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Seroprevalence of *Streptococcus*, *Brucella* and *Salmonella* Infection in Mental Retarded Children in Iran*

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Abstract: Institutionalization of Mental Retarded (MR) children increase the risk of infections. In this study, we aimed at investigation the frequency of *Streptococcus pyogenes*, *Brucella* species and *Salmonella* species, infection among children with mental retardation living in Golestan Province in North of Iran. The study included 304 MR and 302 Healthy subjects who comprise the control group. ASO, Wright, 2ME, Widal and CRP were investigated in all serum samples, using Agglutination method. ASO positive test were 24.9 and 18.7% and the frequency of positive Wright test were determined 3.6 and 0.7% in MR and healthy children, respectively. Neither of the children in 2 groups has positive Widal test. The CRP positive test in MR children which was 4.9% were more than healthy children. The high frequency of streptococcal infection suggests that mental retarded children in our region need particular attention about the development of post-streptococcal infection sequel.

Key words: Mental retardation children, streptococcal infection, brucellosis

Introduction

Mental Retardation (MR) is a symptom with multiple etiologies including chromosomal abnormalities, genetic defects, intrauterine, perinatal, neonatal and postnatal causes. Mental retardation refers to substantial limitations in present functioning. It is characterized by significantly sub average intellectual functioning, existing concurrently with related limitations in two or more of the following applicable adaptive skills areas: communication, self-care, home living, social skills, community use, self-direction, health and safety, functional academics, leisure and work. Cognitive and adaptive behavior deficits are manifested before age 18 and are categorized by intellectual functioning level (IQ) below 70-75(AAMR, 1992). The majority of mentally retarded subjects (85%) having IQ 55-69 which is known as mild MR. The prevalence of MR in different societies is varied and it could be estimated to be about 1-3% in all over the world (Dailyd *et al.*, 2000) but Teymouri and Gharaei (1981) showed that its prevalence in IRAN among children was 4.4%, which was higher than what is reported in other researches in Iran.

Mentally retarded individuals could be infected with various microorganisms, due to their especial condition such as physical, mental, emotional and also because they are usually are kept in densely populated center. On the other hand, it has been proved that in Down Syndrome (DS), which is one of the main common types of mental retardation, the Immune system and thymus gland are affected with subsequent immune deficiency. The main disorders in the immune system of such patients are including thymus abnormalities, changes in cell-mediated immunity, phagocytosis and antibodies-mediated immunity (Ustrova and Arikova, 1997) Also Carrie *et al.* (1999) found a gene which normally involved in immune system function and can cause mental retardation when it is mutated.

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Therefore it seems that due to above reasons, mentally retarded children have the higher potential to get an infection compared to the healthy subjects. The aim of this study was to compare determine the find out the infections due to bacterial pathogenesis in mentally retarded and healthy children in Iran.

Materials and Methods

In this study 304 mentally retarded children from the special centers and 302 healthy children school which were matched, were chosen from the Golestan Province in north of Iran, the largest number of subjects presented during the winter and other in early spring months of 2003. The legal permission was obtained from the authorities and children's parents. A questionnaire which include the demographic information were filled for each subject.

ASO, CRP, Widal and Wright and 2ME tests (on the occasion of positive Wright test) were performed on the serums obtained from each subjects by agglutination test by Bionik Kit (Tehran, Iran P.O. Box 14155-4661).

ASO were chosen as a marker of airborne infection, Widal and Wright test were performed as markers of Food born infections and CRP as an unspecific marker of either infection or inflammation. The percentages of positive results in two groups of subjects were compared by chi-square test.

Results

The mean age among of the mentally retarded children were 10.3 (6-14) years and in healthy group were 10.6 years (7-15). The number of boys among the mentally retarded children were 178, Which were 1.41 times of girls cases (126 cases) and in healthy children 165 vs. 137 boys and girls, respectively (Table 1).

ASO positive test (≥ 250 Todd) were 24.9 and 18.7% in the mentally retarded and healthy children, respectively ($p = 0.057$) 20 cases of MR children (6.8%) and 17 cases of healthy children (5.6%) were recognized with ≥ 330 Todd (Table 2).

The frequency of positive Wright test ($>1/80$) in MR and healthy children were determined 3.6 and 0.7%, respectively ($p = 0/061$) out of these positive cases we also found out that 2ME test were positive 4 cases vs. 1 (Table 3).

