

Comparison Of Urine Leukocyte Examination in Patients With Urinary Tract Infections (Utis) Using The Dipstick And Microscopic Methods in The Working Area Of Klasaman Health Center

Junaidin^{1*}, Sahrul Gunawan², Evi Hudriyah Hukom³, Muhamad Faisal Arianto⁴, Andirwana⁵, Sakinah Sarnia Iriani Lihawa⁶, Sabila⁷

^{1,3,5,7}Medical Laboratory Technology Study Program, Health Science College of Papua, Southwest Papua, Indonesia

^{2,6}Pharmacy Study Program, Health Science College of Papua, Southwest Papua, Indonesia

⁴Public Health Study Program, Health Science College of Papua, Southwest Papua, Indonesia

*Correspondence: Junaidin, Email: junaidin92@gmail.com

Received: December 1, 2025 ○Revised: January 1, 2025 ○Accepted: February 1, 2025

ABSTRACT

Background: Urinary tract infection (UTI) is a common type of infection caused by the growth of microorganisms in the human urinary tract. Leukocytes are a component of the immune system that fight infection and inflammation. The methods commonly used for urine leukocyte examination are the dipstick and microscopic methods.

Objective: This study aims to compare the results of urine leukocyte examination between the dipstick and microscopic methods in UTI patients.

Methods: This research is descriptive comparative with a cross-sectional design. The study was conducted at Puskesmas Klasaman and the TLM Laboratory of STIKES Papua from June 28 to August 21, 2024. The study population includes all UTI patients at Puskesmas Klasaman, Sorong City, totaling 16 patients, with a sample of 16 urine samples from patients confirmed positive for UTI, selected using a total sampling technique. The data collected were entered into a master table and analyzed statistically.

Results: The results of the urine leukocyte examination using the dipstick method showed that the majority of respondents had results of approximately 70 leukocytes/ μ l (+1), while the results from the microscopic method indicated that the majority had 5-9 cells/HPF (+2). This study found a significant difference between the results of urine leukocyte examination using the dipstick and microscopic methods (p -value < 0.05) using the nonparametric Wilcoxon Signed Rank Test (WSRT).

Conclusion: There is a significant difference in the results of urine leukocyte examination between the dipstick and microscopic methods, where the dipstick method is more practical but less accurate compared to the more detailed and accurate microscopic method. It is recommended to explore other urine examination methods and compare the results with a larger sample to understand the advantages and disadvantages of each method.

Keywords: Urinary Tract Infection (UTI), Urine Leucocytes, Disptick Method, Microscopic Method

INTRODUCTION

According to the World Health Organization (WHO) in 2022, urinary tract infection (UTI) is the second most common infection in humans after respiratory infections, with reported cases reaching 8.3 million annually (Warnangan, Ambar, & Armajin, 2024). Based on data from the Indonesian Ministry of Health in 2022, the number of UTI patients in Indonesia remains quite high, reaching 90-100 cases per 100,000 population each year, or approximately 180,000 new cases annually, affecting both children and adults. UTI is the second most common infectious disease and ranks among the top ten diseases with the highest incidence rates. A study in Indonesia found that the incidence of UTI among diabetes patients was 47%, among patients with kidney stones was 41%, and among patients with urinary tract obstruction was 20% (Prasetya, Putri, Yundari, Puspawati, & Asdiwinata, 2022).

Based on an initial survey conducted by the Sorong City Health Office in 2023, the number of patients with urinary tract infections (UTI) in Sorong City in 2022 was recorded at 252 patients. Additionally, an initial survey at Puskesmas Klasaman in 2024 found seven patients positive for

UTI in March, four patients positive for UTI in April, and five patients positive for UTI in May.

The examination of urine leukocytes in UTI patients is crucial as an initial step in diagnosis, considering that urine culture, as the gold standard, requires more time and higher costs. Leukocyturia indicates an inflammatory response due to bacterial infection, where the body increases the number of leukocytes to combat the infection. By quickly identifying the increase in leukocytes, early diagnosis of UTI can be made, and treatment can be initiated promptly. This is important to prevent serious complications such as kidney infections. If left unchecked, UTI can spread and endanger other vital organs, especially the kidneys (Sunaidi & Putri Maharani Mansyur, 2022).

