

TOTAL IgE DETECTION IN PAIRED CEREBROSPINAL FLUID AND SERUM SAMPLES FROM PATIENTS WITH NEUROCYSTICERCOSIS(1)

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SUMMARY

Neurocysticercosis (NC), the presence of *Taenia solium* metacestodes in tissues, is the most frequent and severe parasitic infection of the central nervous system. We investigated the presence of total IgE by an automated chemiluminescence assay in 53 paired cerebrospinal fluid (CSF) and serum samples from patients with NC (P) and in 40 CSF samples from individuals with other neurological disorders as the control group (C). Total IgE concentration ranged from 1.2 to 6.6 IU/ml (mean = 1.4 IU/ml, standard deviation-sd = 1.1 IU/ml) in 28.3% of CSF samples from the P group, a value significantly higher than for the C group (≤ 1.0 IU/ml). The serum samples from the P group showed concentrations ranging from 1.0 to 2330.0 IU/ml (mean = 224.1 IU/ml, sd = 452.1 IU/ml), which were higher than the normal value cited by the manufacturer (< 100.0 IU/ml) in 32.1% of the samples. A significant difference was observed in CSF samples from the P and C groups ($p = 0.005$) and in serum samples from the P group compared to the normal value ($p = 0.005$), with sera showing more frequent abnormal results.

KEYWORDS: Cysticercosis; IgE; Serum; CSF.

INTRODUCTION

Neurocysticercosis (NC), the presence of *Taenia solium* metacestodes in tissues, is the most frequent and severe parasitic infection of the central nervous system. Its distribution is universal, being frequent in developing countries in Latin America, Africa, Asia and India^{1,9,16,18,20}, and with cases reported in the United States due to the immigration of individuals coming from endemic areas¹⁷.

The diagnosis of NC is based on clinical, epidemic and laboratory data (neuroimaging and immunological methods). Since clinical diagnosis is hindered by the nonspecific and polymorphic symptomatology of NC, the detection of anti-*T. solium* antibodies in cerebrospinal fluid (CSF) represents an important diagnostic factor^{2,8,9,13,22,23}.

Most of the antibodies found in CSF are intrathecally synthesized, with a smaller proportion coming from peripheral blood by blood-brain barrier rupture⁷. Some authors have reported specific IgG, IgM, IgA and IgE antibodies in CSF and/or serum from patients with NC, without a correlation between antibody class and clinical aspect of the disease^{3,5,6,12}. In parasitic infections, including the teniasis-cysticercosis complex, the level of total IgE can be high, many times without the identification of the specificity of the antibody^{14,19}.

The objective of the present study was to investigate the total IgE antibodies in CSF and serum samples from patients with NC by a chemiluminescence assay.

MATERIAL AND METHODS

We studied 53 paired CSF and serum samples from patients with NC (P) selected according to the General Protocol of NC Investigation followed at the Center of Neurological Investigations, University Hospital, Faculty of Medicine of the University of São Paulo. The study was approved by the Ethics Committee for Analysis of Research Projects, Clinical Management of UHFMUSP, 072/97, in agreement with Resolution 196/96 of the National Council of Health, Ministry of Health, Brasilia, Brazil. The patients' age ranged from 15 to 72 years [mean, 40 years; standard deviation (sd), 13 years].

As a control group (C) we studied 40 CSF samples from individuals with other non-NC neurological disorders in order to evaluate the method of CSF sample analysis. For serum samples we considered the normal value to be 100.0 IU/ml, as cited by the manufacturer.

We detected total IgE using an automated chemiluminescence assay (IMMULITE Total IgE, DPC Diagnostic Products Corporation, Los Angeles, USA).

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In the test, an antibody sandwich complex is formed between IgE of sample, solid-phase (polystyrene bead coated with a polyclonal antibody specific for IgE) and conjugate (alkaline phosphatase-conjugated IgE monoclonal antibody). Unbound enzyme conjugated is removed by a centrifugal wash, after which chemiluminescent substrate (phosphate ester of adamantyl dioxetane) is added. The chemiluminescent substrate undergoes hydrolysis in the presence alkaline phosphatase to yield an unstable intermediate, that results in the sustained emission of light. The bound complex (photon output) as measured by the luminometer, and its proportional to the concentration of total IgE in the sample, calculated starting from standard curve.

The mean and standard deviations were calculated for each group and the data analyzed by the Mann-Whitney test (Software INSTAT).

RESULTS

Total IgE, reported as IU/ml, for the CSF and serum samples analyzed by chemiluminescence are presented in Figure 1.

In 28.3% of CSF samples from the P group, total IgE concentration ranged from 1.2 to 6.6 IU/ml [mean, 1.4 IU/ml; sd, 1.1 IU/ml], values significantly higher than those detected in the C group ($p = 0.005$). The

40 CSF samples from the C group showed IgE levels lower 1.0 IU/ml (Figure 1).

In 32.1% of serum samples from the P group, total IgE concentrations were higher than normal (up to 100.0 IU/ml). The concentrations obtained for all serum samples ranged from 1.0 to 2330.0 IU/ml (mean, 224.1 IU/ml; sd, 452.1 IU/ml) (Figure 1).

The results showed 15.1% of paired CSF and serum samples with total IgE concentration higher than normal values and/or controls. CSF IgE levels differed significantly between the P and C groups ($p = 0.005$), and serum IgE levels differed significantly between the P group and normal values ($p = 0.005$).

DISCUSSION

The biological parasite-host interactions involved in NC are complex because of the different evolutionary stages of the parasite and of the individual variations in the response of the host¹⁷. The mechanisms of the humoral immune response have been studied especially during the active phase of the disease, and several authors have detected IgG antibodies in CSF and/or serum from patients with NC^{3,6,7,8}. There are only few reports about the immune response in different evolutionary stages of NC⁴.

