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Identification of Candida Sp. Fungi in the Urine of Inpatient Surgical Patients Using Catheters at Bendan Regional General Hospital, Pekalongan City

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ABSTRACT

Background & Objective: andiduria is an opportunistic fungal infection caused by *Candida sp*. that indicates contamination, colonization, or infection that can be life-threatening and even fatal. This disease often affects hospitalized patients, especially those with severe underlying conditions. Patients at high risk of *Candida sp*. infection include those with compromised immune systems, often due to invasive procedures received during treatment. This study aims to determine the presence of *Candida sp*. in urine samples from surgical inpatients using catheters at Bendan General Hospital in Pekalongan City. **Method:** This study is a descriptive study using total sampling with 14 respondents. **Result:** Macroskopically, 5 samples tested positive for *Candida sp*. fungi, characterized by white-yellowish colonies, a slightly acidic odor, yeast-like colony shape, and a moist, convex colony surface. Following this, LPCB staining was performed on the 5 samples that were macroscopically positive for *Candida sp*. fungi. The positive samples were confirmed through microscopic observation using LPCB staining, showing oval-shaped yeast cells (blastospores) with a predominantly white color and a slight bluish tint. **Conclusion:** People who use catheters often forget to maintain hygiene to keep the pH stable, thereby minimizing the excessive growth of *Candida sp*. fungi. Risk factors that can lead to the presence of *Candida sp*. in the urine of catheter users, as identified in this study, include the foods and beverages consumed, medications taken, gender, humidity around the catheter area, and the duration of catheter use, all of which can influence the growth of *Candida sp*. fungi.

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Introduction

Candiduria is an opportunistic fungal infection caused by *Candida sp*. species, characterized by contamination, colonization, or infection that can be life-threatening or even fatal. This condition commonly affects hospitalized patients, particularly those with severe underlying conditions. Patients at high risk of *Candida sp*. infection include those with compromised immune systems, often due to invasive procedures received during treatment. (Widarti *et al.*, 2023)

Based on the data obtained, there were 1,544 patients admitted to the ICU at RSPAD Gatot Subroto in 2021. Laboratory results showed that 111 patients were infected with *Candida sp*., resulting in a Candiduria incidence rate of 7.19% among ICU patients at RSPAD Gatot Subroto. Hamdiyati et al. also conducted a study in the ICU of Sanglah Bali General Hospital in 2013, where 10% of patients were infected with *Candida sp*. Palit et al. also conducted a study, with results showing 4% incidence, over a one-year period from 2017 to 2018 in the intensive care unit of Prof. Dr. RD Kanadou Hospital in Manado. This is likely due to RSPAD Gatot Subroto being a Type A referral hospital in Jakarta that frequently receives patients with severe conditions, making infections more likely to occur. In this study, data was collected from 84 patient medical records, with 27 records excluded due to incompleteness. (Widarti *et al.*, 2023)

The incidence of candiduria in the urine of catheter users has increased because some patients are immunocompromised and have associated risk factors such as intravenous catheter use, urinary catheters, etc. This is not dangerous, but caution is needed regarding the large amount of normal *Candida sp*. flora found in the area around the catheter insertion site, which will be carried along with the urine. One preventive measure that can be taken is to use advanced medical devices that can reduce mortality and prolong life to prevent the growth of *Candida sp*. fungi, the cause of candiduria. (Setyaningsih, Zulfa and Nugrohowati, 2024)

Previous research addressed the topic of the growth of *Candida sp*. fungi, the cause of candiduria, in the urine of patients with urinary tract infections who use catheters at a hospital in Makassar. Previous researchers used urine samples from patients with urinary tract infections who used catheters as the study population. In the pre-analytical stage, preparations were made, including sterilizing equipment, preparing SDA (Sabouraud Dextrose Agar) media, and collecting catheter urine samples. During the analytical phase, urine culture, microscopic examination, and total plate count (TPC) were performed. The previous study was conducted at the Microbiology Laboratory of the Medical Laboratory Technology Department at Poltekkes Kemenkes Makassar from May 13 to June 3, 2022. The sampling technique used was accidental sampling, with a total of 12 samples. (Widarti *et al.*, 2023)

From the above description, the researcher was interested in conducting research that differed from previous studies in that the subjects were surgical inpatients who used catheters, not just patients with UTIs (urinary tract infections) who used catheters. The sampling location differs because the researcher used Bendan General Hospital in Pekalongan City as the sampling site, and the study was conducted at the Hematology Laboratory of the Pekalongan Health Analyst Academy. The method used by the researcher involved the use of SDA (Sabouraud Dextrose Agar) medium and staining of *Candida sp*. fungal colonies with LPCB (Lactophenol Cotton Blue). The

samples were collected by the researchers from mid-February to early May 2025 using total sampling, with the technique of directly collecting urine from inpatients undergoing surgery who used catheters into urine containers from the urine bags they used.

