**MEDIA INFORMASI**
Center for Research and Community Service
Health Polytechnic of the Ministry of Health Tasikmalaya
https://ejurnal2.poltekkestasikmalaya.ac.id/index.php/bmi

# Comparison of Serum Creatinine Levels in Cervical Cancer Patients Receiving Cisplatin-Based and Non-Cisplatin-Based Chemotherapy at NTB Provincial General Hospital

**Kadek Vera Ardiani[1*], Ari Khusuma[2], Thomas Tandi Manu[3], Lalu Srigede[4]**

[1,2,3,4] Medical Laboratory Technology, Kemenkes Poltekkes Mataram
***Corresponding author:**

veraardiani27@gmail.com

**Article Info**
Submitted 01 06 2026
Revised 25 06 2026
Published 30 06 2026

**Keywords:**
*Cervical Cancer, Serum Creatinine, Cisplatin, Non-Cisplatin, Chemotherapy*

**P-ISSN : 2086-3292**
**E-ISSN : 2655-9900**

**National Accreditation:**
Sinta 4

**Abstract**

**Background**: Cervical cancer is one of the leading causes of morbidity and mortality among women worldwide. Cisplatin-based chemotherapy is widely used because of its effectiveness in inhibiting tumor cell growth. However, its clinical use is limited by nephrotoxicity, which can lead to impaired renal function. Serum creatinine is a key laboratory parameter routinely used to assess kidney function during chemotherapy.
**Objectives**: This study aimed to compare serum creatinine levels between cervical cancer patients receiving cisplatin-based chemotherapy and those treated with non-cisplatin regimens at the Regional General Hospital of West Nusa Tenggara Province.
**Methods**: This analytical observational study employed a cross-sectional design using retrospective medical record and laboratory data. Subjects meeting the inclusion criteria were selected through total sampling. Data were analyzed descriptively and compared using the Mann–Whitney U test because the data were not normally distributed. Statistical significance was set at $p<0.05$.
**Results**: Serum creatinine levels in the cisplatin group ranged from 0.20 to 4.10 mg/dL, with a mean of 1.60 mg/dL. In the non-cisplatin group, levels ranged from 0.50 to 3.10 mg/dL, with a mean of 0.91 mg/dL. The Mann–Whitney U test showed a statistically significant difference between the two groups ($p=0.030$).
**Conclusion**: Cervical cancer patients receiving cisplatin-based chemotherapy had significantly higher serum creatinine levels than those receiving non-cisplatin regimens. These findings emphasize the importance of regular renal function monitoring to detect nephrotoxicity and support safe chemotherapy management.

## INTRODUCTION

The disease burden resulting from malignancies of the uterine cervix remains a significant health challenge for the global female population. Referring to the World Health Organization report (2025), this type of cancer ranks fourth among the most frequently occurring malignancies affecting women, accompanied by persistently high morbidity and mortality rates, particularly in developing regions. Despite continuous efforts to implement various preventive strategies and early screening, fluctuations in incidence and mortality rates from these cases have not shown a significant decline in developing areas. A similar phenomenon is observed in Indonesia, where cervical cancer remains one of the oncological pathologies with the highest prevalence in women, demanding a comprehensive, effective, and sustainable therapeutic management (West Nusa Tenggara Provincial General Hospital, 2023).

The therapeutic modalities applied to patients are based on the clinical stage, the patient's general physical performance, and the final prognosis of the treatment (Fang et al., 2021). Chemotherapy represents one of the primary pillars of treatment implemented extensively, both as a single intervention and combined with radiotherapy (Gunawan, 2016). Among the numerous choices of cytostatic agents, cisplatin remains positioned as a first-line treatment due to its superior efficacy in inhibiting malignant cell proliferation while optimizing therapeutic outcomes. However, interventions using this platinum-based agent are frequently limited by the risk of nephrotoxic side effects, necessitating strict monitoring of the patient's renal excretory function throughout the treatment cycles (Dos Santos et al., 2012).

