

CASE REPORT

Red discoloration of urine caused by *Serratia rubidae*: A rare case

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ABSTRACT

There have been only a few reported human cases of infections caused by *Serratia rubidae* in literature. Among these sparse cases there is only one reported case of urinary tract infection (UTI) due to *S. rubidae* in literature. The organism is known to produce a red pigment known as prodigiosin. We report a case of UTI caused by *S. rubidae* in a diabetic patient who presented with burning micturition and reddish discoloration of urine, which on laboratory diagnosis, was proved to be due to the reddish pigment produced by the organism. This case report highlights that this rare organism might be associated with UTI leading to reddish discoloration of urine.

Key words: Diabetes, *Serratia rubidae*, urinary tract infection

INTRODUCTION

Serratia rubidae was described for the first time in 1940 as *Bacterium rubidae* and was later reclassified as *S. rubidae*. Furthermore, it has also been known as *Serratia marinorubra*, although its present nomenclature has prevailed. Three subspecies have been reported: *S. rubidae* subsp. *burdigalensis*, *S. rubidae* subsp. *rubidae*, and *S. rubidae* subsp. *colindalensis*. The habitats of *S. rubidae* are not perfectly known, but human infections due to *S. rubidae* is regarded to be associated with the consumption of contaminated coconuts or vegetable salads, as several studies have shown a high degree of salads contaminated with *S. rubidae*.^[1]

Apart from *Serratia marcescens* and the *Serratia liquefaciens* complex (*S. liquefaciens*, *Serratia proteamaculans*, *Serratia grimesii*), which are regarded as causing the majority of human *Serratia* infections, there is little information about the remaining *Serratia* spp. (“unusual” *serratiae*), including their susceptibility patterns to antimicrobial agents or underlying mechanisms of resistance. According to the data in the literature, it can be suggested that the relative paucity of reported cases of “unusual” *Serratia* infections is largely

due to the misidentification of these strains by commercial systems.^[2]

S. rubidae is a rare organism causing urinary tract infection (UTI). The red pigment produced by *S. rubidae* could lead to reddish discoloration of urine. Here, we report a case of UTI caused by *S. rubidae* in a diabetic female, who presented with reddish discoloration of urine, which was successfully treated with oral ciprofloxacin.

CASE REPORT

A 40-year-old female patient presented with fever, urgency, frequency, and burning micturition since 6 days. The patient also gave a history of passage of pale reddish urine since the last 2 days. She was a known type 2 Diabetes mellitus patient, on oral hypoglycemic drugs for the last 10 years. The blood investigations were as follows: Fasting blood glucose-330 mg/dl, urea 24 mg/dl, creatinine-0.98 mg/dl. The patient did not give any history suggestive of previous episodes of UTI.

The mid-stream urine sample collected aseptically was cloudy, with a reddish tinge. The urine routine microscopy

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interestingly showed 5-7 pus cells/high power field and bacilli but no red blood cells. The dipstick test performed for detecting microscopic hematuria was also negative. The gram stain showed pus cells and gram-negative cocco-bacilli. Urine sample was inoculated onto blood agar and MacConkey agar, incubated overnight at 37°C aerobically. Semi-quantitative technique was followed for colony count. After overnight incubation, pure growth of red pigmented colonies with a significant colony count of $>10^5$ CFU/ml was observed. Red pigment was also produced on Nutrient agar. On further testing, it was found to be a motile gram negative cocco-bacillus. Biochemical reactions showed catalase-positive, oxidase-negative, showed K/A (alkaline slant/acid butt) with gas production on triple sugar iron agar, ortho-Nitrophenyl- β -galactoside (ONPG)-positive fermented acid with adonitol, arabinose, lactose, raffinose, sucrose, and xylose. It did not ferment sorbitol and rhamnose. Indole was not produced but utilized citrate. It was confirmed as *Serratia rubidaea* by standard biochemical techniques.^[3] Strain was found to be susceptible to ciprofloxacin, piperacillin, cotrimoxazole ceftazidime, amikacin, meropenem and was resistant to nitrofurantoin and polymixin B by the Kirby-Bauer disc diffusion technique as per Clinical Laboratory Standards Institute (CLSI) guidelines [Figure 1]. The minimum inhibitory concentration of ciprofloxacin was 0.02 μ g/ml. The patient was treated with ciprofloxacin to which the patient responded well with the relief of the symptoms. Repeat mid-stream urine sample after 3 weeks did not yield any growth on the culture medium and the urine microscopy was normal.

DISCUSSION

S. rubidaea is a rare organism causing UTI. Paraplegia could be a predisposing factor for this organism to cause UTI.^[1] Study conducted by Ursua *et al.* showed *S. rubidaea* as an



Figure 1: The antibiotic susceptibility plate showing the reddish pigment produced by *Serratia rubidaea*

invasive pathogen isolated from bile and blood of a patient with a bile tract carcinoma.^[4-6]

In studies conducted by Stock *et al.* *S. rubidaea* was one of the *Serratia* species least susceptible to quinolones, resulting in several *S. rubidaea* strains with natural resistance to piperimidic acid and a few strains with intermediate susceptibility to some fluoroquinolones and was also resistant to tetracyclines, chloramphenicol, streptomycin, and spectinomycin and antifolates, but our isolate was sensitive to ciprofloxacin *in vitro*, and the patient also responded well to treatment with oral ciprofloxacin.^[2]

Although, *Serratia* spp. other than *S. marcescens* was first described several decades ago, they have barely been examined in many respects. The main reason for this lack of data in regard to pathogenicity, antimicrobial susceptibility, and mechanisms of antibiotic resistance might be the leading role of *S. marcescens* in human infections caused by *Serratia* spp. However, the occurrence of all *Serratia* spp. in clinical specimens, the recently described virulence-associated properties in *Serratia* strains other than *S. marcescens*, the increasing number of documented infections as well as the misidentification or non-identifiability of these bacteria by commercial systems strongly suggest their implication in human disease. *S. rubidaea* was found to be naturally sensitive to amoxicillin, amoxicillin/clavulanate, and ticarcillin but resistant to narrow-spectrum cephalosporins including, cefuroxime making this phenotypic pattern unique among *Enterobacteriaceae* species and points, together with species-related differences in susceptibility to ceftibuten and ceftoxitin, to the expression of unusual species-specific AmpC enzymes.

Evidence of novel mechanisms of resistance, in particular species-specific β -lactamases that have been described in the present study for the first time, should also direct the interest in research on “unusual” *Serratia* spp. for which isolation from clinical specimens can no longer be regarded as anecdotal and which are likely to be important human pathogens. There has been only one study documenting the antimicrobial sensitivity of these unusual *Serratia* species.^[2]

Though *S. rubidaea* causing UTI is rare, still clinicians must be aware of it as a causative agent of UTI, especially in immunocompromised patients.^[1] The ability of the organism to produce reddish discoloration of urine is also an important finding in this study.

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