Given these issues, the author is interested in conducting research on the comparison of urine leukocyte examination in UTI patients using the dipstick method and the microscopic method, with samples taken from the working area of Puskesmas Klasaman.

METHODS

This study employed a comparative descriptive method with a cross-sectional approach to provide an

overview or explain the comparison of urine leukocyte examination results using the dipstick and microscopic methods in patients with urinary tract infections (UTIs), involving a total of sixteen samples. The focus is more on understanding the differences in urine leukocyte examinations between the two methods conducted by the researchers using urine samples from UTI patients in the working area of Klasaman Health Center. The research was conducted from June 28 to August 21, 2024. The results of the study are presented through tables describing the characteristics of the respondents and tables comparing the distribution of urine leukocytes. Subsequently, the data were analyzed, evaluated descriptively, and discussed narratively. In this study, the Wilcoxon Signed Rank Test (WSRT) was used, which is a hypothesis testing method where the data used are paired.

RESULTS

Table 1. Frequency Distribution of Age in Patients with Urinary Tract Infections (UTIs) in the Working Area of Klasaman Health Center in 2024

No.	Age	Frequency (F)	Perscentage (%)
1.	14-24 years	11	68,8 %
2.	25-35 years	2	12,5 %
3.	> 35 years	3	18,8 %
Total		16	100 %

Based on Table 1, the frequency of patients aged 14-24 years is 11 individuals, accounting for 68.8%. The frequency of patients older than 35 years is 3 individuals, representing 18.8%, and the frequency of patients aged 25-35 years is 2 individuals, accounting for 12.5%

Table 2. Frequency Distribution of Gender in Patients with Urinary Tract Infections (UTIs) in the Working Area of Klasaman Health Center in 2024

No.	Description	Frequency (F)	Perscentage (%)
1.	Male	11	68,8 %
2.	Female	5	31,3 %
Total		16	100 %

Based on Table 2, the frequency of male patients is 11 individuals, accounting for 68.8%, while the frequency of female patients is 5 individuals, representing 31.3%.

Table 3. Frequency Distribution of Education in Patients with Urinary Tract Infections (UTIs) in the Working Area of Klasaman Health Center in 2024

No.	Description	Frequency (F)	Perscentage (%)
1.	Elementary School	1	6,3 %
2.	Junior High School	1	6,3 %
3.	Senior High School	13	81,3 %
4.	Bachelor's Degree	1	6,3 %
Total		16	100 %

Based on Table 3, the frequency of patients with a high school education (SMA) is 13 individuals, accounting for 81.3%. The frequency of patients with elementary education (SD) is 1 individual,

representing 6.3%, while the frequency of patients with junior high education (SMP) is also 1 individual, accounting for 6.3%. Additionally, there is 1 individual with a bachelor's degree (S1), representing 6.3%.

Table 4. Frequency Distribution of Occupation in Patients with Urinary Tract Infections (UTIs) in the Working Area of Klasaman Health Center in 2024

No.	Description	Frequency (F)	Perscentage (%)
1.	Unemployed	1	6,3 %
2.	Civil Servant	1	6,3 %
3.	Private Sector	12	75,0 %
4.	State Civil Apparatus	1	6,3 %
5.	Housewife	1	6,3 %
Total		16	100 %

Based on Table 4, the frequency of patients working in the private sector is 12 individuals, accounting for 75.0%. There is 1 individual who is unemployed, representing 6.3%, 1 individual who is a civil servant (PNS), also accounting for 6.3%, 1 individual who is an ASN (State Civil Apparatus), representing 6.3%, and 1 individual who is a housewife (IRT), also accounting for 6.3%.

