



## Increased recognition of *Chryseobacterium* species as an emerging cause of nosocomial infection at a tertiary care centre in Mangalore

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### Abstract:

**Background:** *Chryseobacterium* is an environmental inhabitant which is periodically discovered in human specimens. It is one of the prominent pathogens among non-fermentative Gram-negative bacilli. The members of *Chryseobacterium* genus are mainly noted for their multi-drug resistance. **Materials and Methods:** Patients admitted in tertiary care centre were examined for 6 months. *Chryseobacterium* species were isolated from different clinical samples using conventional methods (according to CLSI guidelines) and antibiotic susceptibility patterns were obtained. This study also comprised of associated underlying risk factors, comorbidities and eventually the treatment outcome. **Results:** A total of 9 isolates of *C. indologenes* were recovered from specific samples like urine, sputum, pus and ascitic fluid. Among which, four patients had respiratory tract infection, one had chronic liver disease, two had wound infection and in other two, the organism was isolated from the sample of catheterized urine. The two patients were in the intensive care unit and had central lines and indwelling catheter. The common underlying risk factors identified were diabetes, hypertension and coronary artery disease. **Conclusion:** This case concludes that *C. indologenes* may cause symptomatic disease in immunocompetent persons with otherwise no associated underlying risk factors.

**Key words:** *Chryseobacterium*, indwelling catheter, drug resistance

### Introduction:

*Chryseobacterium* is an environmental inhabitant that is usually identified in human specimens. *Chryseobacterium* species, which was formerly known as *Flavobacterium*, are aerobic, oxidase-positive, glucose non-fermenting, Gram-negative rods<sup>1</sup>. It is one of the emerging pathogens among non-fermentative Gram-negative bacilli. It has been isolated from patients with bacteraemia, meningitis, pneumonia, peritonitis, ocular infections and other long-term indwelling devices. The members of *Chryseobacterium* genus are known for their multi-drug resistance.<sup>2</sup> The risk factors for *Chryseobacterium* infection vary from hospitalization, cancer, immunosuppression, diabetes mellitus to prolonged antibiotic therapy (>14 days).<sup>3</sup> *Chryseobacterium meningosepticum* and *Chryseobacterium indologenes* are the two species generally isolated from clinical specimens.

*Chryseobacterium indologenes* species was primarily isolated in 1993 from the tracheal aspirate of a patient with ventilator-associated pneumonia<sup>4</sup>. Majority of the cases of *C. indologenes* were reported from long-term hospitalised patients on mechanical support associated with the underlying disease. The present case study was targeted to quantify the burden of *C. indologenes* infections among the patients admitted in different disciplines. The main aim of the present study was to isolate *Chryseobacterium* species from various clinical samples and the determination of its antibiotic sensitivity patterns.

### Materials and Methods:

The patients admitted in tertiary care centre were examined for 6 months from November 2017 to April 2018. The *Chryseobacterium* species was isolated from different clinical samples like ascitic

fluid, respiratory secretions, urine and exudate.

Blood agar and MacConkey agar plates was used in the culture of ascitic fluid and exudate like pus. Respiratory secretions like sputum were cultured onto chocolate agar and MacConkey agar plates, and incubated overnight at 37°C. Urine specimens were cultured onto MacConkey agar and CLED agar plates by exploiting the semi-quantitative method.

Provisional identification of *Chryseobacterium* spp. was mainly made by the presence of dark yellow-colored colonies, oxidase-positive and appearance of Gram negative bacilli on gram stain. These isolates were further identified by biochemical reactions and Polymixin B resistance as per the CLSI guidelines and thus antibiotic susceptibility patterns were determined. Results of antibiotic susceptibility testing were interpreted as per the Clinical and Laboratory Standards Institute guidelines.<sup>5</sup>

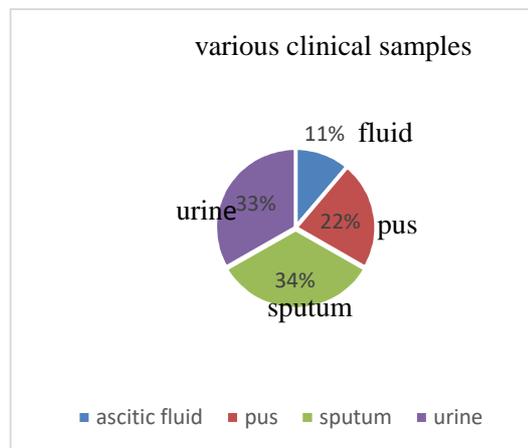
**Figure I:** Nutrient agar showing yellow coloured colonies of *Chryseobacterium* species



**Results:**

A total of 9 isolates of *C. indologenes* were recovered from different samples (one from ascitic fluid, two from pus, three from respiratory secretions like sputum and other three from urine).

