**Afro-Asian Journal of Scientific Research (AAJSR)**
المجلة الأفروآسيوية للبحث العلمي (AAJSR)
E-ISSN: 2959-6505
Volume 1, Issue 3, July-September 2023, Page No: 215-220
Website: https://www.aajsr.com
**SJIFactor 2023: 3.908** **ISI 2023: 0.337**

# Evaluation of Neutrophil-Lymphocyte Ratio (NLR) in Hemodialysis Patients

Zakya Shoub Elshari [1], Nadia Adel Shuaib [2], Mabrouka Hassan Al Awami [3], Salwa Muftah Eljamay [4*]
[1,2,3] College of Medical Technology, Lab Medicine Department, Derna, Libya
[4] College of Medical Technology, Public Health Department, Derna, Libya

*Corresponding author: salwaeljamay@cmtd.edu.ly

| Received: July 16, 2023 | Accepted: August 24, 2023 | Published: September 02, 2023 |
|---|---|---|

**Abstract:**
A marker of systemic inflammation called the neutrophil-lymphocyte ratio (NLR) has been demonstrated to be able to predict mortality in patients; its predictive value for patients receiving hemodialysis is unknown. Aimed at: Is the percentage of white blood cells with lymphocytes and neutrophils (NLR) a sign of systemic urinary inflammation that can be used to predict the deaths of dialysis patients? Material and Methods: 60 hemodialysis patients' N/L ratio and clinical laboratory parameters were registered. Multivariate regression analysis was carried out to investigate the relationship with the N/L ratio. Result: The percentage of white blood cells (WBCs) in dialysis patients is almost normal because the highest rate was 66.7% normal, while the other ratios lose the lowest percentage. This shows that there is nothing to do with WBCs in renal failure. The relationship between the ratio of lymphocytes and neutrophils in kidney intestines is shown: the P-Value ratio of urea with P-Value lymphocytes was 0.919, with P-Value neutrophils 0.398, and with P-Value and NLR 0.333, > 0.05. The P-value creatinine ratio with lymphocytes was 0.535, the P-value neutrophil was 0.723, and the P-value and NLR 0.0.286 were > 0.05. The P-Value ratio for albumin with lymphocytes was 0.825, the P-Value for neutrophils was 0.574, and the P-Value for cell ratio rate was 0.923 > 0.05. Since the relationship between kidney intake, neutrophil, and lymphocyte NLR and the P-value is < 0.05, this indicates that there is no correlation between the immune system and renal failure disease. Conclusion: This study indicated that there was no relationship between NLR and kidney failure.

**Keywords**: Evaluation, Neutrophil-Lymphocyte Ratio (NLR), Kidney Failure

**Cite this article as:** Z. S. Elshari, N. A. Shuaib, M. H. Al Awami, S. M. Eljamay, "Evaluation of Neutrophil-Lymphocyte Ratio (NLR) in Hemodialysis Patients," *Afro-Asian Journal of Scientific Research (AAJSR)*, vol. 1, no. 3, pp. 215–220, July-September 2023.



# تقييم نسبة الخلايا الليمفاوية إلى العدلات في مرضى غسيل الكلى

زكية شعيب الشاعري [1*]، نادية عادل شعيب [2]، مبروكة حسن العوامي[3]، سلوى مفتاح الجامعي[4]
[1،2،3] قسم طب المختبرات، كلية التقنية الطبية، درنة، ليبيا
[4]قسم الصحة العامة، كلية التقنية الطبية، درنة، ليبيا