Table 1: Demographic and epidemiological data for mental retarded cases and healthy children

		Mental retarded case (%)	Control group (%)	p-value
Sex	Male	178(58.6)	165(54.6)	NS
	Female	126(41.4)	137(45.4)	
Mean age (years)		10.3	10.6	NS
Family member*	≤ 4	27.7	27.1	<0.001
	5-7	42.8	54.4	
	≥ 8	29.5	18.5	

*Only MR children with defined family were assessed, NS: Not Significant

Table 2: ASO seroprevalence in mental retarded cases and control group

Titer	Mental retarded case (%)	Control group (%)	Total (%)
160	56.80	58	57.10
200	18.35	23.30	20.80
250	18.30	13.20	15.80
330	5.20	4.90	5.10
500	1.30	0.70	1

Table 3: Brucellosis seroprevalence in mental retarded cases and control group

Titer	Mental retarded case (%)	Control group (%)	Total (%)
Wright test			
<1/80	293(96.4)	300(99.3)	593(97.9)
≥1/80	11(3.6)	2(0.7)	13(2.1)
2ME			
*Positive	4	1	5

*Among Wright positive cases

Neither of the children in 2 groups have positive Widal test ($>1/80$). The CRP positive test ($\geq 6 \text{ mg L}^{-1}$) in MR and healthy children were 4.9 and 2.4%, respectively but this difference didn't statistically meaningful.

Discussion

In this study, the frequency of infection with streptococcus pyogenes (ASO test) and *Brucella* species (Wright test) in mental retarded cases was found to be 24.9 and 3.6%, respectively. These rates were statistically higher than the rate identified in the control group. This finding suggests that mentally retarded cases in our region could be in considered under risk for streptococcal and probably, other airborne infection and some of food born disease particularly brucellosis.

Some other studies also showed that some type of infections are more prevalent in MR children, Kaplan *et al.* (2004) showed that, the frequency of Toxocara infection in mental retarded cases who had not required institutionalization and having special education was found to be 18.8%, That was statistically higher than the rate identified in the control group (Kaplan *et al.*, 2004). Akhi and Ansarin (2003) in there report indicated that urinary tract infection in urine samples of 200, MR children group vs. healthy children were 5 to 0% infection, respectively.

Anti-streptolysin O (ASO) is the antibody response most often examined in serological tests to confirm earlier streptococcal infection. An increase in the ASO titer of ≥ 166 Todd units is generally accepted as evidence of a group A streptococcal infection. It has been investigated for its significant role in the development of post-streptococcal infection sequel, including acute rheumatic fever, acute glomerulonephritis and reactive arthritis (Madeleine, 2000).

The Upper Limits of Normal (ULN) ASO titer is considered when 80-85% of the normal populations are under that titer, therefore the titer more than this designated value are guiding us toward as streptococcal infection. In Kaplan *et al.* (1998) study on 1131 children, ages 2 to 12 years, ULN ASO were 240 Todd. In Iran in two independent studies and by two different groups about the same sample population reported that upper limit of normal ASO titer was 166 and 250 Todd units (Hashemi *et al.*, 2001; Jamshidian and Kalantarhormozi, 1992). In this study ULN ASO in healthy and MR, 6-15 years, children was determined to be as 200 Todd, therefore the titer more than this value were identified as streptococcal infection.

Brucellosis is endemic in Iran, the prevalence of human brucellosis in Kashan (In center of Iran) among the 2376 cases, was 22 (0.9%) (Moniri and Dastegoli, 1997), which are similar to our finding in healthy children (0.7%), whereas in MR children is 3.6% this means that some type of food born disease especially brucellosis is more prevalent in our region according to present results we could suggest MR children need to be under more attention for the Brucellosis.

It should be mentioned that other intestinal pathogen, salmonella typhi, the etiologic agent of Typhoid fever, which were assessed by Widal test were not positive in neither of two groups. Haque *et al.* (1999) said that in a study in Peru O and H antibodies were found to be raised in 30 and 75%, respectively, of the normal population, he found in his study that Widal test was positive in 28% of the general population in Pakistan and in their study Widal test was positive in as many as 11 (44%) persons. All of later results are much higher than our finding; these differences may be either related to age limitation or the low prevalence of this infection in this region.

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