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# Overview of Urine Cylinders in Patients With Pulmonary Tuberculosis Undergoing Advanced First-Line Treatment at the RSUD Ciamis

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**ABSTRACT**

**Background & Objective**: Pulmonary tuberculosis is a contagious disease caused by *Mycobacterium tuberculosis* bacteria that can attack various organs, especially the lungs. Tuberculosis patients are treated with anti-tuberculosis drugs such as rifampicin and streptomycin, which can potentially cause kidney function impairment. A urine sediment examination is conducted to detect any kidney abnormalities, which can identify an increase in urine cylinders if any kidney damage is present. This study aims to provide insights into urine cylinders in patients with pulmonary tuberculosis based on the duration of their treatment.

**Method**: This is a descriptive study that utilized a purposive sampling technique. The study involved 38 Tuberculosis patients as respondents. Sampling was conducted at the DOTS clinic of RSUD Ciamis, and the research was conducted between October 2021 and May 2022.

**Result**: Out of 38 samples, six people tested positive for cylinders at a value of +1 (which means very little). These cylinders included hyaline, wax, granule, fat, and epithelial cell cylinders. The percentage of people who tested positive for cylinders was 15.8%. On the other hand, 32 people tested negative for cylinders, which accounts for 84.2% of the total sample.

**Conclusion**: It can be concluded that cylinders were found in tuberculosis patients. Future researchers are advised to examine urine cylinders in pulmonary tuberculosis patients undergoing the sixth month of treatment in patients at a young age.

**Keywords:** Tuberculosis; Anti-tuberculosis Drugs; Urinary Sediment.

**Introduction**

*Tuberculosis* is a disease that remains a public health problem and is one of the top 10 leading causes of death worldwide (Rokhmah, 2013). Indonesia ranks second in the world with the most tuberculosis patients after India. An estimated 10 million people suffered from TB worldwide in 2019. In 2015-2020, the cumulative reduction in TB cases was only 9% (Abna et al., 2022). Despite the decline in new TB cases, more is needed to meet the end-2020 TB strategy goal of reducing TB cases by 20% between 2015 and 2020. As with TB deaths, the number of deaths in 2019 was 1.4 million. Globally, TB deaths decreased yearly but did not meet the END TB 2020 target of 35%. The cumulative number of deaths between 2015 and 2019 was 14%, less than half of the set target (Ramayanti et al., 2024).

In 2020, the number of tuberculosis cases found was 351,936 cases, which decreased compared to all tuberculosis cases found in 2019, which was 568,987 (Halim et al., 2023). Most cases were reported from the highly populated provinces of West Java, East Java and Central Java. TB cases in these three provinces account for almost half of the total TB cases in Indonesia (46%). In 2020, TB cases were found in the 45 to 54 age group at 17.3%, followed by the 25 to 34 age group at 16.8% and the 15 to 24 age group at 16.7% (Mr et al., 2021).

Pulmonary tuberculosis can cause respiratory problems, such as chronic cough and shortness of breath, reducing the patient's productivity. If not controlled, the disease can cause death (Wilda et al., 2021). In addition to affecting the individual, pulmonary TB can also affect the patient's family. Patients must undergo treatment for six months to break the transmission chain. The current drug recommendations are isoniazid, rifampicin, pyrazinamide, and ethambutol in the first two months of treatment, called the intensive phase, and isoniazid and rifampicin for the next four months, referred to as the continuation phase (Kurniati, 2010).

Rifampicin and Streptomycin can be nephrotoxic, which means they are toxic or destructive to cells in the kidneys, which can cause damage to the kidneys (Tangkin et al., 2016). The kidney is an important organ that plays an important role in regulating fluid and electrolyte needs (Rivandi & Yonata, 2015). This can be seen in the function of the kidneys, namely as water regulators, regulating the concentration of salt in the blood, regulating the acid-base balance in the blood and regulating the excretion of residual products or excess salt. The process of regulating water needs begins with the ability of the glomerulus to act as a fluid filter. The filtered fluid then flows through the renal tubules, whose cells absorb all the substances they need (LM, 2014). An examination can be carried out to determine the presence of disorders in the kidneys, one of which is by urinalysis in the form of microscopic observation of urine sediment (Nuriah et al., 2023).