The mechanism of kidney injury induced by cisplatin is closely linked to the accumulation of the active drug substance within proximal tubule cells, which subsequently induces the secretion of reactive oxygen species (ROS), oxidative stress, local inflammatory reactions, mitochondrial functional impairment, and programmed cell death or apoptosis (Zhang et al., 2021). This structural injury leads to a decrease in the glomerular filtration rate (GFR), resulting in the impaired excretion of metabolic waste products and triggering a spike in creatinine concentrations within the bloodstream (Rahmi et al., 2020). On this basis, the measurement of serum creatinine levels is categorized as an essential laboratory instrument that must be performed periodically to monitor the integrity of the renal system in hospitalized patients (Hidayati, 2021). This indicator is selected due to its relatively constant nature in representing the glomerular filtration rate value (International Agency for Research on Cancer, 2024). This examination is integrated into the routine protocol for oncology patients to ensure the early detection of nephrotoxic signs resulting from exposure to cytotoxic substances. Therefore, the evaluation of serum creatinine profiles plays a crucial role in assessing the safety level of treatment regimens, both those utilizing a cisplatin base and non-cisplatin compounds (King & Robins, 2006).

Although the correlation between cisplatin exposure and fluctuations in blood creatinine levels has been widely explored, variability in results across studies is still frequently encountered. This discrepancy is suspected to stem from differences in patient demographic profiles, the number of therapy cycles completed, cumulative drug dosage, hydration management, and the presence of medical comorbidities that potentially influence renal filtration function (Ariani, 2015; Adiputra et al., 2021). Furthermore, comparative studies regarding serum creatinine levels between patients receiving cisplatin-based chemotherapy and the non-cisplatin group within the scope of the West Nusa Tenggara Provincial General Hospital remain very scarcely published.

Driven by this urgency, this study was initiated with the objective of comparing serum creatinine concentrations in cervical cancer patients receiving either cisplatin-based or non-cisplatin-based cytostatic interventions at the West Nusa Tenggara Provincial General Hospital. These findings are expected to provide a scientific database regarding the implications of regimen selection on renal function, while simultaneously serving as a clinical reference to optimize patient safety monitoring during therapy.

## METHOD

This study was designed as an analytical observational study applying a cross-sectional method. The primary focus of the study is to examine the differences in serum creatinine parameters within the cervical cancer patient population, evaluated based on the type of cytostatic treatment regimen received, namely the cisplatin-based therapy group and the non-cisplatin group.

The data collection process was conducted at the Medical Records Department and Clinical Laboratory of the West Nusa Tenggara Provincial General Hospital, covering an observation timeline from February to May 2026. The execution of this study obtained official approval and cleared ethical review from the local Health Research Ethics Committee (Number: 00.9/18/1561/RSUDP/2026). The data analyzed were entirely secondary in nature, sourced from patient medical records and laboratory test outcomes integrated within the hospital's electronic data management system.

The target population encompassed all cervical cancer patients recorded as undergoing a chemotherapy program at the West Nusa Tenggara Provincial General Hospital within the study period. Sampling was performed using a total sampling (exhaustive sampling) approach, whereby every patient meeting the eligibility criteria was directly included as a study subject.

The inclusion criteria for this research consisted of patients with a definitive diagnosis of cervical cancer, registered as recipients of either cisplatin-based or non-cisplatin-based chemotherapy, and having complete documentation of serum creatinine laboratory results. Conversely, medical records presenting incomplete, illegible, or unvalidated data were excluded from the analysis group.

The independent variable in this research was identified as the type of cytostatic regimen (classified into cisplatin and non-cisplatin groups). Meanwhile, the dependent variable was the serum creatinine concentration obtained from clinical laboratory data records. Supporting data, such as age variables and specific details regarding the chemotherapy cycles, were also gathered to enrich the descriptive analysis.

The data management workflow was organized through several stages. Descriptive analysis was applied to map the distribution of serum creatinine values in each group by presenting the minimum, maximum, and mean parameters. Prior to comparative testing, the data were first subjected to normality testing (using the Shapiro-Wilk test with a p-value threshold of $< 0.05$, yielding a significance value of $< 0.001$ for the chemotherapy variable and $< 0.001$ for the creatinine variable) and homogeneity testing to determine the relevant statistical test. Because the data distribution pattern violated parametric assumptions, hypothesis testing was shifted to the non-parametric Mann–Whitney test method at a 95% confidence interval and a significance level of ($p = 0.05$). A resulting value of ($p < 0.05$) was interpreted as an indicator of a statistically significant difference in serum creatinine profiles between the two treatment groups.