Table 5. Frequency Distribution of Duration of UTI in Patients with Urinary Tract Infections (UTIs) in the Working Area of Klasaman Health Center in 2024

No.	Description	Frequency (F)	Perscentage (%)
1.	1 Day	5	31,3 %
2.	2 Days	6	37,5 %
3.	> 2 Days	5	31,3 %
Total		16	100 %

Based on Table 5, the frequency of patients suffering from UTIs for 2 days is 6 individuals, accounting for 37.5%. The frequency of patients suffering for 1 day is 5 individuals, representing 31.3%, and the frequency of patients suffering for more than 2 days is also 5 individuals, accounting for 31.3%

Table 6. Results of Urine Leukocyte Examination Using the Dipstick and Microscopic Methods in Patients with UTIs in the Working Area of Klasaman Health Center in 2024

Examination Method	Urine Leukocyte Examination Results								Total
	Negative	%	+ 1	%	+ 2	%	+ 3	%	
Dipstick Method	0	0 %	6	37,5 %	5	31,3 %	5	31,3 %	16
Microscopic Method	0	0 %	6	37,5 %	8	50,0 %	2	12,5 %	16
$\alpha = 0,05$		sig. = 0,000							

Based on Table 6, the frequency of urine leukocyte examination results using the dipstick method in patients with urinary tract infections (UTIs) shows that there were 6 individuals with a

urine leukocyte result of (+1), accounting for 37.5%, 5 individuals with a result of (+2), representing 31.3%, and 5 individuals with a result of (+3), also accounting for 31.3%. There were no individuals with a negative result, which corresponds to 0%. In contrast, the frequency of urine leukocyte examination results using the microscopic method in

Table 7. Crosstab Results of Urine Leukocyte Examination Using the Dipstick and Microscopic Methods in Patients with UTIs in the Working Area of Klasaman Health Center in 2024

Urine Leukocyte Examination Results Using the Dipstick Method	Urine Leukocyte Examination Results Using the Microscopic Method							
	+1	%	+2	%	+3	%	Total	%
+1	1	6,3%	5	31,3%	0	0%	6	37,5%
+2	3	18,8%	1	6,3%	1	6,3%	5	31,3%
+3	2	12,5%	2	12,5%	1	6,3%	5	31,3%
Total							16	100%

Based on Table 7, the frequency of urine leukocyte examination results using the dipstick method shows that there were 6 individuals with a result of (+1), accounting for 37.5%. From this number, 5 individuals (31.3%) received a result of (+2) using the microscopic method, while 1 individual (6.3%) received a result of (+1) using the microscopic method, and none obtained a result of (+3), with a percentage of 0%. The frequency of urine leukocyte examination results using the dipstick method with a result of (+2) was 5 individuals, representing 31.3%. From this group, 3 individuals (18.8%) received a result of (+1) using the microscopic method, 1 individual (6.3%) received a result of (+2), and 1 individual (6.3%) also received a result of (+3). The frequency of urine leukocyte examination results using the dipstick method with a result of (+3) was 5 individuals, accounting for 31.3%. From this number, 2 individuals (12.5%) received a result of (+1) using the microscopic method, 2 individuals (12.5%) also received a result of (+2), and 1 individual (6.3%) received a result of (+3).

DISCUSSION

A very high leukocyte count in urine indicates a highly active immune response and a serious infection. Patients with these results typically experience more severe symptoms such as intense pain, fever, and the presence of blood in the urine, as the infection may have spread further or persisted longer (Kumala, Triswanti, & , Hidayat, 2016). A bivariate analysis was conducted to compare the results of urine leukocyte examinations between the dipstick and microscopic methods. The Shapiro-Wilk normality test indicated that the data from both methods were not normally distributed (sig. <0.05), thus the analysis continued using the nonparametric Wilcoxon Signed Ranks Test. The results of the Wilcoxon Signed Ranks Test showed a significant difference between the urine leukocyte examination

patients with UTIs indicates that there were 8 individuals with a urine leukocyte result of (+2), making up 50.0%, 6 individuals with a result of (+1), accounting for 37.5%, 2 individuals with a result of (+3), representing 12.5%, and again, no individuals with a negative result, which corresponds to 0%.

results using the dipstick method and the microscopic method ($Z = -3.552$ and sig. 2-tailed = 0.000). Since the sig. 2-tailed value is less than 0.05, it can be concluded that the method used in the urine leukocyte examination significantly affects the results. One reason influencing the significant difference between the urine leukocyte examination results of the dipstick and microscopic methods in patients with urinary tract infections (UTIs) is the difference in the operational principles of the two methods.

