SHORT COMMUNICATION

RISING INCIDENCE OF *MYCOPLASMA PNEUMONIAE* PNEUMONIAS IN A TERTIARY PAEDIATRIC CENTRE: IMPLICATIONS FOR ANTIBIOTIC THERAPY

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SUMMARY

Objectives: The aim of this study is to determine the incidence of *Mycoplasma pneumoniae* pneumonia (MPP) in children and adolescents in Prague, Czech Republic, between January and July 2024, and to compare the findings with data from the preceding period.

Methods: A retrospective analysis of data of paediatric patients at our single tertiary care facility was conducted. Two distinct patient cohorts were subjected to analysis: the first comprising individuals who had been hospitalised between January 2019 and July 2024, and the second consisting of outpatients who had been treated during the periods of January to July 2023 and January to July 2024.

Results: A 12.3-fold increase in the number of outpatients diagnosed with MPP was observed between January and July 2024 in comparison to the same period in 2023, with 111 cases reported in 2024 versus 9 cases in 2023. A total of 23 patients were hospitalised with MPP between January 2019 and July 2024, with 15 of these hospitalisations having occurred between January and July 2024. The median age was 12 years, with an age range of 1 to 17 years. The majority of cases presented with a high fever, chest pain, and required oxygen support. A failure of the clarithromycin treatment was observed, resulting in 19.48% of doxycycline prescriptions being issued due to a prior failure of clarithromycin treatment. During the monitoring period, no cases of treatment failure with doxycycline were documented.

Conclusion: The present study demonstrates an emerging trend of increased incidence of *Mycoplasma pneumoniae* pneumonia in the paediatric population during the initial seven months of 2024 in the Czech Republic. Doxycycline has been demonstrated to be the optimal antibiotic for the treatment of MPP and in accordance with the prevailing practice in other states it should be included in the therapeutic regimen even in children under the age of eight. The authors put forward recommendations for the implementation of measures aimed at reducing the negative impact of MPP on public health.

Key words: Mycoplasma pneumoniae, Mycoplasma pneumoniae pneumonia, atypical pneumonia, incidence, doxycycline, children, paediatric population

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INTRODUCTION

Mycoplasma pneumoniae is a common cause of respiratory infections, particularly in school-aged children. The majority of infections manifest as a relatively mild respiratory illness, which is sometimes colloquially referred to as "walking pneumonia" (1). Nevertheless, some individuals may experience a more severe form of pneumonia, necessitating hospitalisation and oxygen therapy (2). Significant cyclical increases in *Mycoplasma pneumoniae* pneumonias (MPP) have been observed every 3–5 years (3), which is likely due to changes in the predominant circulating strain. In a statement released in November 2023, Chinese authors cautioned that an increase in MPP was likely during the upcoming season (4). This prediction has since been corroborated in our setting.

MATERIALS AND METHODS

The authors retrospectively analysed data from the electronic medical records of paediatric patients at a single tertiary care facility in Prague, Czech Republic. It is estimated that the catchment area of this centre is between 300,000 and 500,000 inhabitants. The objective of the study was to investigate the incidence of MPP in two distinct patient groups. The initial group comprised children who had been hospitalised for MPP during the period from January 2019 to July 2024. The second group comprised outpatients with MPP and was compared with two similar time periods: January–July 2023 and January–July 2024. The basic data of the cohort of hospitalised patients were analysed and supplemented with information regarding gender and age distribution. Furthermore, our evaluation encompassed the efficacy of antibiotic therapy with doxycycline.

RESULTS

From January to July 2024, 111 outpatients were diagnosed with verified pneumonia on chest X-ray, suspected for *Mycoplasma pneumoniae* aetiology based on clinical presentation and laboratory parameters. In comparison, during the same period in the previous year, only 9 such patients were diagnosed, representing a 12.3-fold increase (Fig. 1a). A total of 54 patients with suspected MPP were treated initially with clarithromycin, while 66 patients received doxycycline. As a consequence of the insufficient effectiveness of clarithromycin, the treatment was switched to doxycycline in sixteen patients (29.62%), which resulted in subsequent positive outcomes. In particular, between January and July 2024, treatment with doxycycline was completed in 77 patients, of whom 15 (19.48%) had been treated with doxycycline as a result of the failure of clarithromycin treatment.