The civil ethical aspects of the patients were strictly maintained through a data de-identification (anonymization) process of the subjects. All data records were utilized exclusively for academic purposes and managed in alignment with medical ethical standards, which prioritize confidentiality, respect for privacy, and the guaranteed utilization of research outcomes for the advancement of science and medical services.

## RESULTS AND DISCUSSION

This study involved subjects from the population of cervical cancer patients (the majority of whom fell within the 46–55 age group) undergoing either cisplatin-based or non-cisplatin-based chemotherapy regimens at the West Nusa Tenggara Provincial General Hospital. Subject selection was strictly based on the outlined inclusion and exclusion parameters, ensuring that the acquired dataset is considered highly representative in capturing the real-world conditions of serum creatinine levels in both groups.

### 1. Descriptive Comparison of Serum Creatinine Levels

The results of the descriptive analysis revealed a difference in the distribution patterns of serum creatinine levels between subjects receiving cisplatin-based chemotherapy and the non-cisplatin group. Within the cisplatin group dataset, the creatinine concentration range spanned from 0.20 to 4.10 mg/dL, achieving a mean value of 1.60 mg/dL. On the other hand, the non-cisplatin group recorded a lower distribution of values, ranging from 0.50 to 3.10 mg/dL, with a mean value of 0.91 mg/dL.

This discrepancy in mean values indicates that subjects undergoing cisplatin-based interventions have a tendency toward a more massive accumulation of serum creatinine compared to patients on non-cisplatin regimens. Furthermore, the wide gap between the minimum and maximum values in both groups confirms a high variability in inter-individual biological responses to cytostatic drug exposure. This diversity in parameters is suspected to be closely related to variations in individual clinical conditions, pre-treatment renal performance, the number of completed treatment cycles, and other comorbid factors.

**Table 1. Distribution Profile of Serum Creatinine According to Chemotherapy Regimen Characteristics**

| Type of Regimen | Minimum (mg/dL) | Maximum (mg/dL) | Mean (mg/dL) Number of Sample | Number of Patients |
|---|---|---|---|---|
| Cisplatin | 0,20 | 4,10 | 1,60 30 | |
| Non-cisplatin | 0,50 | 3,10 | 0,91 30 | |

Referring to the data presented in Table 1, it is clearly evident that the median value of the cisplatin-based chemotherapy group exceeds that of the non-cisplatin group. This preliminary data provides a strong indication of a negative correlation between cisplatin exposure and a decrease in renal filtration efficiency, as reflected by the high blood creatinine concentrations.

**2. Inferential Analysis of Differences in Serum Creatinine**

Prior to proceeding with the comparative test, the prerequisites of normality and homogeneity of data distribution were evaluated. Given that the data were not normally distributed (non-parametric), the intergroup comparison was resolved using the Mann–Whitney test.

The Mann–Whitney test yielded a coefficient of ($p$ = 0.030), a figure that falls below the designated significance threshold ($p$ = 0.05). Based on these inferential findings, the research hypothesis is declared accepted; there is a statistically significant difference in serum creatinine levels between the cervical cancer patient groups receiving cisplatin and those receiving non-cisplatin.

**Table 2. Summary of the Mann–Whitney Comparative Test**

| Variable | p Score | Summary |
|---|---|---|
| Serum creatinine concentration | 0,030 | Statistically significant difference |

Through these inferential results, it is proven that the choice of cytostatic regimen type significantly correlates with fluctuations in serum creatinine levels in cervical cancer patients. The group receiving cisplatin-based intervention demonstrates a tendency toward higher creatinine values, signaling a specific impact of this platinum agent on renal functional capacity.

On a macro level, these experimental data validate the postulate that the utilization of cisplatin in the management of cervical cancer risks triggering an increase in serum creatinine parameters. This outcome reaffirms how vital periodic monitoring of renal excretory function is as part of the patient safety algorithm while the chemotherapy cycles are ongoing.