This research aligns with the study conducted by Karlina (2018). In that study, the majority of the dipstick test results showed a result of (+1), while the microscopic method predominantly indicated a result of 5-9 cells/HPF (+2). Their research also found a significant difference between the dipstick and microscopic methods in urine leukocyte examination. This is due to the sensitivity and operational mechanisms of each method. The dipstick method provides faster results by detecting leukocytes through a chemical reaction that causes a color change on the test strip, which may be less sensitive at low concentrations. However, it tends to yield qualitative or semi-quantitative results that lack detail. The chemical reaction on the dipstick only detects the presence of leukocyte enzymes (esterase), which may not accurately reflect the actual number of leukocytes present in the sample. Meanwhile, the microscopic method counts leukocytes directly based on the shape and size of the cells observed under the microscope, allowing for more detailed detection. This method provides more quantitative, specific, and accurate results, where the number of leukocytes is counted in detail per high power field (HPF), thus requiring more time to produce results.

However, this study does not align with the research conducted by Sari et al., (2024). In that study, it was found that for the dipstick method, the majority of respondents had negative leukocyte counts in their urine, with 26 individuals (87.0%), while for the microscopic method, it was noted that most respondents had urine leukocyte counts of 1-4

cells/HPF (+1), totaling 25 individuals (84.0%). Furthermore, this study also stated that there was no significant difference between the dipstick and microscopic methods in urine leukocyte examination and found that both methods had equivalent accuracy. This may be due to variations in patient sample characteristics, such as the severity of the infection and differing leukocyte counts, which can affect the sensitivity of each method. Additionally, differences in technical conditions, such as the quality of the test strips or microscopes used, can influence the examination results. In the study by Sari et al., (2024), it is possible that they used equipment with consistent and adequate standards and procedures, thereby reducing the likelihood of differences in results between the two methods.

CONCLUSION

This study shows that patients with urinary tract infections (UTIs) in the working area of Klasaman Health Center are most commonly found in the age group of 14-24 years (68.8%). The majority of patients are male (68.8%), with the highest level of education being high school (81.3%), and most are employed in the private sector (75.0%). In examinations using the dipstick method, all samples showed the presence of urine leukocytes in patients with UTIs, with results of leukocytes (+1), (+2), and (+3). This method provides quick and practical results, although it is semi-quantitative in nature. In examinations using the microscopic method, the majority of results indicated 5-9 cells/HPF (+2), accounting for 50.0%. This method provides more detailed, accurate, and quantitative results by directly counting the number of urine leukocytes, allowing for the detection of lower leukocyte concentrations compared to the dipstick method. There is a significant difference between the results of urine leukocyte examinations using the dipstick method and the microscopic method. The dipstick method tends to provide faster and more practical results, but it is less accurate compared to the microscopic method, which offers more detailed and accurate results

REFERENCES

- Al-Hanawi, M. K. (2017). The healthcare system in Saudi Arabia: How can we best move forward with funding to protect equitable and accessible care for all? *International Journal of Healthcare*, 3(2), 78. <https://doi.org/10.5430/ijh.v3n2p78>
- Al-Hanawi, M. K., Khan, S. A., & Al-Borie, H. M. (2019). Healthcare human resource development in Saudi Arabia: emerging challenges and opportunities—a critical review. *Public Health Reviews*, 40(1), 1. <https://doi.org/10.1186/s40985-019-0112-4>
- Al-Nozha, M. M., Abdullah, M., Arafah, M. R., Khalil, M. Z., Khan, N. B., Al-Mazrou, Y. Y., ... Al-Mobeireek, A. (2007). Hypertension in Saudi Arabia. *Saudi Medical Journal*, 28(1), 77–84.
- Al Rahhaleh, N. A., Al-Khyal, T. A., Alahmari, A. D., & Al-Hanawi, M. K. (2023). The financial