Between January 2019 and July 2024, a total of 23 patients were hospitalised with pneumonia caused by agent *Mycoplasma pneumoniae* (2019 – 3 cases, 2020 – 3 cases, 2021 – 0 cases, 2022 – 0 cases, 2023 – 2 cases, and 15 patients from January to July 2024) (Fig. 1b).

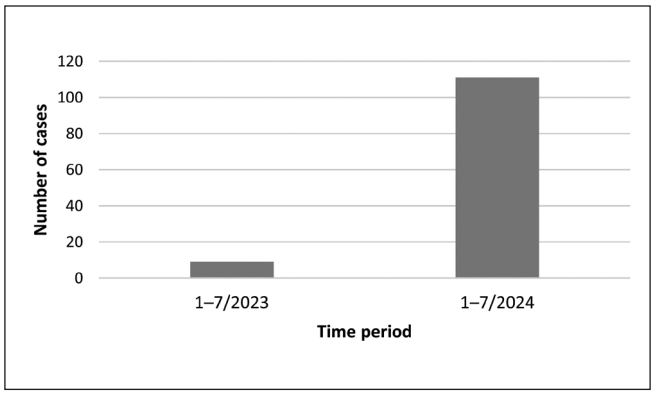

Fig. 1a. *Number of outpatient cases of suspected Mycoplasma pneumoniae pneumonia (MPP).*

The number of outpatient cases of suspected *Mycoplasma pneumoniae* pneumonia in children from January to July 2023 was compared to the same period in 2024. The data revealed a 12.3-fold increase, with the number of cases rising from 9 in 2023 to 111 in 2024.

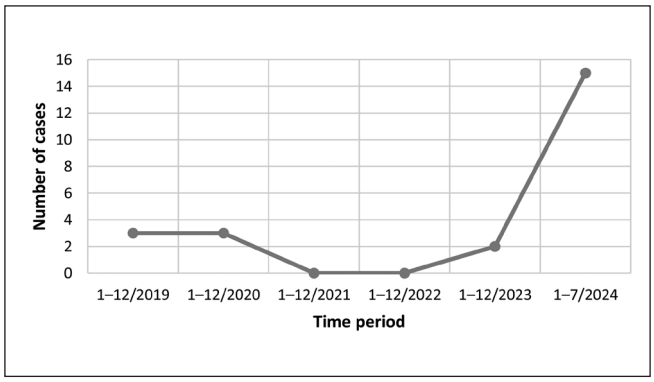

Fig. 1b. *Number of hospitalized cases with MPP in children.*

The number of cases of *Mycoplasma pneumoniae* pneumonia in children that have resulted in hospitalisation following the absence of cases in 2021 and 2022, which is likely attributable to the implementation of preventive measures to control the spread of the novel coronavirus. There has been a notable rise in the number of cases during the first seven months of 2024. The number of cases presented for the year 2024 encompasses the period between June and July of that year only.

The aetiology was determined by PCR testing of a nasopharyngeal swab and/or by the serological pattern of acute infection.

Female patients represented 61% of the cohort. The median age was 12 years, with an age range of 1 to 17 years. The median C-reactive protein level among patients who were hospitalised was 36 mg/L (range: 3–240 mg/L). Pleural effusion was observed in six patients, representing 26% of the total number of cases. Seven patients (30.43%) required oxygen therapy, all of whom were diagnosed within the first seven months of 2024. In the event of a suspected *Mycoplasma pneumoniae* aetiology, a course of therapy was initiated for 13 patients using clarithromycin, and for 10 patients using doxycycline. In six of the 13 patients treated with clarithromycin, the course of therapy was switched to doxycycline due to a lack of efficacy. This resulted in a complete recovery in all patients.