Urine sediment examination detects insoluble substances in the urine and abnormalities in kidney and urinary tract function, and it monitors treatment results (Rosida, 2016). Renal damage due to nephrotoxic substances is seen in the presence of proximal tubular constriction, necrosis of proximal tubular epithelial cells, the presence of hyaline casts in the distal tubules, rupture of red blood cells, intravascular coagulation, deposition of oxalate and uric acid crystals, and tissue hypoxia (Prasetyaning et al., 2013). The classification of urine cylinders that can be found in kidney disorders includes hyaline cylinders, leukocyte cylinders, erythrocyte cylinders, granule cylinders, wax cylinders, epithelial cell cylinders and fat cylinders

(Rinawati & Aulia, 2022). According to PMK No. 67 on tuberculosis prevention, drug resistance will occur in certain conditions, including liver function disorders, kidney function disorders, epilepsy, psychosis and pregnant women (Faradis & Indarjo, 2018). In such cases, patients should be referred to an MDR TB referral hospital to begin treatment at the referral hospital.

Based on the results of previous research conducted by Nira Fitria in 2019 entitled Overview of Urine Cylinder Examination in Patients with Chronic Renal Failure, the results were 46.7% positive and 53.3% negative. Based on the description above, the researcher wants to know the description of urine cylinders in patients with pulmonary TB advanced first-line treatment.

## Objective

This study aimed to establish the characteristics of urine cylinders in patients with tuberculosis who received advanced first-line treatment at RSUD Ciamis.

## Method

This study is a descriptive study with a purposive sampling technique. Respondents in this study were 38 Tuberculosis patients. Measurements were made microscopically using a microscope instrument, and the results of observations were processed manually and displayed in tabular form for narration. Sampling was conducted at the DOTS clinic of RSUD Ciamis, and research was carried out at the Clinical Chemistry Laboratory of STIKes Muhammadiyah Ciamis from October 2021 to May 2022.

## Results

The specimens used in this study were urine specimens from patients with pulmonary tuberculosis undergoing advanced first-line treatment at RSUD Ciamis, with a total sample of 38 people. Based on the research results at the Clinical Chemistry Laboratory of STIKes Muhammadiyah Ciamis on June 2-7, 2022, the results showed six people with urine cylinders +1 (very few) and 32 people with negative cylinders.

**TABLE 1** Results of Frequency Distribution of Urine Cylinder Examination in Patients with Pulmonary Tuberculosis who are Undergoing Advanced First-Line Treatment at RSUD Ciamis in 2022

| Cylinder Inspection Result | Quantity | Percentage (%) |
|---|---|---|
| Normal | 32 | 84,2 |
| Abnormal | 6 | 15,8 |
| Total | 38 | 100 |

Information:
Normal : 0-1 low power-field (negative)
Abnormal : Cylinders present
\+ : 1-5 /low power-field (very small)
++ : 5-10 / low power-field (little)
+++ : 10-30 /low power-field (much)
++++ : >30/low power-field(very much)

Calculation of percentage:

$$y = \frac{x}{n}\ x\ 100\%$$

Information:
y: percentage of each result of the number of cylinders / Small visibility
x: data that changes the cylinder results
n: total data

1. Percentage of cylinder positive results

$$y = \frac{x}{n}\ x\ 100\%$$

$$y = \frac{6}{38}\ x\ 100\%$$

$$y = 15{,}8\ \%$$

2. Percentage of cylinder negative results

$$y = \frac{x}{n}\ x\ 100\%$$

$$y = \frac{32}{38}\ x\ 100\%$$

$$y = 84{,}2\%$$

Based on the examination results in Table 1, the results of urine cylinder examination in 38 samples of pulmonary tuberculosis patients who were undergoing advanced first-line treatment at RSUD Ciamis, as many as 6 samples were positive for urine cylinder and 32 samples were negative for urine cylinder.
Based on the results of the research that has been done, the results of urine cylinder images in several patient samples seen from 40x objective magnification are as follows:

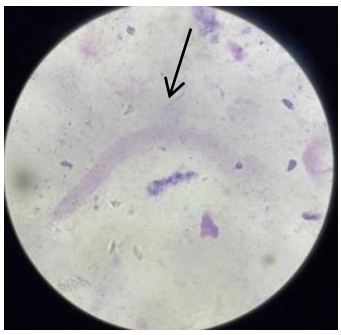

**FIGURE 1** Hyaline cylinder obtained from a patient sample with code MO

**Discussion**

Identifying cylinders in urine indicates the presence of a pathology process because there should be no cylinders at all. Based on the results of urine cylinder examination in pulmonary tuberculosis patients who were undergoing advanced first-line treatment at RSUD Ciamis who met the inclusion criteria with a total of 38 patients, six people (15.8%) were positive for cylinders and 32 people (84.2%) were negative. In patients with pulmonary tuberculosis undergoing advanced first-line treatment, negative cylinder results were obtained because drug administration is not carried out every day and only a combination of 4H3R3, which is given three times a week, to reduce the risk of nephrotoxicity. After all, the body is not continuously exposed to drugs (Cahyati & Maelani, 2019).