- performance of private hospitals in Saudi Arabia: An investigation into the role of internal control and financial accountability. *PLoS ONE*, 18(5 MAY), 1–22. <https://doi.org/10.1371/journal.pone.0285813>
- Alanazi, A. M., Almutairi, A. M., Aldhahi, M. I., Alotaibi, T. F., AbuNurah, H. Y., Olayan, L. H., ... Alabdali, A. A. (2023). The Intersection of Health Rehabilitation Services with Quality of Life in Saudi Arabia: Current Status and Future Needs. *Healthcare (Switzerland)*, 11(3), 1–21. <https://doi.org/10.3390/healthcare11030389>
- AlFaleh, H. F., Al Shamiri, M. Q., Ullah, A., AlHabib, K. F., Hersi, A. S., AlSaif, S., ... Kashour, T. (2015). Disparities in health care delivery and hospital outcomes between non-Saudis and Saudi nationals presenting with acute coronary syndromes in Saudi Arabia. *PloS One*, 10(4), e0124012. <https://doi.org/10.1371/journal.pone.0124012>
- Alfaqeeh, G., Cook, E. J., Randhawa, G., & Ali, N. (2017). Access and utilisation of primary health care services comparing urban and rural areas of Riyadh Providence, Kingdom of Saudi Arabia. *BMC Health Services Research*, 17(1), 106. <https://doi.org/10.1186/s12913-017-1983-z>
- Alghaith, T., Almoteiry, K., Alamri, A., Alluhidan, M., Alharf, A., Al-Hammad, B., ... Alazemi, N. (2020). Strengthening the Pharmaceutical System in the Kingdom of Saudi Arabia: Towards a Medicine Policy To Support Vision 2030. *World Bank Discussion Paper*.
- Alkhamees, M., Lea, J., Islam, M. S., Alasqah, I., Alzghaibi, H., Alharbi, M. F., ... Parker, V. (2023). A Qualitative Investigation of Factors Affecting Saudi Patients' Communication Experience with Non-Saudi Physicians in Saudi Arabia. *Healthcare (Switzerland)*, 11(1). <https://doi.org/10.3390/healthcare11010118>
- Almasabi, M., & Thomas, S. (2017). The impact of Saudi hospital accreditation on quality of care: a mixed methods study. *The International Journal of Health Planning and Management*, 32(4), e261–e278. <https://doi.org/https://doi.org/10.1002/hpm.2373>
- Althumairi, A. A., Bukhari, F. M., Awary, L. B., & Aljabri, D. (2023). The effect of transformation policies on healthcare providers' satisfaction in primary healthcare centers: the case of Eastern Saudi Arabia. *BMC Health Services Research*, 23(1), 1–9. <https://doi.org/10.1186/s12913-023-10335-8>
- Binkheder, S., Aldekhyyel, R., & Almulhem, J. (2021). Health informatics publication trends in Saudi Arabia: A bibliometric analysis over the last twenty-four years. *Journal of the Medical Library Association*, 109(2), 219–239. <https://doi.org/10.5195/jmla.2021.1072>
- De Vries, N., Lavreysen, O., Boone, A., Bouman, J., Szemik, S., Baranski, K., ... De Winter, P.