DISCUSSION

In the majority of cases MPP are non-severe, with only a small proportion of children requiring hospitalisation. However, a recent seven-month period in the current year has shown an increase in the number of children hospitalised for MPP when compared with the five previous years. This deviation from the usual experience is of particular interest. The most recent season has been observed to demonstrate a predominance of cases presenting with elevated fever, chest discomfort, and oxygen dependency. Given that serology and PCR testing for *Mycoplasma pneumoniae* are not routinely performed in our clinical practice for all patients with suspected atypical pneumonia (especially in cases with a favourable clinical course), it is probable that the total number of hospitalised children with MPP was considerably higher than the number reported. In the outpatient setting, we did not have laboratory confirmation of MP aetiology in every case. The diagnosis of MP was based on clinical presentation and epidemiological consequences, rather than definitive laboratory confirmation. Conversely, other aetiological agents such as Legionella or Chlamydia were not detected in the last five years of analysis, and it is highly probable that they were not the source of infection in the group of unconfirmed patients. It is hypothesised that the total number of hospitalised children with MPP was considerably higher than the number reported. Conversely, a marked decline in cases was observed during the years 2020 and 2021, which may be ascribed to the implementation of preventive measures aimed at regulating the transmission of the novel coronavirus.

The prevailing therapeutic approach to infections caused by *Mycoplasma pneumoniae* is the administration of macrolide antibiotics. There is considerable geographical variation in the prevalence of macrolide resistance, with the highest levels (> 90%) observed in Asia (5). At our institution, clarithromycin is the primary treatment option for children below the age of eight, while doxycycline is the standard treatment for children aged 8 years and older (6). This antibiotic treatment has been demonstrated to be both efficacious and cost-effective, with a favourable safety profile, as evidenced by multiple studies. Moreover, the efficacy of doxycycline therapy was evident within a relatively short time frame (7).

Conversely, during the current respiratory season, 19.48% of cases required doxycycline due to prior treatment failure with clarithromycin. It is significant to note that the examined cohort

of paediatric patients did not exhibit any unsuccessful cases of doxycycline treatment.

However, a significant limitation of doxycycline therapy is that in the European guidelines is not approved for use in children under the age of eight. The most recent recommendations from the American Academy of Pediatrics now endorse the utilisation of doxycycline in children of all ages, with a maximum dosage of 21 days (8). This recommendation is based on the observation that doxycycline exhibits a lower affinity for calcium compared to other tetracycline drugs, which reduces the risk of dental staining associated with short-term use (9). The safety of doxycycline in children under 8 years of age has been confirmed by several studies (10, 11). The Paediatric Asthma Centre in Israel reports 30 years of experience administering doxycycline to young children for suspected atypical pneumonia, using 4 mg/kg on the first day, followed by 2 mg/kg for 9 days without any clinical evidence of dental staining (12).

The recent outbreak of *Mycoplasma pneumoniae* pneumonia has the potential to have a significant impact on public health in the Czech Republic. The burden on the healthcare system is driven not only by a notable increase in infections among outpatients but also by an acute rise in the number of patients requiring hospitalisation. Unfortunately, primary prevention in the form of vaccination is not currently available (10), therefore, alternative interventions must be employed, the effectiveness of which largely depends on the time of their implementation (11).

A timely and accurate diagnosis of infection is fundamental to limiting the spread of the disease. The implementation of innovative therapeutic strategies, such as the administration of doxycycline to younger children, should be given due consideration. Furthermore, the introduction of paediatric formulations into the market should also be considered. Finally, adequate isolation of infected individuals throughout their contagious phase is imperative for disease control.

CONCLUSIONS

In conclusion, the findings of our study indicate a notable rise in the incidence of MPP among children and adolescents, which is in accordance with the results reported in other published studies (12–17). Furthermore, cases of more severe infection necessitating hospitalisation and oxygen therapy were observed. The prolonged duration of the current respiratory season, coupled with the severity of infection outcomes and suspected antimicrobial resistance to clarithromycin (3, 18), underscores the need for continued vigilance. The accurate and adequate provision of information, coupled with an awareness of the appropriate antibiotic therapy and the isolation of the contagious patient, should help to prevent the rapid spread of infection and should be regarded as a public health concern.

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Conflicts of Interest

None declared

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