalence in Thai young adults due to the limited numbers in the studied groups and the narrow age range, it confirmed a low prevalence of parvovirus B19 infection in Thais.

During childhood, infections that manifest as high fever followed by rash are common. Most are caused by viral infections. There are a number of possible viral agents, for example, measles, enteroviruses, Epstein-Barr virus (EBV), cytomegalovirus (CMV), human herpesvirus-6 (HHV-6) and parvovirus B19. The prevalence of infection in Thai children has been previously reported in EBV, CMV and HHV-6 (Pancharoen *et al*, 1998; 2001; Bhattarakosol *et al*, 2001). The data indicated that more than 80% of children aged more than 5 years old already have experience of past infection. Thus, nearly 100% of the Thai

population was suspected to have had experience of past infection by adulthood. In contrast to parvovirus B19, only 10% of young adults (18-24 years) have past infection. Knowledge of this information will be useful to pediatricians for the differential diagnosis of the possible agents of disease with high fever and rash.

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