The researchers investigated the presence of *Candida sp*. fungi because many patients lack understanding of how to maintain hygiene when using catheters as a tool to expel urine, leading to moist areas that cause itching due to the growth of *Candida sp*. fungi around the catheter insertion site or those expelled along with urine. This study is expected to reduce the growth of *Candida sp*. fungi in surgical patients who use catheters during hospitalization, thereby maintaining the cleanliness of the catheter insertion area so that it remains clean and dry.

Objective

This study aims to determine the presence of *Candida sp*. fungi in urine samples from surgical inpatients using catheters at Bendan Regional General Hospital in Pekalongan City.

Method

The type of research used in this study is descriptive research, which is a research method that describes the characteristics of the population or phenomenon being studied or occurring. The main focus of this research method is to describe the research subject. It answers what events or phenomena are occurring and being studied. (Mayang, 2022) This type of research is appropriate for the study being conducted, which aims to identify *Candida sp*. fungi in the urine of surgical inpatients using catheters at Bendan General Hospital in Pekalongan City. The study was conducted from mid-February to early May 2025. The population in this study consists of all surgical patients using catheters for 2–6 days who were in the inpatient ward of RSUD Bendan Kota Pekalongan from mid-February to early May 2025, totaling 14 respondents. The sample used in this study is the entire population as the research sample or using the total sampling technique available from mid-February to early May 2025. Sample testing was conducted at the Hematology Laboratory of the Pekalongan Health Analyst Academy. Data analysis techniques involved organizing the data obtained from the study into tables and analyzing them descriptively.

Results

The results of *Candida sp*. fungal identification in the urine of surgical inpatients using catheters at Bendan Regional General Hospital in Pekalongan City, conducted at the AAK Pekalongan hematology laboratory from mid-February to early May 2025, are presented in Figure 1 below:

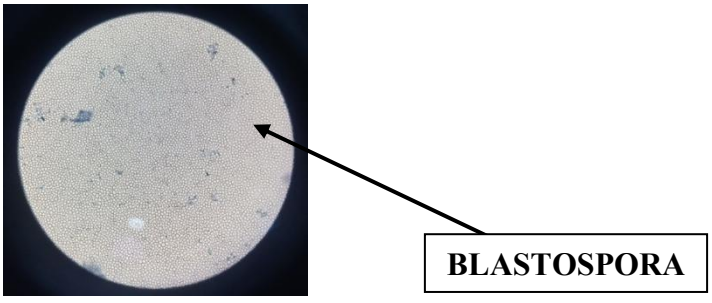

FIGURE 1. *Candida sp*. fungal colony in blastospore form with LPCB staining.

Based on Figure 4.1 regarding the identification of *Candida sp*. fungi in the urine of surgical patients using catheters, *Candida sp*. fungi were found in the form of blastospores. After culturing 14 samples on SDA medium for 2–3 days at 37 degrees Celsius. Macroscopic observations revealed 5 positive samples for *Candida sp*. fungi, characterized by white-yellowish colonies, a slightly acidic odor, yeast-like colony shape, and a moist, convex colony surface. Subsequently, LPCB staining was performed on the 5 samples that were macroscopically positive for *Candida sp*. fungi. These positive samples were confirmed by microscopic observation using LPCB staining, showing oval-shaped yeast cells (blastospores) with a predominantly white color and a slight bluish tint.

The results of the identification of *Candida sp*. fungi in the urine of inpatients undergoing surgery who used catheters at RSUD Bendan Hospital in Pekalongan City are presented in Table 1 below:

TABLE 1. Summary of the results of *Candida sp*. identification in the urine of surgical inpatients using catheters at Bendan Regional General Hospital, Pekalongan City

Hasil	Jumlah	Persentase (%)
Positif	5	36%
Negatif	9	64%
Total	**14**	**100%**

From Table 1 above, five samples (36%) tested positive for *Candida sp*. fungi.

Discussion

Based on the results of research on the identification of *Candida sp*. fungi in the urine of surgical patients using catheters in Figure 4.1, *Candida sp*. fungi were found in the form of blastospores with LPCB staining after the urine samples were cultured for 2-3 days in SDA medium at a temperature of 37 degrees Celsius. Blastospores are oval or round in shape, with elongated cells whose sizes vary but generally range between 2-6 micrometers. After conducting research on 14 urine samples from surgical patients using catheters who were treated at Bendan General Hospital in Pekalongan City, macroscopic examination on SDA medium revealed that 5 samples were positive for *Candida sp*. fungi, characterized by white-yellowish colonies, a slightly acidic odor, yeast-like colony shape, and a moist and convex colony surface. Subsequently, microscopic examination was performed using LPCB staining, which also yielded positive results for *Candida sp*. in 5 samples, characterized by the presence of blastospores in LPCB staining, oval-shaped cells with a diameter of approximately 5 micrometers, and a white-blue color. Based on these two examinations, out of 14 samples, 5 samples tested positive for *Candida sp*. in the urine of surgical patients using catheters who were hospitalized, with a percentage of 36%. The results were lower than those of a previous study by Widarti et al., which found that patients with urinary tract infections who used catheters had varying ages: 8.33% were aged 20–30 years, 16.6% were aged 31–40 years, 25.0% were aged 41–50 years, 33.3% were aged 51–60 years, >60 years old 16.6%. The incidence rate of candiduria in women was 66.6%, while in men it was 33.3%. The distribution of candiduria incidence in patients with urinary tract infections who used catheters was 50% positive and 50% negative. Candiduria is most commonly experienced by women, at 66.3%, compared to 33.3% in men. This may be due to the natural anatomical and functional differences in the urinary tract systems of women and men. These differences may be attributed to the anatomical structure of the urinary system in women, vaginal infections, and the