**الملخص**
ثبت أن علامة الالتهاب الجهازي تسمى نسبة العدلات إلى الخلايا الليمفاوية (NLR) قادرة على التنبؤ بالوفيات في المرضى، قيمتها التنبؤية للمرضى الذين يتلقون غسيل الكلى غير معروفة. تهدف إلى: هل النسبة المئوية لخلايا الدم البيضاء مع الخلايا الليمفاوية والعدلات (NLR) علامة على التهاب بولي جهازي يمكن استخدامه للتنبؤ بوفيات مرضى غسيل الكلى؟ المواد والطرق: تم تسجيل 60 مريضًا بغسيل الكلى "نسبة N/L وبارامترات المختبرات السريرية. تم إجراء تحليل الانحدار متعدد المتغيرات للتحقيق في العلاقة مع نسبة N/L. النتيجة: النسبة المئوية لخلايا الدم البيضاء (*WBCs*) في مرضى غسيل الكلى طبيعية تقريبًا لأن أعلى معدل كان طبيعيًا بنسبة 66.7٪، بينما تفقد النسب الأخرى أدنى نسبة. هذا يوضح أنه لا علاقة له بـ WBCs في الفشل الكلوي. تظهر العلاقة بين نسبة الخلايا الليمفاوية والعدلات في أمعاء الكلى: كانت نسبة *P-Value* لليوريا مع الخلايا الليمفاوية P-Value *0.919*، مع العدلات P-Value 0.398، ومع P-Value و0.333 NLR 0.05 <. كانت نسبة P-Value creatine مع الخلايا الليمفاوية 0.535، و P-Value العدلات 0.723، و P-Value و NLR 0.0.286 كانت > 0.05. كانت نسبة P-Value للألبومين مع الخلايا الليمفاوية 0.825، و P-Value للعدلات 0.574، و P-Value لمعدل نسبة الخلية 0.923 > 0.05. نظرًا لأن العلاقة بين تناول الكلى والعدلات والخلايا الليمفاوية NLR و P-Value هي < 0.05، فإن هذا يشير إلى عدم وجود علاقة بين الجهاز المناعي ومرض الفشل الكلوي. الاستنتاج: أشارت هذه الدراسة إلى عدم وجود علاقة بين NLR والفشل الكلوي.

**الكلمات المفتاحية:** التقييم، نسبة الخلايا الليمفاوية إلى العدلات (*NLR*)، الفشل الكلوي.

## Introduction

A chronic inflammatory ailment called chronic kidney disease typically results in changes to the architecture of the renal tissue and further leads to glomerular dysfunctions in the nephron. Therefore, the aberrant excretion of protein and albumin in the urine is caused by glomerular dysfunction. The neutrophil-lymphocyte ratio is regarded as a biomarker of inflammation because it is typically higher in inflammatory circumstances. [1], Numerous hematological indices, including hemoglobin, neutrophils, lymphocytes, NLR, eosinophils, MCV, MCHC, RBCs, WBCs, and monocytes, differed significantly between sick and control samples. [2], he NLR was closely associated with nutritional status. NLR may be an indicator of Protein-energy wasting (PEW) in chronic kidney disease (CKD) patients.[3], Neutrophil-to-lymphocyte ratio (NLR), Platelet-to-lymphocyte ratio (PLR), Inflammation, Non-dialysis patients with end-stage renal disease (ESRD)[4], NLR of 5.0 could predict recovery from renal injury in patients requiring hemodialysis (area under the curve, 0.929; sensitivity, 83.3%; specificity, 85.7%). NLR and platelet-to-lymphocyte ratio (PLR) could be candidates for predicting renal outcomes in patients with rapidly progressive glomerulonephritis (RPGN)[5], In patients receiving hemodialysis, NLR is substantially linked to mortality, but the link between PLR and unfavorable outcomes is less robust. NLR is a cheap, easily accessible biomarker that may be useful in determining a patient's risk of receiving hemodialysis.[6], Longer hospital stays and more dialysis sessions per patient were also linked to higher ratio values.[7], Lower maximum lymphocyte counts following dasatinib therapy were linked to the development of CKD. On the other hand, dasatinib treatment-induced increases in lymphocyte counts may stop the course of CKD.[8], The results of the current study suggest that NLR, IL-6, and TNF- were significantly associated with albuminuria in Type 2 Diabetic patients with Diabetic Nephropathy (DN )and that they can be used as clear biomarkers in determining the progression of deteriorating renal function and different stages of renal disease in patients with DN.[9], Increased neutrophil-to-lymphocyte ratio was substantially connected with the advancement of diabetic nephropathy, and it can be used as a predictive risk marker for diabetic nephropathy as well as an early signal.[10], In order to assess the prevalence and intensity of inflammation in CKD, the inflammatory marker NLR, which is high in the disease and rises with disease severity, can be a valuable tool.[11], Up to 18.8% of patients with end-stage renal disease or kidney transplants had latent tuberculosis infection (LTBI). Patients with renal failure or transplant may be protected against LTBI by BCG immunization and high NLR.[12], in individuals with immunoglobulin A nephropathy (IgAN), an elevated NLR influences renal progression and prognosis and may serve as a marker for the assessment of renal function and pathologic lesions.[13], NLR and LMR levels in peripheral blood are likely biological indicators to predict renal function and prognosis in LN patients.[14], The current investigation verified the link between preoperative NLR and postoperative AKI in individuals undergoing digestive system surgery. To assess the risk of AKI, a cut-off NLR value of 2.12 may be helpful.[15], Donor NLR dynamic alterations offer hope for forecasting post-transplant delayed graft function (DGF). It will help clinicians identify and treat kidney transplant problems early on. It is necessary to validate this new biomarker in a sizable investigation[16], In patients with chronic renal disease, NLR is a predictor of all-cause death