- (2023). Retaining Healthcare Workers: A Systematic Review of Strategies for Sustaining Power in the Workplace. *Healthcare (Basel, Switzerland)*, 11(13). <https://doi.org/10.3390/healthcare11131887>
- Hazazi, A., & Wilson, A. (2022). Noncommunicable diseases and health system responses in Saudi Arabia: focus on policies and strategies. A qualitative study. *Health Research Policy and Systems*, 20(1), 1–10. <https://doi.org/10.1186/s12961-022-00872-9>
- Hirashiki, A., Shimizu, A., Nomoto, K., Kokubo, M., Suzuki, N., & Arai, H. (2022). Systematic Review of the Effectiveness of Community Intervention and Health Promotion Programs for the Prevention of Non-Communicable Diseases in Japan and Other East and Southeast Asian Countries. *Circulation Reports*, 4(4), 149–157. <https://doi.org/10.1253/circrep.CR-21-0165>
- Karlina. (2018). Perbandingan jumlah leukosit urin metode mikroskopik dan mindray ua-600t. *Jurnal Unimus*.
- Kumala, I., Triswanti, N., & , Hidayat, R. L. T. (2016). Gambaran Hasil Pemeriksaan Urinalisis Pada Pasien Infeksi Saluran Kemih Yang Terpasang Kateter. *Jurnal Medika Malahayati*, 7(1), 1–23.
- Mustapha, F., Omar, Z., Mihat, O., Md Noh, K., Hassan, N., Abu Bakar, R., ... Allotey, P. (2014). Addressing non-communicable diseases in Malaysia: an integrative process of systems and community. *BMC Public Health*, 14 Suppl 2(Suppl 2), S4. <https://doi.org/10.1186/1471-2458-14-S2-S4>
- Prasetya, D., Putri, N. L. N. D. D., Yundari, A. A. I. D. H., Puspawati, N. L. P. D., & Asdiwinata, I. N. (2022). Edukasi pencegahan penyakit infeksi saluran kencing pada pedagang pasar agung peninjoan denpasar. *Bhakti Community Journal*, 1(2), 68–79. <https://doi.org/10.36376/bcj.v1i2.10>
- Rahman, R. (2020). The Privatization of Health Care System in Saudi Arabia. *Health Services Insights*, 13, 1178632920934497. <https://doi.org/10.1177/1178632920934497>
- Sari, R., Harlita, T. D., & Aina, G. Q. (2024). Gambaran Leukosit Urine Mahasiswi Pengguna Description of Urine Leukocytes of Students Using Pantyliners Using the Dipping and Microscopic Methods. *Gorontalo Journal Health and Science Community*, 8(2), 60–68.
- Sheerah, H. A., Almuzaini, Y., & Khan, A. (2023). Public Health Challenges in Saudi Arabia during the COVID-19 Pandemic: A Literature Review. *Healthcare (Basel, Switzerland)*, 11(12). <https://doi.org/10.3390/healthcare11121757>
- Sunaidi, Y., & Putri Maharani Mansyur, D. (2022). Pemeriksaan Leukosit Urin Terhadap Bakteri Penyebab Infeksi Saluran Kemih Di Pondok Tahfidz Ahlul Qur'an Putri Examination of Urinary Leukocytes on Bacteria Causing Urinary Tract Infections At Tahfidz Ahlul Qur'an Putri Private Vocational School. *Jurnal Pengabdian Kepada Masyarakat: Kesehatan (JPKMK)*, 2, 2807–3134.
- Thalib, H. I., Zobairi, A., Javed, Z., Ansari, N., & Alshanberi, A. M. (2024). Enhancing Healthcare Research in Saudi Arabia According to Vision 2030 : An In-Depth Review, 12(9), 1–8.
- Warnangan, F., Ambar, E., & Armaiyn, L. (2024). Karakteristik Infeksi Saluran Kemih Pada Pasien rawat Inap di RSUD. Dr. H. Chasan Boesoirie Ternate. *Seroja Husada Jurnal Kesehatan Masyarakat*, 1(5), 372–383.
- Yusuf, N., & Rajeh, M. T. M. (2022). Policy Implications to Mitigate Economic Impact of Covid-19 and Enhance Healthcare Services during Pandemic in Saudi Arabia. *European Journal of Sustainable Development*, 11(1), 191. <https://doi.org/10.14207/ejsd.2022.v11n1p191>