Based on the statistical testing conducted, a significant disparity in serum creatinine levels was found between cervical cancer patients exposed to cisplatin-based chemotherapy regimens and the non-cisplatin group ($p$ = 0.030). Subjects in the cisplatin group exhibited a tendency toward higher mean creatinine values. This condition confirms the status of cisplatin as a chemotherapeutic agent that induces a decline in renal filtration capacity. The trend of findings in this research aligns with the report published by Rahmi et al. (2020), which documented a post-therapy spike in serum creatinine levels resulting from exposure to platinum-based compounds that damage renal cells.

As a platinum-class chemotherapeutic agent, cisplatin occupies a central position in cervical cancer treatment protocols across various stages due to its high efficacy in disrupting tumor cell replication chains (Ministry of Health of the Republic of Indonesia, 2018; Cohen et al., 2019). Nevertheless, its intrinsic nephrotoxic characteristics serve as a major limitation to the smooth progression of therapy. This damaging effect occurs due to the accumulation of the drug compound in the proximal tubule area, which subsequently induces the pathway for reactive oxygen species (ROS) formation, triggers oxidative stress, stimulates inflammatory cascades, damages DNA structures, disrupts mitochondrial integrity, and ultimately leads to cellular apoptosis pathways. Massive damage

to this tissue reduces the glomerular filtration rate, impairs waste excretion, and triggers the accumulation of creatinine within the serum (Dos Santos et al., 2012; Fang et al., 2021; Zhang et al., 2021).

These clinical findings reinforce the theory by Dos Santos et al. (2012), which positions elevated serum creatinine as a primary manifestation of cisplatin-induced renal toxicity. Furthermore, Zhang et al. (2021) outlined that the severity of this nephrotoxicity is multifactorial, with its variability determined by cumulative drug dosage, frequency of therapy cycles, the biological age of the patient, hydration management, and the baseline pre-treatment renal functional status. Therefore, the varying range of creatinine values in this study remains within the corridor of valid pathophysiological explanations.

Although the cisplatin group generally recorded a high mean, not all subjects in that group exhibited creatinine parameters that exceeded the normal threshold. This dynamic was most likely influenced by the patients' pristine baseline renal performance, the optimization of intravenous hydration intake before and after drug administration, adherence to tolerance doses, and individual biological variability factors. Adequate hydration intervention has been proven capable of reducing the concentration of active cisplatin compounds in the renal tubule area, thereby minimizing the severity of renal injury during the treatment period (Dos Santos et al., 2012; Fang et al., 2021).

On the other hand, the fact that patients from the non-cisplatin group were also found to have above-normal creatinine levels indicates the influence of confounding variables. The spike in creatinine values is not solely triggered by the type of drug regimen, but is also influenced by age factors, comorbidities (such as hypertension or diabetes mellitus), patient hydration status, the concurrent use of other nephrotoxic drugs, or pre-existing renal impairment prior to commencing the chemotherapy program (Gunawan, 2016; Rusdi et al., 2024). Based on these conditions, the diagnostic process for renal markers must be carried out comprehensively by evaluating the patient's clinical status holistically.

Serum creatinine remains relied upon as the primary parameter for renal evaluation due to the ease of its testing method, its good stability, and its accuracy in representing glomerular filtration rate performance (Gunawan, 2016). Therefore, monitoring the creatinine profile before and during chemotherapy cycles must be maintained as an early detection step for nephrotoxicity (Cohen et al., 2019; World Health Organization, 2025). Strict and continuous monitoring provides clinicians with the opportunity to make drug dosage adjustments, intensify hydration regimens, or switch to alternative non-platinum drugs for patients with high renal risk profiles (Mustika et al., 2016).

This study is acknowledged to have several clinical limitations. The research design, which relied on secondary data from medical records, restricted the researchers' ability to control for confounding variables, such as histories of comorbidities, the simultaneous intake of other nephrotoxic drugs, actual hydration levels, cumulative dosage accumulation, and detailed numbers of treatment cycles. Furthermore, this research was limited to the use of a single serum creatinine indicator without involving estimated glomerular filtration rate (eGFR) calculations or the testing of other sensitive acute kidney injury biomarkers. On this basis, future research is recommended to implement a prospective design, utilize a more massive sample scale, and control for these confounding variables so that the causal correlation between chemotherapy exposure and the degree of renal function decline can be mapped more comprehensively.