and cardiovascular events.[17], In Chinese seniors with MetS, higher NLR is linked to male gender, older age, renal failure, and cardiac unfavorable remodeling.[18], Although NLR is not the primary risk factor for the renal prognosis in patients with LN, it does impair some significant renal functions to some extent.[19], In individuals with type 2 diabetes, the NLR and PLR were closely related to renal function, and elevated NLR and PLR levels may be used as indicators of DKD[ 20], the immune markers NLR and MCP-1 are risk factors for the onset of T2DKD and may be employed clinically as new markers of T2DKD.[21].

## Material and methods

### Subjects and design of study

The study involved 60 patients who received HD three times per week for 4-5 hours at Alwhada Hospital between June 2021 and July 2021. Patients with active infection or inflammation, atherosclerotic vascular disease, hepatitis B and C virus infection, poor hepatic function, autoimmune disorders, current or previous malignancy, and immunosuppressive medication were excluded.

### Collection of data and measurement

Patient interviews and hospital charts were used to collect data on baseline characteristics and medical history. Blood pressure measures were taken for each patient, regardless of age, gender, or drug use therapy. Furthermore, Venous blood samples were drawn from the HD patients performed in a morning midweek dialysis session , Three milliliters of blood was drawn into a tube containing ethylene diamine tetra acetic acid (EDTA) for complete blood count and differential blood count are carried out by automated sysmax machine . N/L ratio was constructed by dividing neutrophil count to lymphocyte count. Biochemistry analyses [creatinine, serum albumin, Urea] the kits used by biomegrab and Biosystem analyzer 4040 were detected to correlate with lymphocyte and neutrophil counts.

### Statistical Analysis

Was performed using SPSS (version 26.0, SPSS.Inc., Chicago, IL, USA) statically package of social science, data were presented as correlation test was performed to deter-mine the relationships between continuous variables., frequency, and crosstabs. Univariate analysis of correlations for N/L ratio was performed prior to multivariate analysis. Independent relationships of N/L ratio were examined with multivariate-ate linear regression analysis with stepwise backward elimination method. All probability values were calculated by assuming a two-sided p-value of p0.05 with confidence intervals (CIs) at the 95% level.

## Results and discussion

In table (1) show that of 60 cases found in the dialysis department of the educational unit hospital in the city of Derna, we note that the number of males is higher than females, as the number of males reached 34 (56.7%), and the number of females 26 (43.3%)

**Table 1** frequency and percent of Gender for hemodialysis patients

| Gender | Frequency | Percentage % |
|---|---|---|
| Male | 34 | 56.7 |
| Female | 26 | 43.3 |
| Total | 60 | 100.0 |

In figure 1, 60 cases in the dialysis department with renal failure indicate that the highest age is 56–60 years, followed by 45–50 years, followed by 60–65 years, indicating that older ages are more likely to develop kidney failure in addition to later factors that include chronic diseases, exposure to viral or bacterial infections, or permanent use of painkillers.

