First case report of *Pseudomonas Luteola* isolated from urinary tract infection in Babylon City, Iraq

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Abstract. Urinary tract infections (UTIs) are common in both men and women. They are caused by bacteria that get into the urinary tract through the urethra (the tube going from the penis to the bladder) or, in rare cases, the ureters (tubes that carry urine from the kidneys to the bladder). Risk factors for developing a UTI include having a catheter inserted to drain the bladder or a surgical wound on the urinary system. *Pseudomonas luteola* (*P.luteola*) is a Gram-negative, rod-shaped bacterium considered ecologically problematic and can cause pneumonia and urinary tract infections in humans. It is a common cause of hospital-acquired pneumonia and accounts for around 20% of all such cases. *P. luteola* causes fever, tachycardia, and other signs of infection, but some of these symptoms may be present for many weeks before the symptoms of infection are clear. According to our knowledge, this is the first detection in January 2023, of *P. luteola* in Iraq, Babylon City from a 51-year-old woman with chronic urinary tract infections and kidney failure (dialysis).

1 Introduction

Urinary tract infections (UTIs) are common in both men and women. They are caused by bacteria that get into the urinary tract through the urethra (the tube going from the penis to the bladder) or, in rare cases, the ureters (tubes that carry urine from the kidneys to the bladder). Risk factors for developing a UTI include having a catheter inserted to drain the bladder or a surgical wound on the urinary system. They can also be caused by a sexually transmitted disease, such as gonorrhea or chlamydia [1]. In adults, the most common symptoms of a UTI are burning with urination and more frequent urination than usual. Women also may experience pain during sex, a painful urinary tract infection, and unusual vaginal discharge. The symptoms often appear about a week after being exposed to the bacteria that cause the infection. But in some cases, they may appear shortly after exposure [2]. A fever is not usually a symptom of a UTI but may be more common in people who are immunocompromised. Antibiotics can be taken to treat a UTI, although they are not always effective. Prevention is the best treatment for a UTI. *Pseudomonas luteola* is a gram-negative, oxidase and catalase positive, rod-shaped bacterium that is the causative agent of cystitis in women. It is a common commensal bacterium of the urinary tract, and is most...
commonly isolated from women with cystitis or complicated cystitis. It is known to colonize the urinary tract, especially the urinary bladder [3]. The ability to colonize the urinary tract may be due to several factors including increased adherence to the urinary tract and the expression of surface structures that facilitate adhesion [4]. It is found in soil, water, and the respiratory tract of humans and animals. *P. luteola* is a facultative anaerobe and can grow in the presence or absence of oxygen. This organism is typically found in the environment in low doses and does not cause illness. However, when *P. luteola* is found in high concentrations it can cause a variety of infections in both humans and other animals. The clinical forms of disease caused by this organism are pneumonia, urinary tract infections, skin infections, eye infections, and ear infections [5]. In addition to these clinical forms, there have been several case reports describing cases of septicemia due to *P. luteola* in humans. This condition can cause sepsis, which is a serious condition in which there is, widespread inflammation throughout the body and can lead to death. It is estimated that there are between 10 million and 100 million cases of bacterial infection due to *P. luteola* each year around the world [6]. *Pseudomonas luteola* is a Gram-negative, aerobic bacterium that is commonly found in water and soil. This bacterium is capable of causing diseases in both plants and animals. *P. luteola* can cause a number of diseases, including leaf spot, stem blight and downy mildew. There are also reports of this bacterium being responsible for food spoilage. A growing body of research shows that *P. luteola* can be used to treat certain types of cancer in laboratory animals. However, there are concerns regarding the long-term use of this type of bacteria as a medical treatment in humans [7]. One of the most notable characteristics of *P. luteola* is its ability to produce many different antibiotics. For example, it has the ability to produce at least eight different antibiotics and at least 24 other antimicrobial compounds. These substances are produced by a number of different genes that are located within different regions of the bacterial genome. The bacteria also contain several different toxins that are capable of killing other types of bacteria. Researchers have studied these molecules and found that they can be useful in treating certain types of cancers [4]. Recent studies have also showed that *P. luteola* can kill different types of cancer cells and prevent the spread of tumors that have spread to other organs in the body. The ability of *P. luteola* to kill different types of cancer cells depends on the ability of the bacteria to kill the cells that line the blood vessels that surround the tumor [3]. This process causes the walls of the blood vessels to leak blood and other fluids into the tumor. This will cause the tumor cells to begin to die and eventually die themselves. Researchers are investigating the use of *P. luteola* as a potential cancer treatment because it appears to be relatively safe and effective for treating certain forms of cancer. In this case report, we isolated the first strain of *P. luteola* form chronic urinary tract infection in a woman with kidney failure [6].