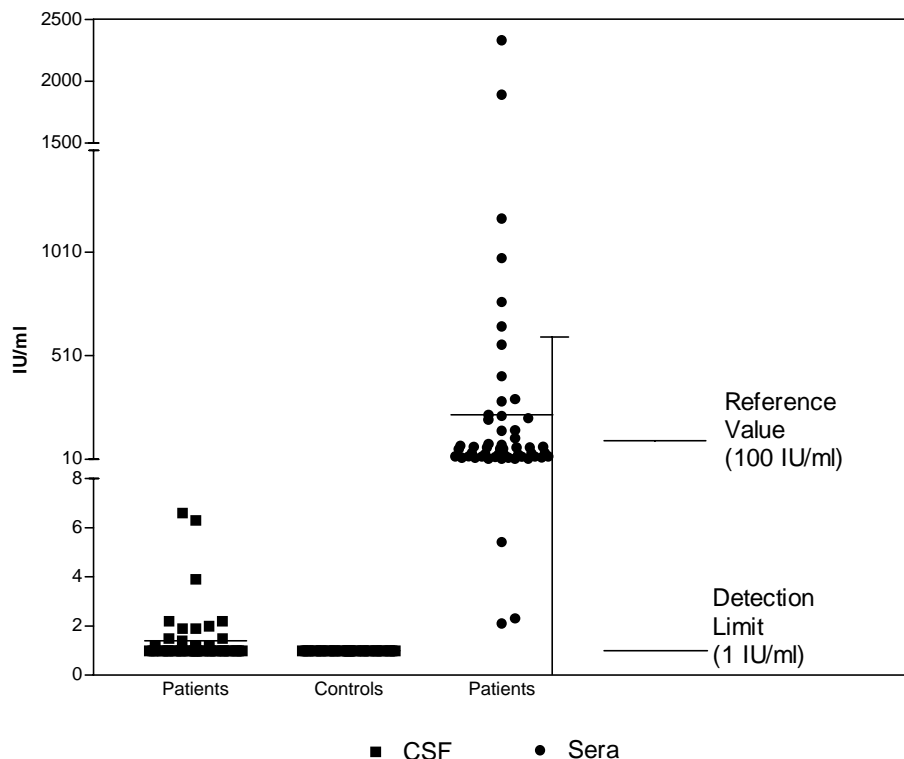


Fig. 1 - Total IgE levels (IU/ml) determined by chemiluminescence in 53 CSF and serum samples from patients with neurocysticercosis and in 40 CSF samples

The level of total IgE has been determined by different methods in parasitic infections, including NC^{10,14,19,21}. OSTROSKY-ZEICHNER *et al.*¹⁵, reported that total IgE levels determined by radioimmunoassay were higher than control in 59% of CSF samples from patients with NC. In contrast to these findings, we observed only 28.3% CSF samples from the P group with higher total IgE concentration than in the C group. We observed a mean total IgE concentration of 1.4 IU/ml in CSF samples from the P group, similar to the values reported by SPINA-FRANÇA *et al.*²¹ and OSTROSKY-ZEICHNER *et al.*¹⁵, but different from those reported by GOLDBERG *et al.*¹⁰ (0.44 IU/ml), and MELO *et al.*¹⁴ (0.76 IU/ml). The first three groups used radioimmunoassay, and the last one used an immunoenzymatic test with a fluorogenic substrate.

The serum samples showed 224.1 IU/ml of total IgE, similar to GORODEZKY *et al.*¹¹. These authors detected higher IgE concentrations in 52% of the serum samples from patients with NC than in the control group, as opposed to a 32.1% rate in the present study. Some authors¹⁰ have reported higher mean concentrations of total IgE (516.0 IU/ml) in serum samples from patients with NC than we observed here, while others¹⁹ reported a lower concentration (28.6 IU/ml) detected by radioimmunoassay.

Although only 2 (3.8%) CSF samples and 7 (13.2%) serum samples showed specific IgE by ELISA (data not shown), the results indicate that the humoral immune response in NC also involves total IgE production. The present results confirm the complex parasite-host relationship involved in NC, whose full elucidation requires further investigation.

RESUMO

Detecção de IgE total em amostras pareadas de líquido cefalorraquiano e soro de pacientes com neurocisticercose

Neurocisticercose (NC), causada pela presença da forma larvária de *Taenia solium* em tecidos, é a mais frequente e grave infecção parasitária que acomete o sistema nervoso central. Nós investigamos a presença de IgE total por quimiluminescência em 53 amostras pareadas de líquido cefalorraquiano (LCR) e soro de pacientes com NC (P) e 40 amostras de LCR de indivíduos portadores de outras desordens neurológicas como grupo controle (C). A detecção de IgE total mostrou 28,3% das amostras de LCR do grupo P com concentrações entre 1,2 UI/ml e 6,6 UI/ml (média = 1,4 UI/ml, desvio padrão-sd = 1,1 UI/ml), maiores que o grupo C ($\leq 1,0$ UI/ml). As amostras de soro do grupo P mostraram concentrações entre 1,0 UI/ml e 2330,0 UI/ml (média = 224,1 UI/ml, sd = 452,1 UI/ml), e 32,1% das amostras apresentaram valores maiores que o valor normal citado pelo fabricante ($< 100,0$ UI/ml). Diferença significativa foi encontrada entre as amostras de LCR dos grupos P e C ($p = 0,005$) e entre as amostras de soro do grupo P e valor de referência ($p = 0,005$), sendo os resultados dos soros mais frequentemente alterados.

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