

## MUMPS MENINGOENCEPHALITIS

### AN EPIDEMIOLOGICAL APPROACH

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**ABSTRACT** - The aim of this study was to analyse distribution of meningoencephalitis caused by mumps virus in children related to sex, age and seasonal influences. Thirty seven children were evaluated, ages ranging from 2 to 14 years. They were seen at Emergency Unit of Faculdade de Medicina do Triângulo Mineiro and at Hospital da Criança, in Uberaba-MG, Brazil, from March 1st 1991 to February 1st 1993 and they were hospitalized for about 5 days. Through a protocol findings were studied during hospitalization and clinical course stressing epidemiology, symptomatology, cerebrospinal fluid studies, electroencephalogram and cortical function analysis. Only epidemiological data were considered in the present study. Data analysis revealed male predominance, at a range from 5 to 9 years and great number of occurrences at the last quarter of the year.

**KEY WORDS:** mumps meningoencephalitis, neuroepidemiology, aseptic meningoencephalitis.

#### **Meningoencefalite pelo vírus da caxumba: abordagem epidemiológica**

**RESUMO** - O presente trabalho tem por objetivo, estudar a distribuição quanto ao sexo, idade e sazonalidade, em crianças com meningoencefalite pelo vírus da caxumba. Foram avaliadas 37 crianças, com idades variando de 2 a 14 anos, atendidas no Pronto-Socorro do Hospital Escola da FMTM e do Hospital da Criança, MG, no período de 1-março-1991 a 1-fevereiro-1993 e hospitalizadas por período médio de 5 dias. Através de protocolo pré-elaborado foram estudados os achados obtidos por ocasião da internação e evolução, enfatizando-se a epidemiologia, sintomatologia, líquido cefalorraqueano, eletrencefalograma e função cortical. São considerados apenas os dados epidemiológicos, no presente estudo. A análise das informações pertinentes revela predomínio no sexo masculino, na faixa etária dos 5 aos 9 anos e maior número de casos no último trimestre do ano, correspondente à estação da primavera.

**PALAVRAS-CHAVE:** meningoencefalite pelo vírus da caxumba, neuroepidemiologia, meningoencefalite asséptica.

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Mumps virus is one of the most frequent agents causing aseptic meningoencephalitis in patients under 15 years old. Nevertheless, the real incidence is clinically difficult to establish because it occurs asymptotically (36%)<sup>3</sup> or in the absence of parotiditis (29%)<sup>26</sup>. Cerebrospinal fluid (CSF) studies in patients with epidemic parotiditis show pleocytosis ranging from 34% (26/77)<sup>4</sup> to 63% (235/371)<sup>3</sup>.

Mumps virus belongs to genus Paramyxovirus, family Paramyxoviridae, and possess one RNA molecule. Two surface glucoproteins (HN and F) were described, which are essential for

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infectivity and to elicit antibodies production<sup>5</sup>. It often causes endemic parotiditis, with cosmopolitan distribution, occurring predominantly during winter and beginning of spring, at an inter-epidemic period of 3 years<sup>1</sup>. Humans are probably the only reservoir for the virus and personal contact is essential for the transmission, through saliva or respiratory secretions, reaching individuals of all ages, predominantly those between ages 5 to 15 (85 to 95%) years<sup>16</sup>. Around 25% to 40% of individuals aged above 5 years, carrying this virus, and 50% of children less than 5-years-old, are asymptomatic<sup>27</sup>. It is rare in young children less than 6 months-old. Incubation period varies from 12 to 35 days (mean, 14 to 21 days)<sup>16</sup>.

Clinic diagnosis of meningeal involvement is made in 23<sup>13</sup> to 35%<sup>12</sup> of patients, emerging 2 to 10 days after parotiditis and lasting 3 to 5 days<sup>27</sup>. Encephalitis occurs in 0.2%<sup>12</sup> of cases and it occurs 1 to 2 weeks after parotiditis<sup>27</sup>. Etiologic diagnosis is suspected when parotiditis is associated and this was manifested until 3 weeks before acute neurologic period. Parotiditis is accepted as an important criterion<sup>11,18</sup> and differential diagnosis must be considered in the absence of epidemiological data or when it is atypical<sup>16</sup>.

It is the purpose of this report discuss some epidemiologic findings which were observed in a definite population, during the course of meningoencephalitis caused by mumps virus (MEMV) in children related to sex, age and seasonal influences.

## MATERIALS AND METHODS

Thirty seven children aged 2 to 14 years were seen at Emergency Unit of Hospital Escola of FMTM and at Hospital da Criança, in Uberaba-MG, Brazil, from March 1st 1991 to February 1st 1993.

Diagnosis was made following these criteria: temporal association with epidemic parotiditis; presence of symptoms and signals of neurologic involvement; laboratorial findings through cerebrospinal fluid (CSF) studies and antibodies for mumps virus in the CSF, and spontaneous clinical improvement.<sup>23-26</sup>

Aiming to facilitate interpretation of clinical data, children were divided into age groups as follows: group A, patients aged 1 to 4; group B, from 5 to 9; and group C, from 10 to 14 years.

Clinical and neurologic evaluations were performed prospectively following a protocol. Laboratorial tests consisted on total peripheral leukocyte and erythrocyte counts, and serum amylase and electrolyte level determinations. CSF studies included cytology, biochemistry, bacterioscopy and bacterial culture in addition of IgM antibodies to mumps virus (Hoechst-Boehringer®). Normal values for CSF were those of Spina-França,<sup>22</sup> Silver & Todd<sup>20</sup> and Fishman.<sup>7</sup>

Meteorologic conditions as air humidity, pluviometric index, environmental temperature, and wind speed were analysed at period from March 1991 to February 1993.