## 2 Methods

In January 2023, a 51-year-old woman infected with kidney failure with chronic urinary tract infection, 5 ml of midstream urine was collected from a loop full of urine streaked on blood agar and MacConkey agar. This was incubated with brain heart infusion broth at 37°C for 48 h. *P. luteola* diagnoses have been made using cultural characteristics [8], biochemical tests [9], and the VITEK 2 System. The Kirby-Bauer disc diffusion method was used to test antibiotic susceptibility. Five fresh bacterial colonies were suspended in nutrient broth (0.5 Mc-Ferland standard tubes with 1.5x10⁸ CFU per ml) and adjusted accordingly [10, 11]. A streak of suspension was added to Mueller Hinton agar, which was then covered with all antibiotic discs and incubated aerobically at 37°C for 24 hours. The current study used twelve antibiotics; amoxicillin 25g, amoxicillin-clavulanic acid 25/10g, cefotaxime 30g, ceftriaxone 30g, Ceftazidime 30g, levofloxacinxacin 5g, Gentamicin 15g,
Ciprofloxacin 5, Tetracycline 30UI, Amikacin 30g, Tobramycin 10g, and imipenem 10g. Based on the diameter of the bacterial growth zone, the Clinical and Laboratory Standards Institute provides guidelines regarding antibiotic susceptibility and resistance [12, 13].

3 Results

Our result showed that the colonies were grey in color on Blood agar and green on CHROMagar (Fig.1). Pseudomonas luteola Gram-negative bacterium (Table 1) is aerobic, non-spore-forming, motile, and lactose-non-fermented (Fig. 2). It grows well on MacConkey agar, is lactose-non-fermented, and is non-spore-forming. Most clinical isolates are oxidase negative. On MacConkey agar, it produces yellow colonies that distinguish it from other Pseudomonas. In contrast to other fluorescent species, P.luteola does not reduce nitrate nor does it oxidize xylose, which makes them easy to distinguish from other Pseudomonas species.

![Fig. 1. CHROMagar was cultured with Pseudomonas luteola isolated from a 51-year-old woman with chronic urinary tract infections and kidney failure (dialysis).](image)

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<th>Table 1. Biochemical tests of Pseudomonas Luteola.</th>
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Fig. 2. VITEK® 2 COMPACT report for diagnosis of *Pseudomonas luteola*.

4 Discussion

UTIs are a common infection in both men and women. Approximately 1 in 3 women will get a UTI in their lifetime, and this infection is most commonly caused by bacteria known as *E.coli*. The symptoms of a UTI include pain when urinating, frequent urination, and cloudy or bloody urine. A diagnosis of a UTI is made by examining the urine sample under a microscope and culturing the bacteria that is present. The most common treatment for UTIs is antibiotics [2]. Although these drugs are effective in many cases, they usually do not work against *P. luteola* infections. This is because these bacteria have developed resistance to the antibiotics commonly used to treat urinary tract infections. *Pseudomonas aeruginosa* is a type of bacteria that can infect the lining of the urinary tract. This infection can cause blood in the urine, urinary frequency, painful urination, and painful sexual intercourse for women. If the infection is not treated, it can spread to other areas of the body and cause more severe symptoms, such as sepsis (an infection in the bloodstream) [4].

*Pseudomonas luteola* is a Gram-negative, motile bacterium that can cause serious health problems in humans and animals. In humans, it can cause skin infections and urinary tract infections. In cattle and other livestock, it can result in abortions or stillbirths depending on the stage of pregnancy at which the infection occurs. The disease also affects the reproductive organs of sheep and goats and may cause milk infertility in those animals as well [5]. However, in dogs it is usually limited to skin lesions (primarily on the paws), which cause the affected areas to ulcerate and bleed. *P. luteola* is a common cause of mastitis in dairy cows and can significantly reduce the quality of milk produced. While the exact mechanism through which this bacterium causes these diseases is not yet fully understood, it is believed that the infectious agent enters through the skin and infects the underlying tissues, causing inflammation and damage. *Pseudomonas Luteola* cause UTIs in women more often than any other type of bacteria. *Pseudomonas Luteola* is a Gram-negative, oxidase- and catalase-positive bacteria [3]. It is found in the lower urinary tract of both men and women. The bacterium spreads through sexual contact or by sharing unsanitary conditions, such as changing diapers. Women who have a weakened immune system or are undergoing chemotherapy for treatment of certain types of cancers are at higher risk of developing an infection with *Pseudomonas Luteola*. *Pseudomonas Luteola* can also cause infections in infants and young children. This type of infection is typically known as neonatal sepsis. A baby can develop this infection when the mother has the bacteria in her urine during labor or birth [6].
Symptoms of a urinary tract infection caused by *Pseudomonas Luteola* include burning pain in the lower back and/or lower abdomen, fever, nausea, vomiting, cloudy or bloody urine, and painful urination. In severe cases, a *Pseudomonas Luteola* infection can lead to kidney damage or even death. Sometimes a baby who develops an infection with *Pseudomonas Luteola* may become very ill and requires intensive care in an intensive care unit. The type of treatment that is used will depend on the severity of a child's symptoms. In some cases, antibiotics will be prescribed to fight the infection. In other cases, the baby may need to be treated with intravenous fluids and administered oxygen through an inhaler. Most babies recover completely from their *Pseudomonas Luteola* infection within a few weeks [7].

