Epidemiological profile of acute bacterial meningitis in the State of Rio Grande do Norte, Brazil

Perfil epidemiológico da meningite bacteriana aguda no Estado do Rio Grande do Norte, Brasil

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ABSTRACT

Introduction: Acute bacterial meningitis (ABM) remains a public health problem in Brazil. To evaluate the epidemiology of ABM cases at Giselda Trigueiro Hospital, Rio Grande do Norte, a descriptive retrospective survey was conducted covering 2005 to 2008. Methods: Clinical and laboratory data were collected from the epidemiology department of the hospital and analyzed. Results: Out of 168 ABM cases, 24.4%, 10.7%, and 2.4% were, respectively, caused by Streptococcus pneumoniae, Neisseria meningitidis and Haemophilus influenzae b, and 5.4% by other bacteria. The mean age was 22.48 ± 18.7 years old. Conclusions: Streptococcus pneumoniae was the main causative pathogen in the young urban population.

Key-words: Bacterial meningitis. Epidemiology. Brazil.

RESUMO

Introdução: Meningite bacteriana aguda (MBA) permanece um problema de saúde pública no Brasil. Para avaliar a epidemiologia da MBA atendida no Hospital Giselda Trigueiro, Rio Grande do Norte, um estudo retrospectivo-descritivo foi realizado de 2005 a 2008. Métodos: Dados clínicos e laboratoriais foram coletados do departamento de epidemiologia hospitalar e analisados. Resultados: Dos 168 casos de MBA, 24.4%, 10.7% e 2.4% foram, respectivamente, causados por Streptococcus pneumoniae, Neisseria meningitidis e Haemophilus influenzae b e 5,4% por outras bactérias. A média da idade foi 22,48 ± 18,7 anos. Conclusões: Streptococcus pneumoniae foi o principal patógeno causador na população urbana jovem.


Acute bacterial meningitis (ABM) is a public health problem worldwide and, in Brazil, in the 1990s, an average of 28,000 cases of meningitis were reported annually¹. In an etiological survey in northeastern Brazil in the 1980s, Bryan et al² reported that N. meningitides (meningococcus) was the most prevalent ABM pathogen, followed by Haemophilus influenzae type b (Hib) and Streptococcus pneumoniae (pneumococcus)². However, after the introduction of the anti-Hib conjugated vaccine to the public vaccination program in 1999, there was a significant decrease in the incidence of cases of ABM due to H. influenzae in Brazil³.

Because of the high mortality rate and long-term sequelae, fast and accurate diagnosis and appropriate treatment of ABM are fundamental for a good outcome⁴. The initial antibiotic regimen is usually empirical, and therefore, knowledge of the epidemiological profile of ABM in the community could lead to the best therapeutic choice⁵.

In the present study, we describe the epidemiological profile of ABM at Giselda Trigueiro Hospital (GTH), a reference center for infectious diseases in the State of Rio Grande do Norte, Brazil, between 2005 and 2008. We are not aware of any previous study on the epidemiology of ABM in this Brazilian state.

This study consisted of a descriptive retrospective survey of the cases of ABM that were attended at GTH between 2005 and 2008. During the period of this study, the hospital could not afford a pediatric ward, and children were sent to pediatric hospitals after diagnosis and initial treatment.

Information on age, sex, home location (rural or urban area), laboratory results, criteria for diagnostic confirmation, previous use of antibiotics and outcome were collected from the official records of the Brazilian compulsory notification system (SINAN), which were available in the hospital’s epidemiology department. The data were analyzed through SPSS (Statistical Package for the Social Sciences), version 13.0.

The diagnoses of cases with clinical signs and symptoms of ABM were confirmed in accordance with at least one of the following criteria: 1) cerebrospinal fluid (CSF) culture; 2) CSF Gram stain; 3) blood culture or blood Gram stain; 4) latex agglutination test on CSF; and 5) CSF presenting pleocytosis (> 500 cells/mm³), predominantly polymorphonuclear neutrophils, protein level > 40mg/dl and glucose level < 40mg/dl. Two cases did not fit the above criteria and their diagnosis were confirmed post-mortem by means of autopsy.

Blood and CSF were seeded in chocolate agar enriched with 5% sheep blood. The latex agglutination test was used to identify polysaccharide antigens from N. meningitides, S. pneumoniae and Hib in CSF. Gram’s method consisted of a primary stain with crystal violet, followed by the addition of acetic acid, rapid decolorization with basic fuchsir, and staining with safranin.

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The antibiotic susceptibility of the S. pneumoniae was identified by means of disk diffusion method, in accordance with the definitions of the National Committee for Clinical Laboratory Standards (NCCLS, 1998).

This study was granted approval by the National Ethics Commission, under the number 0052.1.051.000-05.

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Received in 16/02/2010
Accepted in 20/05/2010
Between January 2005 and December 2008, 168 cases of ABM were admitted to the GTH, among which 107 (63.7%) were male, 60 (35.7%) were female, and one (0.6%) was not identified by gender in the notification record. The mean age and standard deviation was 22.48 ± 18.7 years old (ranging from one month old to 78 years old). The mean ages according to the etiological agents were 29.8 years old for pneumococcus, 20.5 years old for meningococcus and 12.5 years old for Hib. Regarding the location of the patients’ homes, 123 (73.2%) were in urban areas, 28 (16.7%) in rural areas and 17 (10.1%) in intermediate areas.