## CONCLUSIONS AND RECOMMENDATIONS

This study concludes that there is a statistically significant difference in serum creatinine levels between cervical cancer patient groups receiving cisplatin-based chemotherapy and the non-cisplatin group at the West Nusa Tenggara Provincial General Hospital ($p$ = 0.030). Patients in the cisplatin-based therapy group exhibited higher serum creatinine values compared to the non-cisplatin group.

This phenomenon confirms a close correlation between cisplatin exposure and an increase in serum creatinine parameters, which act as an indicator of declined renal functional performance. Consequently, periodic and strict monitoring of renal filtration system function is a mandatory protocol that must be fulfilled throughout the duration of the chemotherapy intervention.

Based on the results of this study, it is recommended that renal function monitoring via serum creatinine level testing be routinely performed in cervical cancer patients undergoing cisplatin-based chemotherapy to detect renal impairment as early as possible. Furthermore, future research is expected to involve a larger sample size, utilize a prospective research design, and consider other factors that can influence renal function—such as the cumulative dose of cisplatin, the number of chemotherapy cycles, comorbidities, and the use of other renal function parameters—in order to obtain a more comprehensive overview regarding the nephrotoxic effects of chemotherapy.

**REFERENCES**


Adiputra, I. M. S., Trisnadewi, N. W., Oktaviani, N. P. W., Munthe, S. A., Hulu, V. T., & Budiastutik, I. (2021). *Metodologi Penelitian Kesehatan*. Yayasan Kita Menulis.

Ariani, S. (2015). *Stop! Kanker*. Istana Media.

Cohen, P. A., Jhingran, A., Oaknin, A., & Denny, L. (2019). Cervical Cancer. *The Lancet*, *393*(10167), 169–182.

Dos Santos, N. A. G., Carvalho Rodrigues, M. A., Martins, N. M., & Dos Santos, A. C. (2012). Cisplatin-Induced Nephrotoxicity and Targets of Nephroprotection: An Update. *Archives of Toxicology*, *86*(8), 1233–1250.

Fang, C., Lou, D., Zhou, L., Wang, J., Yang, B., He, Q., Wang, J., & Weng, Q. (2021). Natural Products: Potential Treatments for Cisplatin-Induced Nephrotoxicity. *Acta Pharmacologica Sinica*, *42*(12), 1951–1969.

Gunawan. (2016). *Farmakologi dan Terapi* (6th ed.). Badan Penerbit Fakultas Kedokteran Universitas Indonesia.

Hidayati, T. (2021). *Epidemiologi & Biomolekuler Kanker*. Deepublish.

International Agency for Research on Cancer. (2024). *Global Cancer Observatory: Indonesia Fact Sheet 2022*. https://gco.iarc.who.int/media/globocan/factsheets/populations/360-indonesia-fact-sheet.pdf

Kementerian Kesehatan Republik Indonesia. (2018). *Pedoman Nasional Pelayanan Kedokteran Tata Laksana Kanker Serviks*. Kementerian Kesehatan RI.

King, R., & Robins, M. (2006). *Cancer Biology* (3rd ed.). Pearson Education.

Mustika, D. N., Kusumawati, E., & Istiana, S. (2016). *Modul Kesehatan Reproduksi: Deteksi Dini Kanker Serviks dan Payudara* (Semarang:). CV. Rafi Sarana Perkasa.

Rahmi, R. T., Priyono, S. H., Rosida, A., Prenggono, M. D., & Hendriyono, F. X. (2020). Perbedaan Kadar Kreatinin Sebelum dan Sesudah Kemoterapi Berbasis Platinum. *Homeostasis*, *3*(3), 395–400.

RSUD Provinsi Nusa Tenggara Barat. (2023). *Profil Rumah Sakit RSUD Provinsi Nusa Tenggara Barat Tahun 2023.* https://rsud.ntbprov.go.id

Rusdi, M. S., Mare, A. C. B., Bahar, Z., Deniyati, S. R. ., & Kurniaty, L. (2024). *Farmakologi dan Terapi* (1st ed.). CV Eureka Media Aksara.

World Health Organization. (2025). *Cervical Cancer*. https://www.who.int/health-topics/cervical-cancer

Zhang, J., Ye, Z., Tew, K. D., & Townsend, D. M. (2021). Cisplatin Chemotherapy and Renal Function. *Advances in Cancer Research*, *152*(1), 305–327.