The results of the study found positive urine cylinders in as many as six people (15.8%) out of 38 people, which mostly occurred in men who were approaching old age. Based on interviews conducted by researchers with patients, there are several influences on patient habits on the formation of cylinders in urine, one of which is a lack of drinking intake so that urine output is reduced. There is a decrease in kidney function and smoking habits, and according to research conducted by Harahap (2018), chronic renal failure disease is found in the age of 36-65. Clinically elderly patients have a greater risk of developing chronic renal failure compared to young patients. This is because, with increasing age, kidney function decreases, resulting in a decrease in glomerular excretion rate and worsening tubular function.

Based on the results of a study of 38 tuberculosis patients undergoing advanced first-line treatment at RSUD Ciamis from 15.8% who were positive for cylinders from 6 people, hyaline cylinders were obtained (83.3%) from 5 people. Hyaline cylinders can be found in the urine of healthy people, and there is an increase in the number after strenuous exercise, dehydration, heat exposure, and emotional stress. Granular cylinders were found (66.6%) of 4 people. Granular cylinders can be found in the urine of healthy people; strenuous activity can increase the number of cylinders in the urine, and this increase in the number of cylinders is associated with increased albuminuria and some diuretic therapy (Handayani et al., 2007).

Wax cylinders were found (16.6%) in 1 person. These cylinders are usually found together with other types associated with conditions that have led to kidney failure. Fat cylinders were found (16.6%) in 1 person. These cylinders are often associated with nephrotic syndrome and can also be seen in toxic tubular necrosis. Epithelial cell cylinders were found (33.3%) from 2 people in normal

urine. These cylinders are rarely seen because they occur rarely, especially in kidney disease that affects the tubules (necrosis). Renal tubular epithelial cell cylinders are seen in urine with acute tubular necrosis, viral disease (e.g., cytomegalovirus), or drug exposure.

Based on interviews conducted and not separated from filling out questionnaires to tuberculosis patients, several things affect the increase in urine cylinders, including patients with code MO; in this patient's urine sample, the results were obtained +1 cylinder and several cylinders were found in the urine including hyaline cylinders found 3-4/low power-field with very few criteria, granular cylinders found 1-2/low power-field (very little), wax cylinders found 0-1/low power-field (very little) and epithelial cell cylinders found 0- 1/low power-field (very little). The things that can affect the presence of cylinders in the patient's urine are that this patient has been carrying out the advanced stage of treatment in the last six months, so the patient has been taking OAT for longer. The patient is a patient aged 60 years, which is an elderly patient so that they can be at risk to the kidneys and lack of water consumption.

Patients with codes USN, DSM, SK, NR, and YW: This patient is also a pulmonary tuberculosis patient who is undergoing advanced treatment; in this patient, only a few cylinders were found. Hyaline cylinders with an average number found 2-3/low power-field (very few), granule cylinders found 0-1/low power-field (very few), fat cylinders found 0 – 1/ low power-field (very few), and epithelial cell cylinders found 0-1/ low power-field (very few). OAT can cause the presence of cylinders in these patients, and the patient has been in the fifth and sixth month of treatment. In addition, several factors can cause urine cylinders to increase, namely lack of water consumption, elderly patients, and smoking habits.

Research on the description of urine cylinders in patients with pulmonary tuberculosis based on the length of treatment can be concluded that cylinders in urine can increase in patients who have a risk of decreased kidney function such as dehydration, smoking habits, malnutrition or unbalanced nutritional intake and old age because kidney function will decrease with increasing age. According to PMK No. 67 on tuberculosis prevention, drug resistance will occur in certain conditions if not recognized early on, one of which is kidney function abnormalities.

## Conclusion

It can be concluded that cylinders were found in tuberculosis patients. Future researchers are advised to examine urine cylinders in pulmonary tuberculosis patients undergoing the sixth month of treatment in patients at a young age.

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## Conflict of Interest

There were no conflicts of interest in the preparation of this research and article.

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