**Figure II:** Various clinical samples



**C. indologenes in various age groups:**

The age groups are in the range of 17 yrs to 70 yrs

**Table I:** *C. indologenes* in various age groups

Age	Male	Female	Total
1-20		1	1
20-40		2	2
40-60	3	1	4
>60	1	1	2

**Table II:** Prevalence of *C. indologenes* across the hospital

Unit	<i>C. indologenes</i>
ICU	2
WARD (IP)	6
OP	1

**Table III:** Comorbid conditions

Clinical conditions	<i>C.indologenes</i> infection
Respiratory infection	4
Chronic liver disease	1
Wound infection	2
UTI	2

Other concealed infections were diabetes, hypertension and coronary artery disease. Except one patient (OP), all others had more than 48hrs of hospital stay. Mortality was nil.

**Table IV:** Antibiotic susceptibility patterns for different antibiotics

Antibiotic	Sensitive	Intermediate	Resistant
Levofloxacin	5	1	3
Piperacillin / Tazobactam	7	1	1
Ciprofloxacin	5	2	2
Gentamicin	3	1	5
Amikacin	4	1	4
Ceftazidime	6		3
Cefaperazone /Sulbactam	4	3	2

All isolates were resistant to Carbapenems (intrinsically resistant) and Polymixin B. One isolate from urine sample was multidrug resistant.

#### Antibiotic used in the treatment of *C.indologenes* infection

Third generation cephalosporins (55.56%) were the most commonly used antibiotic for the treatment of *C.indologenes* infection followed by Ciprofloxacin (33.3%) and Gentamicin (22.2%).

#### Discussion:

The primary identification of *C. indologenes* isolates was reasoned by their yellow pigmentation, oxidase positive and Polymixin B resistance. *C. indologenes* is easily distinguished from other non-fermenters by its individual ability to produce indole.<sup>6</sup> In the present study, 9 isolates of *C. indologenes* were recovered from various samples like ascitic fluid, respiratory secretions and urine which were correlated with the study conducted by Kaur H et al<sup>2</sup> and Vidhi Jain et al.<sup>7</sup> The

isolate of *C. indologenes* from ascitic fluid was from a chronic liver disease patient and it was accounted as a true pathogen. Most of the other isolates were from ward patients in this study.

The devices like indwelling vascular catheters, feeding tubes, and other medical devices that involve fluid may become reservoirs for *Chryseobacterium*<sup>1</sup>. In our study, majority of the patients had more than 48hrs of hospital stay and also had any one of the mechanical devices like central line or indwelling catheter, hence, all were categorized under nosocomial infections/ colonisation. A study conducted by Kaur H et al<sup>2</sup> and Vidhi Jain et al<sup>7</sup> also had similar findings.

Globally, infections caused by *Chryseobacterium* spp. have been reported most frequently among elderly people (>65 years old) and least frequently among children (<5 years old)<sup>8</sup>. In this study, the highest frequency of *C.indologenes* infection occurred among the elderly patients > 40years of age and the lowest frequency occurred among < 20 years of age. The main risk factors associated are diabetes, hypertension and coronary artery disease.

According to the SENTRY Anti-microbial Surveillance Program results, the effective antibiotics against *C. indologenes* are quinolones (gatifloxacin and levofloxacin) and sulphamethoxazole-trimethoprim ( $\geq$  95% sensitivity), followed by piperacillin-tazobactam (90% sensitivity)<sup>9</sup>. Majority of the isolates in this study were highly susceptible to piperacillin-tazobactam (77.78%) followed by Ceftazidime (66.67%). One of the isolates from catheterised urine sample was multi-drug resistant and it was correlated with the study done by Palewar MS, Mudshingkar SS et al in 2016.<sup>10</sup> The resistance to multiple antibiotics by *C.indologenes* was observed and confirmed in this study.

As a conclusion, *C. indologenes* should be recognized as an emerging nosocomial pathogen. Its association with indwelling

catheters and devices are well established, and hence this should be monitored and changed regularly during the hospital stay.

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