A woman who has a urinary tract infection caused by *Pseudomonas Luteola* should see her doctor as soon as possible for treatment. Urinary tract infections can be treated with antibiotics that are designed to fight the type of bacteria that caused the infection. It is important to take all of the medication that has been prescribed so that the patient is able to get rid of the infection as quickly as possible. The most common cause of a *Pseudomonas Luteola* infection is contaminated bathing water. This is why proper hygiene is so important in preventing this type of infection. People should wash their hands thoroughly after using the toilet and before they prepare food to prevent the spread of the bacterium. These measures are especially important in public places where others may use the same bathroom facilities [14].

According to the CDC, "Infections with certain bacteria are called invasive or serious infections when they affect normally sterile areas of the body such as the bloodstream, cerebrospinal fluid, brain or meninges, lungs, urinary tract, genital tract, and other body openings." Another potential concern to keep in mind when it comes to these infections is that there may potentially be long-term complications in some cases. Some studies show that these infections may lead to an increased risk of developing chronic diseases such as kidney failure and diabetes in the future. Bacteria such as *P. luteola* play an important role in the environment by breaking down organic matter and helping to release nutrients into the soil. However, some of these bacteria can also cause diseases if they infect plants or animals. *P. luteola* is a common cause of plant disease in many parts of the world. It typically infects wheat plants and can dramatically reduce crop yields. The bacterium can also contaminate seeds used for planting new crops, which makes it very difficult to grow healthy crops in the future [15]. Additionally, the bacteria can spread to humans and cause symptoms such as fever and diarrhea. In some cases, it can cause life-threatening infections in people with weakened immune systems. Researchers are working to develop new methods to control and eliminate bacterial infections to prevent the spread of these diseases and to reduce the losses that they cause to farmers and the food industry [16].

There have been many reports of *P. luteola* infections in previously healthy patients. This is despite the fact that most previously documented *P. luteola* infections were associated with immunocompromised patients and patients with prostheses and indwelling catheters. As described by Engel et al. with regard to a previously healthy patient with fever and elevated liver enzymes. As described by Rastogi and Sperber, a 60-year-old previously healthy patient was admitted to the hospital with *P. luteola* bacteremia and cellulitis and initially had high LFTs, which later returned to normal before graduation from the hospital [17]. Dalamaga et al. described a patient with *luteola* bacteremia and cellulitis with initially high liver function reverting to normal prior to hospital discharge. In Tunisia, Hmida et al. documented the patient was 69 years old, treated with insulin for diabetes mellitus, benign prostatic hyperplasia, and end-stage renal failure requiring hemodialysis three times a week [18]. Barry reported on a 50-year-old immunocompromised female in Saudi Arabia who had been on steroids for years and had an indwelling drain for over six weeks due to hemorrhagic pancreatitis [19]. Our case is the first reported case of *P. luteola*
in a woman with chronic urinary tract infections and kidney failure (dialysis) in Iraq. Many clinical isolates of *P. luteola* are resistant to first- and second-generation cephalosporins, tetracyclines, ampicillin, and trimethoprim-sulfamethoxazole, but susceptible to third-generation cephalosporins, mezlocillin, imipenem, aminoglycosides, and quinolones [20]. In contrast, our isolate was resistant to Amoxicillin, Amoxicillin+clavulanic acid, Cefotaxime, Ceftriaxone, Ceftazidime, Levofloxacin, Gentamicin, Ciprofloxacin, Tetracycline, Amikacin, Tobramycin, while was sensitive to imipenem, it is extensive-drug resistance, this indicates that our isolate was nosocomial in origin.

5 Conclusions

In January 2023, we discovered *Pseudomonas luteola* in Iraq, Babylon City when a 51-year-old woman with chronic urinary tract infections and kidney failure was examined. Due to its resistance to most antibiotics and extensive drug resistance, *Pseudomonas luteola* is classified as a clinical isolate.

References