Dominance of *Klebsiella* Species in Sputum Samples from Health Clinics in Kota Bharu, Kelantan: A Primary Care Surveillance

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Case Report

Pneumonia remains a major cause of morbidity and mortality worldwide, with *Streptococcus pneumoniae* historically recognized as the predominant causative organism. Consequently, the National Antibiotic Guidelines recommend empirical therapy in primary care targeting this pathogen (1). However, recent data from the Kota Bharu Public Health Laboratory (KB PHL) between 2022 and 2024 indicated that *Klebsiella pneumoniae* was the most frequently isolated organism (41.8–53.9%) from sputum samples submitted by health clinics in Kelantan, while *S. pneumoniae* accounted for only 3.4–4.6%. This unexpected finding raises questions about whether *Klebsiella* truly reflects the most common community pathogen in the region. Since most outpatients with suspected pneumonia are treated empirically, microbiological testing is typically performed only in cases with recurrent symptoms or atypical presentations. Moreover, *S. pneumoniae* is a fastidious organism that is more difficult to culture than *Klebsiella* spp., especially in delayed or inadequately processed samples.

This primary care surveillance study aimed to determine the distribution of organisms in sputum samples, their culture positivity rates, and antimicrobial resistance patterns. The study was conducted from January 1 to 31, 2025, and included all patients aged 18 years and above who presented with a productive cough to government health clinics in Kota Bharu, Kelantan. Samples were delivered to the laboratory on the same day to ensure timely processing. Unsatisfactory specimens (based on Bartlett criteria), samples older than 24 hours, and leaking samples were excluded. Demographic data (age and gender) and microbiological findings (culture results and antimicrobial susceptibility profiles) were collected and analysed descriptively.

Of the 139 sputum samples submitted, 10 were excluded. Among the remaining 129 samples, the mean patient age was 49.9 years (±18.54), with a slight female predominance (58.1%). Forty-one samples (31.7%) yielded positive cultures for a single pathogen, 70 (54%) showed no bacterial growth, and 18 (14%) exhibited mixed growth. *Klebsiella* spp. was the most frequently isolated pathogen (22.4%, n=29), followed by *Pseudomonas aeruginosa* (2.3%) and *Streptococcus pneumoniae* (1.6%) (Fig.1). All *Klebsiella* isolates were 100% sensitive to cefuroxime, 96.6% sensitive to amoxicillin–clavulanic acid, and completely resistant to ampicillin.

The sputum culture positivity rate of 31.7% aligns with findings from the University of Malaya (2020), which reported a rate of 22.1%, also from primary care clinic (2). The predominance of *Klebsiella* was consistent with studies conducted in Kenya and Surabaya, reporting isolation rates of 20.6% and 29%, respectively, whereas *S. pneumoniae* remained around 10% (3). In contrast, an outpatient study in Beijing found *S. pneumoniae* in 8.9% of cases and *K. pneumoniae* in only 3.1% (4). These findings underscore the importance of local antimicrobial stewardship. Current national recommendations advocate amoxicillin or doxycycline as first-line empirical therapy for community-acquired pneumonia (1). However, given the predominance of *Klebsiella* spp. in this study, reliance solely on these antibiotics may result in undertreatment for a significant proportion of patients. According to the 2024 National Surveillance Report, *K. pneumoniae* resistance rates across all clinical specimens were 19.3% for amoxicillin–clavulanic acid and 26.3% for cefuroxime, suggesting a growing resistance trend that may soon impact primary care settings (5).

Several limitations should be noted. The study involved only one district in Kelantan, limiting generalizability. Clinical factors and comorbidities influencing pathogen distribution were not assessed, nor were potential associations with *Klebsiella* infection explored. Furthermore, some *Klebsiella* isolates may represent colonization rather than true infection.

In conclusion, this surveillance demonstrated that *Klebsiella pneumoniae* was more commonly isolated than *Streptococcus pneumoniae* in sputum samples from primary care settings in Kota Bharu. The findings highlight the need for continuous local surveillance to guide empirical antibiotic selection and inform public health strategies for respiratory infection management in the community.

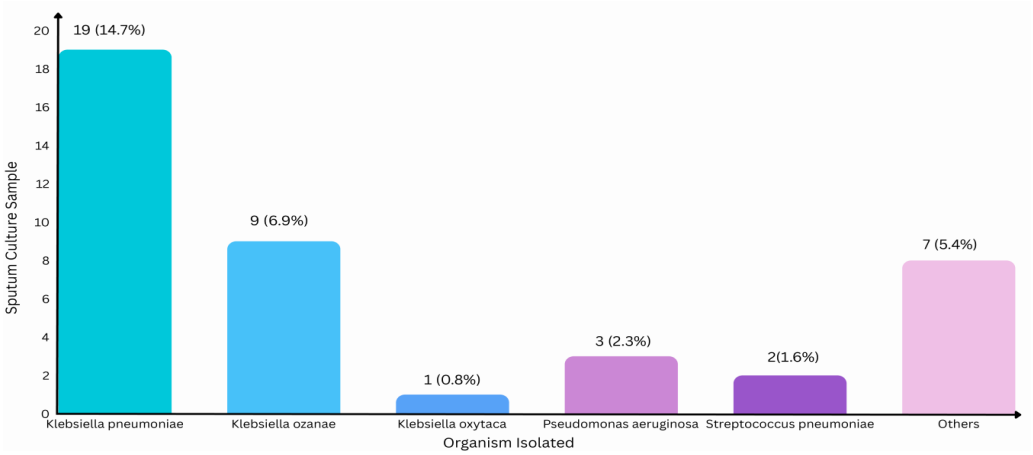

Figure 1. The commonest pathogen isolated from sputum samples from health clinics in Kota Bharu during the surveillance period

Keywords: Pneumonia, primary care, antibiotic resistance

References

1. National Antibiotic Guideline, 2024
2. Punithavathy S, Chia Y.C, Liew Su May. Microbial Pattern Of Sputum Cultures Of Adult Patients From A Primary CareClinic. International Medicalk Journal. ISSN: 13412051, Volume 25, Issue 05, May, 2020
3. Miriti DM, Muthini JM, Nyamache AK. Study of bacterial respiratory infections and antimicrobial susceptibility profile among antibiotics naive outpatients visiting Meru teaching and referral hospital, Meru County, Kenya in 2018. BMC Microbiol. 2023 Jun 29;23(1):172. doi: 10.1186/s12866-023-02905-x. PMID: 37386366; PMCID: PMC10308778.
4. Chen J, Li X, Wang W, Jia Y, Lin F, Xu J. The prevalence of respiratory pathogens in adults with community-acquired pneumonia in an outpatient cohort. Infect Drug Resist. 2019 Jul 30;12:2335-2341. doi: 10.2147/IDR.S213296. PMID: 31440068; PMCID: PMC6679678.
5. Ministry of Health Malaysia. *National Surveillance of Antimicrobial Resistance (NSAR) Report 2024* [Internet]. Kuala Lumpur: Institute for Medical Research; 2024 [cited 2025 Oct 28]. Available from: https://www.imr.gov.my