

Emergence of *Kocuria rhizophila* and *Kocuria rosea* Infections in Immunocompromised Patients

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Abstract: *Micrococcal species are commonly found as commensal on skin and mucosa of humans and animals. However they are known to cause infections such as meningitis, endocarditis, and pneumonia, particularly in immunocompromised patients, and infections related to implanted or inserted devices. Recently, there has been an increasing incidence of different types of Kocuria infections reported, most likely due to the adoption of new and better identification methods. Here, we report two cases of bloodstream infection caused by Kocuria spp in different age group of patients. The infection was subsequently resolved by antibiotic treatment. Judicious and attentive laboratory workup of Gram-positive blood-borne infections may reveal more cases of Kocuria spp infections in immunosuppressed patients, which may collaborate for a better understanding, prevention and early treatment of these infections.*

Keywords: Kocuria spp, Bloodstream infections, Blood Culture

1. Introduction

Kocuria spp are Gram positive microorganisms a member of the Micrococcus family, which includes *Kocuria rosea*, *Kocuria kristinae*, *Kocuria rhizophila*, *Kocuria marina* and *Kocuria aegyptia*. In the limited number of reported cases, the clinical manifestations of *Kocuria* infection included central venous catheter-related bloodstream infection, peritonitis, endocarditis and acute cholecystitis. However, the prevalence of human infections caused by *Kocuria* species is underestimated, as commonly used phenotypic assays are known to misidentify *Kocuria* isolates either as Staphylococci or coagulase negative Staphylococci (CoNS).^{1,2} The precise identification of these rare microorganisms requires automated methods and genomic sequencing, a method that is not available in most clinical microbiology laboratories. Very few cases of *Kocuria* infection have been reported from India.

To better understand the clinical characteristics of infections caused by these environmental pathogens, we describe two patients with positive blood cultures for *Kocuria* species from North East India. There are some reports of *Kocuria* associated infections in patients, especially those with malignancies or other immunosuppressed states. In addition, the number of reported patients in the pediatric group and elderly age group is even more limited.

Case I

A 70 year old man, previously known case of pericarditis and diabetic nephropathy undergoing continuous dialysis for the last four years, was admitted to medicine department of tertiary health care centre in Shillong, with complaints of abdominal pain and pedal oedema for last 3 days. Subsequently, he became febrile, and a peripheral blood examination showed a total cell count of white blood cells

8900 cells/cu.mm, neutrophils 84%, lymphocytes 12% and eosinophils 4%. The hemoglobin concentration was 9.0 g/dL, and the blood urea and creatinine levels were 161 mg/dL and 8.4 mg/dL, respectively. Random blood sugar was 168 mg/dL, total protein 5.9 mg/dL, serum albumin 2.0 mg/dL and globulin 3.9 mg/dL.

The blood culture (5-7 mL) which was sent on day one, inoculated into an adult BacT-alert bottle showed growth within 48hours (BacT/alert; bioMérieux, France). The subcultures were performed on 5% sheep blood agar and Macconkey agar, the plates were incubated at 37°C for 24-48hours in CO₂ incubator. Next day minute yellow colored colonies approximately of 0.5mm size was seen on blood agar, no growth was observed on MacConkey agar. After 48hours of incubation, colonies on blood agar became more prominent with 1mm size. They were Gram positive cocci arranged in irregular manner, non motile, catalase positive, modified oxidase negative, nitrate non reducer. The two isolates were later identified with a 97% probability as *Kocuria rhizophila* using a Vitek-2 system (bioMérieux) of 64 tests; the ID-GPC card panel tested positive only for α -glucosidase, leucine arylamidase, α -galactosidase, alanine arylamidase and tyrosine arylamidase. Two days later, the patient's septic episode due to *Kocuria rhizophila* was again documented with the repeated recovery of this species from a peripheral vein. Susceptibility testing through a modified Kirby-Bauer disc-diffusion technique was performed according to the Clinical and Laboratory Standards Institute guidelines for Staphylococcus. The disc-diffusion method revealed that *Kocuria rhizophila* was susceptible to penicillin, cefotaxime, ciprofloxacin, gentamicin, erythromycin, amikacin, linezolid, teicoplanin and vancomycin. The fever resolved promptly after the initiation of antimicrobial therapy with ceftriaxone for 10 days and subsequent blood culture on day 7 was sterile.