## RESULTS

Of 37 patients, 28 (75.7%) were male and 9 (24.3%) female, ratio of 3:1, being 29 (78.4%) white and 8 (21.6%) non-white.

Ages ranged from 2 to 14 years (mean, 6.6 years). Group A consisted of 7 (18.9%), group B of 25 (67.6%), and group C of 5 (13.5%) children (Fig 1).

Decreased air humidity was observed before the months with great incidence (October to December) (Fig 2).

## DISCUSSION

Mumps virus is responsible for systemic disease with a benign prognosis, which often compromises central nervous system.

Epidemiological study of 37 cases confirms data previously observed of predominance for gender, age groups and seasonal distribution, but there is little information about these findings.

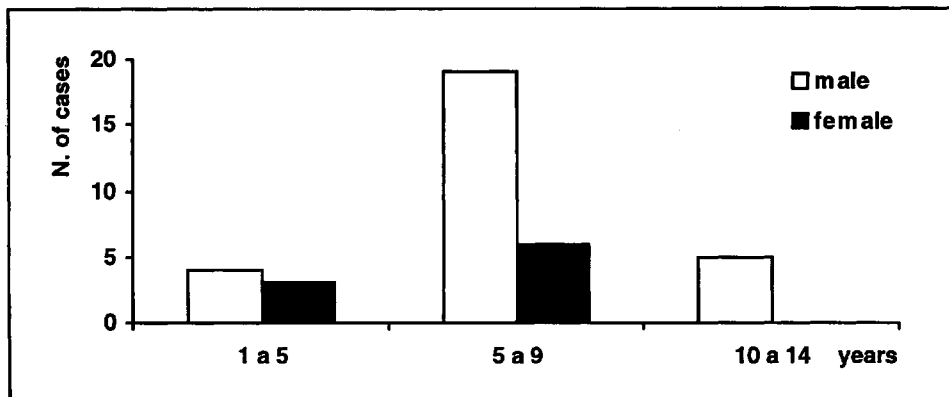


Fig 1. Age and sex distribution of 37 patients with mumps meningoencephalitis.

It is not known the rationale for predominance in male<sup>11</sup>, which ratios are greater than most infectious diseases in childhood<sup>12</sup> and this is in accordance to literature data<sup>6,8</sup>, ranging from 2.4<sup>2,14</sup> to 6<sup>21</sup> for 1. In this study this ratio was 3:1. Since mumps incidence is equal for both sexes<sup>10,19</sup>, meningoencephalitis probably is related to differences in clinical features suggested by the following reasons: a) female children shows more subclinical infections<sup>11</sup>; b) there is a possibility of occurrence of parotiditis and pleocytosis with no sign of meningeal involvement<sup>3</sup>; c) it is possible that children with greater sensibility to painful symptoms reports well what they feel<sup>17</sup>; and d) boys complaints more because they expressed more externalizing symptoms, are likely to tolerate pain less and are less resilient than girls<sup>15</sup>. We believe that these findings could explain this occurrence.

Related to age groups several researchers have found the range 5-9 years the more susceptible<sup>11,14,18</sup>, probably because it is the range which has the greater incidence of mumps<sup>27</sup> and children begin to socialize and agglomerate during school activities.

We believe the striking occurrence of mumps during the last quarter of the year is to due failure of natural defense mechanisms occurring during this period. Studying meteorological ranges,

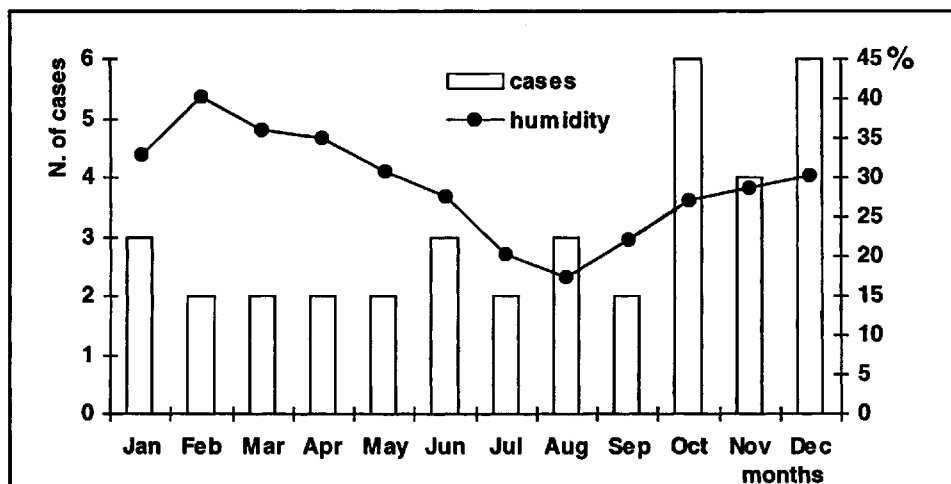


Fig 2. Minimal air relative humidity (%) and number of cases.

we observed low air humidity and dry climate, which are conditions capable to damage mucociliary system and facilitate agent penetration into hostess cell<sup>9</sup>.

## CONCLUSIONS

Our findings show special characteristics in mumps meningoencephalitis, observed in some previous reports, although not related in our country.

The preponderance of males over females, may be explained for one or more of the somatic or psychosocial reasons presented, although we had considered all options true and correlated.

The occurrence of MEMV predominantly during the winter and spring, present in the northern and southern hemispheres, may be associated with the low of air humidity and dry climate, observed in these seasons.

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