Structural changes of *Klebsiella sp* infection in children

Alterações estruturais de infecção por Klebsiella sp em crianças

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Summary

The authors aim to emphasize the growing role of Gram-negative infections affecting young people in low- and medium-income countries; mainly the severity and resistance patterns. Italian authors reviewed data from infections by *Enterococcus sp, Staphylococcus sp, Klebsiella sp, Acinetobacter sp, Pseudomonas sp,* and *Escherichia sp* in a third level University hospital and concluded that *E. coli*, *A. baumannii* and *K. pneumoniae* were the major detected pathogens. Studies from Brazil, Angola and the Netherlands, in addition to autopsy data, are commented. Further research should better clear the role of Gram-negative nasopharyngeal colonization.

Keywords: autopsy, gram-negative infections, *Klebsiella pneumoniae*

Resumo

Os autores visam enfatizar o crescente papel de infecções por Gram-negativos que afetam jovens em países de baixa e média renda; principalmente os padrões de gravidade e resistência. Autores italianos revisaram dados de infecções por *Enterococcus sp, Staphylococcus sp, Klebsiella sp, Acinetobacter sp, Pseudomonas sp* e *Escherichia sp* em um hospital universitário de nível terciário e concluíram que *E. coli*, *A. baumannii* e *K. pneumoniae* foram os principais agentes patogênicos detectados. Estudos no Brasil, Angola e Holanda, além de dados de autópsia, são comentados. Futuras pesquisas devem melhor avaliar o papel de colonização da nasofaringe por Gram-negativos.

Palavras chave: autopsia, infecções por gram-negativos, *Klebsiella pneumoniae*

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Dear Editor,

Reale et al. (2017) evaluated resistance patterns of ESKAPE group (*Enterococcus faecium or Enterococcus faecalis, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa and Escherichia coli*) isolates in a University hospital, and ampicillin, ciprofloxacin, colistin, meropenem, and tigecycline were studied for Gram negative bacteria (GNB).[1] The authors concluded that GNB were the major causes of infection, because of the overall frequency (*E. coli*) and resistance patterns (*A. baumannii and K. pneumoniae*).[1] They suggested further specific studies about resistance mechanisms to beta-lactamases and carbapenemases, which can lessen transmissions and improve the control of these infections.[1]

Infections by GNB have increased in number during the last decade, as well as the prevalence of ESBL *K. pneumoniae*, which accounts for 18% of the bacteremias.[2] This opportunistic pathogen causes blood-borne health care-associated infections in children, with high mortality rate and more prolonged hospitalization time, compared with non-ESBL.[2] Tanır Basaranoglu *et al*. (2017) studied the risk factors for these infections in 97 paediatric patients with median age of 8.0 months, and in 62% *K. pneumoniae* was ESLB-producer.[2] Aston *et al*. (2017) reviewed data of epidemiology and aetiology of CAP in developing countries, and the differences with high-income countries.[3] CAP by Gram-negative bacteria (GNB) are more often reported in low-income countries, and *K. pneumoniae* is a common agent of severe blood-borne infections.[3] Lima *et al*. evaluated 1192 young children of a Midwestern Region of Brazil, and 8.9% had nasopharyngeal colonization by GNB (16% *K. pneumoniae*).[4] They concluded that the nasopharynx of children less than 5 years old may constitute a reservoir and source of invasive infections by GNB, including CAP due to *Klebsiella sp*.[4] Wolf *et al*. (1999) found more healthy carriers of nasopharyngeal GNB (4.9% *Klebsiella sp*.) among Brazilian children aged from 4 months to 5 years compared to Dutch children; the carriage of GNB was related to the number of household members and CAP in a warm-climate country.[5] *Klebsiella sp*. resistant only to trimethoprim-sulfamethoxazole was found in 24% of Brazilian patients;[4,5] whereas this pathogen was resistant to two or three antibiotic classes in 35.3%.[5]

We comment a 9-month-old child with a fever and productive cough treated in another service by erythromycin and trimethoprim plus sulphamethoxazole with

no improvement. Because development of anasarca and pale skin and mucosae she was referred to the hospital. Physical examination revealed 38.6ºC, tachypnea, tachycardia, fine and coarse bilateral pulmonary crackles, discrete hepatomegaly, normal spleen, and absence of lymphadenopathy. Chest X-ray showed acute lung infiltrates localized on the upper right and lower left lobes. Laboratory tests revealed hypoalbuminemia, pancytopenia, erythrocyte sedimentation rate: 40 mm/h, elevated C-reactive protein, high ferritin levels, and low total iron binding capacity. Samples were obtained from urine, blood, sputum, and broncho-alveolar aspiration fluid. Blood agar, chocolate agar, and MacConkey agar were included in pathogen identification. The samples collected from blood and respiratory fluids grew GNB. Test of extended spectrum beta lactamase (ESBL) production was done, but genes coding for ESBLs (blaSHV, TEM and CTX-M) were not screened. Clinical and laboratory data confirmed the diagnosis of acute phase response and sepsis. Aminoglycoside and a third-generation cephalosporin were the treatment option. From D4 to D13, she had diarrhea, epistaxis and melena, cutaneous-mucosal lesions (petechial and ecchymosis), evolving to death on D21. The diagnosis was community-acquired pneumonia (CAP) by non-ESBL *Klebsiella sp*, and the patient underwent antimicrobial susceptibility-guided therapy without improvement. Autopsy study showed lesions in the lungs, intestines, and lymph nodes (Figure 1).

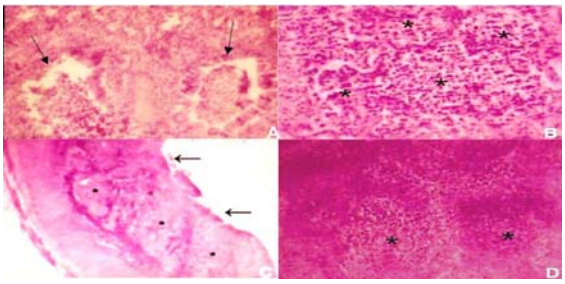

Figure 1 - (Photomicrographs in H&E stain, with low magnification). **A** and **B**: Inflammatory exudates, which appear filling two necrotic airways (arrows) and the surrounding airspaces (asterisks), consistent with bronchopneumonia; **C**: Ulcerated enteric mucosa (arrows), as well as sub mucosal oedema (asterisks); and **D**: Lymphadenitis with foci of necrosis (asterisks).

Further researches should evaluate the role of nasopharyngeal colonization by GNB in infections, in special among younger individuals from low- and medium-income countries.

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