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Research Article

Low Prevalence of *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* in Children Hospitalized for Acute Respiratory Infection in Burkina Faso

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Abstract

Background: Information about *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* infections in children with respiratory infections in Burkina Faso is unknown. To fill this gap, a hospital-based study investigated the prevalence of these atypical bacteria in Burkinabe children with Severe Acute Respiratory Infections (SARI).

Methods: A total of 182 Nasopharyngeal Aspirate (NPA) collected in children hospitalized for SARI between January and December 2015 were tested for *Mycoplasma* and *Chlamydia pneumoniae* by real-time PCR. Sociodemographic and clinical data were recorded using a structured questionnaire.

Results: *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* was detected each in 1.6% (3/182) samples. Co-infection with other respiratory viruses was found in 83.3% (5/6) of cases.

Conclusion: This study showed a low prevalence of *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* in children with SARI but confirm the circulation of these pathogens in Burkina Faso. A national surveillance is needed to determine the epidemiology of these atypical bacteria in Acute Respiratory Infections (ARIs).

Keywords: *Mycoplasma pneumoniae*; *Chlamydia pneumoniae*; *Children*; SARI; *Burkina Faso*

Bakground

Severe Acute Respiratory Infections (SARI) remains a major public health problem worldwide. It is the leading cause of childhood mortality in children under 5 years old especially in low-income countries [1]. *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* are common causative agents of middle and severe respiratory infections [2,3]. Several aetiological studies reported the role of these atypical bacteria in children and adults population in Africa and elsewhere [4-8].

Being the second cause of health center's consultation and hospitalization after malaria [9], ARI is a public health problem in Burkina Faso. Some rare studies [10-12] investigated the aetiology of ARI but very limited information is known about the role of *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* infections in children. The aim of this study was to describe the epidemiology of *Mycoplasma* and *Chlamydia pneumoniae* in children with SARI in Burkina Faso by use of molecular techniques.

Methods

Study population

From January 2015 to December 2015, a hospital-based surveillance was carried out in two hospitals of Burkina Faso: the teaching hospital of Bobo-Dioulasso and the hospital of Bogodogo located in Ouagadougou. This surveillance enrolled children ≤ 5 years hospitalized for a clinical diagnosis of SARI. A SARI case was defined as "an acute respiratory infection with: history of fever or measured fever of ≥ 38°C; and cough; with onset within the last 10 days; and requires hospitalization" [13]. From each children, Nasopharyngeal Aspirates (NPA) were collected using sterile mucus extractors for NPA and placed into tubes containing Viral Transport Medium (Copan, Italy). And then, the samples were transported using the cold chain to the Virology laboratory of IRSS where they were directly aliquoted and stored at -80°C until nucleic acids extraction process. Sociodemographic and clinical data were collected using a standardized questionnaire.

Laboratory analysis

From each sample, nucleic acid was extracted using QIAamp Viral RNA Mini kit (Qiagen, Venlo, The Netherlands) according to the manufacturer's instructions. Extracted nucleic acid were stored at –80°C before sending to the Luxembourg Institute of Health (LIH) for the molecular detection of respiratory viruses and atypical bacteria. *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* were detected using previously described real time PCRs [14, 15]. Primers and PCRs conditions are summarized in Table 1.

Statistical analyses

Statistical Analysis including Chi square and Fisher's exact test were performed using STATA software version 14.0. Results were considered statistically significant for value less than 0.05.

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Table 1: Primers, probes and amplification conditions for the detection of *Mycoplasma pneumoniae* and *Chlamydia pneumoniae*.

Primers/Probes	Sequences (5' – 3')	Gene Target	Product size (bp)	Amplification conditions
Mp181-F Mp181-R Mp181-P	TTTGGTAGCTGGTTACGGGAAT GGTCGGCACGAATTTCATATAAG TGTACCAGAGCACCCCAGAAGGGCT	CARDS toxin	73	95˚C 10:00 95˚C 00:15 45 cyles 60˚C 01:00 Goto 3 44x 6.10˚C 10:00
VD4_F VD4_R VD4_P	TCC-GCA-TTG-CTC-AGC-C AAA-CAA-TTT-GCA-TGA-AGT-CTG-AGA-A FAM-TAA-ACT-TAA-CTG-CAT-GGA-ACC-CTT-CTT-TAC-TAG-G-TAMRA	ompA	125	95˚C 10:00 95˚C 00:15 40 cycles 60˚C 01:00 Goto 3 39x 10˚C 10:00

Ethical considerations

The Institutional Ethic Committee of Centre Muraz approved the study protocol (Ethic Clearance number 13-2013/CE-CM), and the parents or legal guardians gave written informed consent prior the enrolment of children.