proximity of the vagina to the anus. According to the results of a study conducted by Sri Indrayati et al., after examining 22 urine samples from patients with diabetes mellitus admitted to Dr. Rasidin General Hospital in Padang using macroscopic examination on Potato Dextrose Agar (PDA) medium, 4 samples tested positive for *Candida sp*. fungi. with the following characteristics: white-yellowish colonies, a sour odor, yeast-like colony shape, a moist and convex colony surface. After macroscopic examination, microscopic examination was performed using Gram staining, which showed positive results for *Candida sp*. in only 3 samples, characterized by the presence of blastospores in Gram-positive staining, oval-shaped cells with a diameter of approximately 5 µm, and purple coloration. Based on both examinations, out of 22 samples, 3 samples tested positive for *Candida sp*. in the urine of DM patients, representing a percentage of 13.64%. Women with Diabetes Mellitus have extra sugar in the vaginal walls. The sugar present in the urine accumulates on the vulva, providing nourishment for fungal growth. The female genital area is a fertile and ideal environment for fungal growth, so *Candida sp*. is likely to be found in the urine of women with diabetes mellitus (Indrayati, Suraini and Afriani, 2018). The journal discussed by Retno et al. presents a study using 30 urine samples from patients with urinary tract infections with specific inclusion criteria. In the initial stage, inoculation was performed on Sabouraud Dextrose Agar (SDA) medium and incubated at room temperature of 37 degrees Celsius for 4 days to observe the macroscopic morphology of the colonies, characterized by fungal cells ranging from round to elongated in shape and pale yellow in color, with convex, smooth, and fine colony surfaces, as well as microscopic budding yeast cells. The results showed that 9 samples were positive for *Candida sp*. fungal growth, while 21 samples were negative with no *Candida sp*. fungal growth. Certain factors contributing to the presence of Candida albicans in the urine of patients with urinary tract infections (UTIs) include personal hygiene, diabetes mellitus, contraceptive devices, and the use of antiseptics. (Sasongkowati, Anggraini and Putri, 2022)

Long-term urinary catheterization is known to cause urinary flow disturbances, creating conditions that support microbial colonization, including *Candida sp.* Candida fungi are normal flora in the gastrointestinal tract and lower urinary tract, but can become opportunistic pathogens when the microbiota balance is disrupted, such as due to broad-spectrum antibiotic use or postoperative immunosuppression. Under such conditions, Candida can migrate to the urinary tract and colonize, especially if there are foreign objects like catheters that serve as a medium for biofilm formation. Biofilms protect fungi from the immune system and enhance their resistance to antifungal agents. (Fiori B, D'inzeo T, Giaquinto A, 2022) Typically, individuals who use catheters neglect to maintain proper hygiene to keep pH levels stable, thereby minimizing excessive growth of *Candida sp*. fungi. Risk factors that can lead to the presence of *Candida sp*. in the urine of catheter users, as identified in this study, include diet, medications, gender, humidity around the catheter site, and the duration of catheter use, all of which can influence the growth of *Candida sp*. fungi.

Candida sp. was not found in other samples due to limitations of the researchers that could affect the results of the study, such as improper sampling, insufficient incubation time, and incorrect planting techniques on SDA media, which were not suitable for the growth of *Candida sp*. fungi.

Conclusion

Based on the results of a study on the identification of *Candida sp*. fungi in the urine of surgical inpatients using catheters at Bendan General Hospital in Pekalongan City, it can be concluded that from direct examination using colony staining with LPCB and indirect examination using SDA medium from 14 samples as follows:

1. Positive results for *Candida sp*. fungi in the form of blastospores were found, with morphology typically oval or round in shape and varying in size but generally ranging between 2-6 micrometers in the urine of surgical inpatients using catheters at RSUD Bendan Hospital in Pekalongan City.
2. Five samples (36%) of urine from surgical inpatients using catheters tested positive for *Candida sp*. fungi.

For future researchers, it is recommended to further develop studies on *Candida sp*. fungi in urine from catheter users.

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