Out of the 168 cases in our sample, 96 (57.1%) were not identified according to etiological agent, while 41 (24.4%) were caused by S. pneumoniae, 18 (10.7%) by N. meningitidis, four (2.4%) by Hib and nine (5.4%) by other bacteria, namely Staphylococcus aureus (two cases), Salmonella (two cases), Streptococcus viridans (two cases), Klebsiella (two cases) and Proteus mirabilis (one case). The diagnostic criteria used according to the etiology are shown in Table 1. Blood or CSF cultures were positive for only 47 patients (28.0%). Previous use of antibiotics at least 24 hours before the diagnosis and initial treatment of ABM was reported for 11 (6.5%) patients.

Sequels after meningitis were recorded before discharge in 16 patients (9.5%) of the cases, which among hearing loss was the most frequent. Of the three cases of hearing loss, one was related to chronic otitis media and another to trauma. The mortality rate among the sample was 11.3% (19 cases), and S. pneumoniae was responsible for the highest lethality rate (Table 2).

Seven cases of ABM due to S. pneumoniae were associated with skull-brain trauma, six cases were due to CSF fistula, and one case was due to chronic otitis media. The antibiotic sensitivity of S. pneumoniae was tested in 20 samples (Table 3).

Among the 18 cases of meningococcal ABM, N. meningitidis type B was identified in 11 cases and N. meningitidis type C in two cases. The mortality rate was 11.1% (Table 2), and N. meningitidis type B was the cause of all of the deaths.

The high rate of failure to determine the etiological agent at GTH is consistent with other Brazilian reports, which range from 46.8 to 55.5%³,⁶. Although only 6.5% of the patients in the current study reported previous use of antibiotics, which is most likely an underestimation, the low bacterial culture rate is probably greatly affected by the previous use of antibiotics⁵. In a Brazilian national study conducted by Mantese et al⁴, 47.2% of the patients reported previous antibiotic use⁵.

S. pneumoniae was the most prevalent ABM etiological agent in our sample, but was associated with relatively low mortality (14.6%), in comparison with previous reports referring to mortality rates greater than 30% for this bacterium⁷. However, the low mortality rate in our study might have been masked by the poor routine for data records at GTH.

Pneumococcal ABM is associated with conditions leading to immunological impairment, skull-brain trauma and CSF fistula⁷.
The occurrence of skull-brain trauma and CSF fistula in 13 cases of pneumococcal infection may also have accounted for the displacement of the mean age of disease onset to 29.8 years of age. Pneumococcal ABM was most frequent in children < 5 years and the elderly, as reported worldwide. Moreover, the lack of a pediatric ward at GTH over this period contributed towards the higher mean age of the patients in the study.

We found that 7.2% of the pneumococcosis isolates were penicillin resistant, while there was no cephalosporin resistance. These rates are lower than the values found by Brandileone et al, who reported that there was an increase in the numbers of invasive penicillin-resistant S. pneumoniae in Brazil, from 10.2% to 27.9%, between 1993 to 2004. Meningitis isolates were more frequently resistant to cefotaxime (2.6%) than were non-meningitis isolates (0.7%). However, generally, there is high susceptibility to cefotaxime in Brazil, thus supporting the use of third-generation cephalosporins as the drugs of choice for meningitis treatment in this country. These rates vary according to regions, and the northern and northeastern regions are less affected. In this study, pneumococcal resistance rates to chloramphenicol (8.3%), cotrimoxazole (75%), erythromycin (15%) and rifampicin (5.25%) were higher than rates reported in another Brazilian study that showed resistance rates of 1.3%, 65%, 6.2% and 0.7%, respectively.

The higher prevalence of the N. meningitidis serogroup B, in comparison with serogroup C, conforms with previous Brazilian reports. The cases of meningitis due to H. influenza do not fit within the preferential age range for this bacterium. Indeed, the current Brazilian incidence of Hib meningitis in this age range is only 0.02 cases for every 100,000 inhabitants.

The hearing loss experienced by 2.8% of the survivors was lower than the rate of 6.2% found in other Brazilian reports. Our findings cannot be taken as an estimation of permanent sequels since the GTH lacks a follow-up program for patients after discharge.

Our identification of S. pneumoniae as the main agent of ABM in the young urban population requires preventive epidemiological attitudes towards this group. Because of the low rate of penicillin-resistant pneumococci at GTH, careful planning of antibiotic usage and management of meningitis is important in order to avoid raising the pneumococcal resistance rate, which is increasing slowly in Brazil. Therefore, knowledge of the regional epidemiological profile is crucial for improve the diagnosis, treatment and prognosis of ABM patients.

ACKNOWLEDGMENTS

The authors would like to thank the laboratory and epidemiology department team of GTH, especially Mr. Dagoberto Mariz, Mrs. Alcilene Ribeiro Soares and Mrs. Graça Micussi.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

FINANCIAL SUPPORT

The authors received financial support from UBS Optimus Foundation (Switzerland). LFAG and LGC have fellowships from CNPq.

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