Results

Epidemiology

From January to December 2015, a total of 182 children ≤ 5 years hospitalized with SARI were included in this study. One hundred forty-nine (81.9%) were enrolled in the teaching Hospital (Sanou Souro) of Bobo-Dioulasso and 33 (18.1%) in the Hospital of Bogodogo, Ouagadougou. Of the 182 children, 115 (63.2%) were male with a sex ratio of 1.71. The mean age was 13.7 months ± (range: 1 to 60 months) and 147 (80.8%) children were aged less than 2 years. The main clinical symptoms included fever (76.4%), cough (86.3%), difficulty of breathing (84.6%) and indrawal costal (28.6%). Twenty four children (13.2%) had need oxygen therapy. Sociodemographic characteristics and clinical information are summarized in Table 2.

Laboratory finding

Atypical bacteria infection was diagnosed in 3.3% (6/182) of NPA samples. *M. pneumoniae* and *C. pneumoniae* were detected each in 1.6 % (3/6) of samples. All pathogens were detected in children hospitalized in the teaching hospital of Bobo-Dioulasso. Most of pathogens were found in children less than 2 years (4/6, 66.66%). *C. pneumoniae* co-infection with respiratory viruses was observed in the 3 cases with respectively AdV, hBoV and RSV while *M. pneumonia* co-infection occurred in 2 cases with AdV-BoV-CoV and Influenza B respectively. The prevalent symptoms presented by children with atypical bacteria infection were fever, cough and dyspnoea.

Table 2: Sociodemographic and clinical characteristics of enrolled children.

Characteristics	Total of patients N = 182 (%)	Atypical bacteria N = 6 (%)
Sex		
Male	115 (63.2)	2
Female	67 (36.8)	4
Age (month)		
0 – 11	94 (51.6)	1
12 – 23	53 (29.2)	3
24 – 60	35 (19.2)	2
Healthcenter		
Sanou Souro	149 (81.9)	6
Bogodogo	33 (18.1)	0 (0.0)
Symptoms		
Fever	139 (76.4)	6
Cough	157 (86.3)	6
Dyspnea	154 (84.6)	6
Runny nose	48 (26.4)	2
Indrawal costal	52 (28.6)	1
Vomits	54 (29.7)	3
Diarrhoea	28 (15.4)	2
Treatment		
Oxygen Therapy	24 (13.2)	0 (0.0)

Discussion

M. pneumoniae and *C. pneumoniae* are both frequently involved as causative agents in paediatric upper and lower respiratory illness [16]. They are also involved in the initiation and exacerbation of asthma in children and adults population [17, 18]. However, information about the epidemiology of these bacteria in children with ARI in Burkina Faso is lacked. This is the first report describing the role of *M. pneumoniae* and *C. pneumoniae* in children with SARI in this country. Our results showed a prevalence of 1.6% for each these bacteria. Multiples studies conducted in Africa and elsewhere with lower [6, 19-23] and higher [8, 17, 24-28] prevalence of M pneumoniae and C pneumoniae were reported. These results confirm the implication of atypical bacteria in ARI. Also, the difference of prevalence could be explained by many reasons: sampling technique, population studies, geographical region, period of study, etc. For instance, oropharyngeal swabs are the best specimens of choice to detect *M. pneumoniae* by PCR [23]. Moreover, a systematic review conducted in sub-Saharan African countries [29] on the aetiology of ARI in children reveal that the detection of *Mycoplasma* and *Chlamydia pneumoniae* were limited in the past due may be to the lack of high sensitive and specific diagnosis method [28].

Most of atypical bacteria was detected in children less than 2 years. This finding is in accordance with some reports of literature in which *M. pneumonia* and *C. pneumoniae* infections are common in infants and children from 1 to 5 years [8, 28]. Viral coinfection was detected in 5 of cases. In previous studies, more than 50% of cases were co-infected by viruses. [23, 29].

Conclusions

This study confirm for the first time, the circulation of *Mycoplasma*

pneumoniae and *Chlamydia pneumoniae* in children with SARI in Burkina Faso. Despite their low prevalence, our finding highlight the necessity to monitor these pathogens in routine laboratory testing. In addition, further investigations in large scale are needed to determine the epidemiology of these atypical bacteria on the occurrence of respiratory infections in Burkina Faso.

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