Image 1: Minute colonies on 5% Sheep blood agar after 24hours of aerobic incubation

Case II

A post term newborn, suffering from transient tachypnoea and febrile episode, with history of meconium stained liquor and erythema toxicum at birth, was admitted to Neonatal intensive care unit of NEIGRIHMS, Shillong. Subsequently, peripheral blood examination showed a total cell count of white blood cells 15800 cells/cu.mm, neutrophils 72%, lymphocytes 20% and eosinophils 8%. The hemoglobin concentration was 16.0 g/dL, and the blood urea and creatinine levels were 21 mg/dL and 0.4 mg/dL, respectively.

The peripheral blood (1-2 mL) inoculated into a BacT-alert paediatric bottle showed growth within 24hours (BacT-alert; bioMérieux, France). Subculture was performed using sheep blood agar, MacConkey agar and chocolate agar; the plates were incubated at 37°C for 48 h. After incubation, sheep blood agar and chocolate yielded the pure growth of nonhemolytic colonies that were 1–2 mm size, no growth was observed on MacConkey agar. Gram staining of the culture revealed the cells to be gram positive cocci in pairs, short chains and clusters. The Gram positive cocci were non motile, catalase positive, modified oxidase negative, nitrate reducer. The isolate was later identified with a 99% probability as *Kocuria rosea* using a Vitek-2 system (bioMérieux) of 64 tests; the ID-GPC card panel. The susceptibility pattern determined by disc diffusion method, showed sensitivity to penicillin, ciprofloxacin, ampicillin, gentamicin, vancomycin, linezolid, teicoplanin and ceftriaxone. Another blood sample sent on the third day showed the same isolate with the same sensitivity pattern. On day four of admission, injection ceftriaxone was started. She showed considerable improvement within 48 h and was discharged after 1 week.

2. Discussion

Kocuria spp is ubiquitous in nature and is frequently found as normal skin flora in humans and other mammals. Most of the reported cases of *Kocuria* spp infections occurred in immunocompromised patients or in patients with invasive devices during their hospital stay. Many cases might have been missed owing to their misidentification as Coagulase

negative *Staphylococcus* due to the limited biochemical tests². Dotis et al in 2012 and Moreira et al in 2014 described infection by *K. rosea* in children suffering from peritonitis and endocarditis respectively.^{3,4} Reports of *K. rhizophila* human infections were described by Becker et al. in 2008 and Moissenet et al. in 2012 in patients with intravascular devices.^{5,6} In majority of cases, most common portal of entry has been related to indwelling catheters. The pathogenicity and virulence factors remain unclear. This organism is susceptible to commonly used antibiotics and successfully treated with third generation cephalosporins along with catheter removal.⁷

Our case is the first reported case of blood stream infection due to *Kocuria rhizophila* and *Kocuria rosea* in North East India. On preliminary investigations, we could find evidence in the patient of being immunocompromised and direct evidence of any underlying disease condition. Probably infection might have resulted from direct invasion of intravascular devices like catheter etc. In these two cases of different age group with varying morbidity, the patients presented with the symptoms of febrile episodes and the blood culture grew *Kocuria* spp. No other foci of infection were found, and symptoms showed a remarkable improvement after therapy with third generation cephalosporins. The repeat blood culture was sterile after 1 week of completion of the antibiotic therapy.

In conclusion, if an organism resembling micrococci is repeatedly isolated from blood cultures, it is important to use means other than the routine biochemical systems, such as VITEK-2, Gene sequencing or MALDI-TOF MS, to obtain an accurate species identification. It is also recommended to verify the integrity of long-term intravascular devices.

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Nil.

4. Conflicts of Interest

There are no conflicts of interest.

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