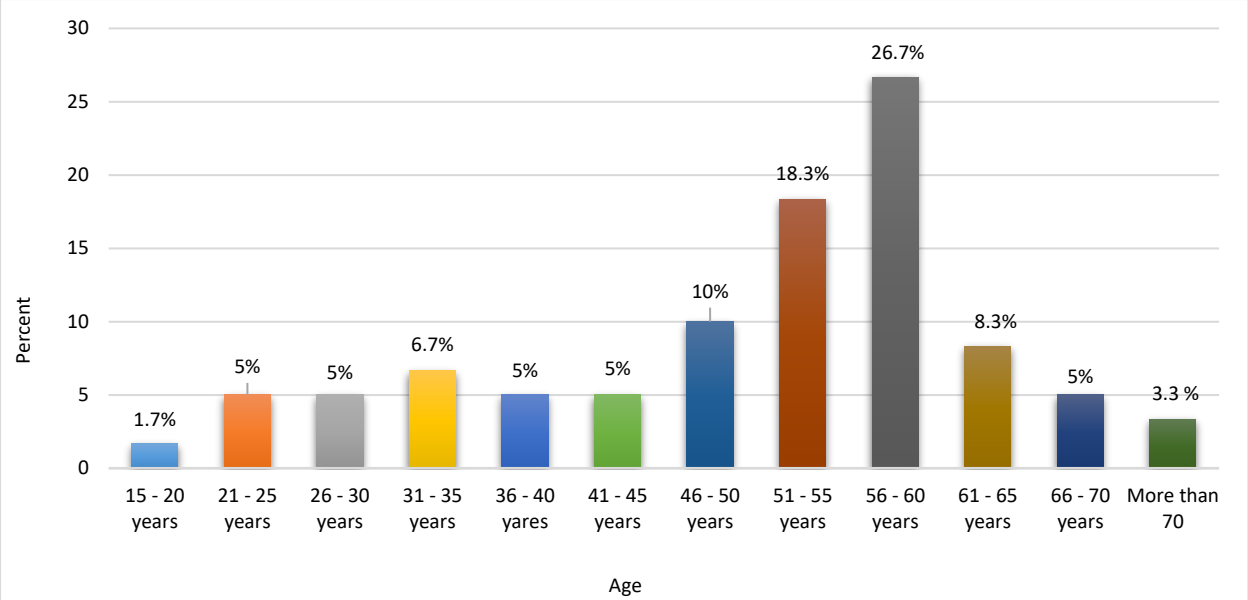


**Figure 1** Frequency and percent of Age of hemodialysis patients.

In figure 2, the percentage of white blood cells (WBCs) in dialysis patients is almost normal because the highest rate was 66.7% normal, while the other ratios lose the lowest percentage. This shows that there is nothing to do with (WBCs) with renal failure disease.

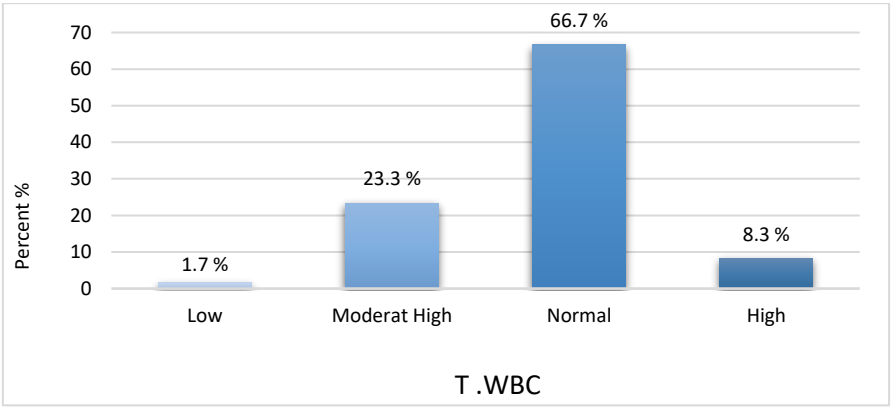


**Figure 2** Percentage of total white blood cells (T WBC) in hemodialysis patients.

In figure 2, the relationship between the ratio of lymphocytes and neutrophils with kidney intestines is shown, that the P-Value ratio of urea with P-Value lymphocyte was 0.919 and with neutrophil P-Value 0.398 and P-Value and NLR 0.333, > than 0.05. The P-Value creatinine ratio with lymphocyte was 0.535, the P-Value neutrophil was 0.723 and the P-Value and NLR 0.0.286 were > 0.05. The P-Value ratio for albumin with lymphocyte was 0.825, the P-Value neutrophil & 0.574 and the P-Value for cell ratio rate 0.923 > 0.05.

**Table 2** the correlation between renal function test with NLR, Lymphocyte and Neutrophil

| Correlation | | Lymphocyte | Neutrophil | NLR |
|---|---|---|---|---|
| **Urea** | R | -0.013- | -0.111- | -0.127- |
| | P- Value | 0.919 | 0.398 | 0.333 |
| **Creatinine** | R | 0.082 | 0.047 | 0.140 |
| | P- Value | 0.535 | 0.723 | 0.286 |
| **Albumin** | R | 0.029 | 0.074 | -0.013- |
| | P- Value | 0.825 | 0.574 | 0.923 |
| | N | 60 | 60 | 60 |
| **. Correlation is significant at the 0.01 level (P-Value).<br>*. Correlation is significant at the 0.05 level (P-Value). | | | | |

Table 1 shows that of the 60 cases found in the dialysis department of the educational unit hospital in the city of Derna, we note that the number of males is higher than females, as the number of males reached 34 (56.7%) and the number of females 26 (43.3%). In figure I, 60 cases in the dialysis department with renal failure indicate that the highest age is 56–60 years, followed by 45–50 years, followed by 60–65 years, indicating that older ages are more likely to develop kidney failure in addition to later factors that include chronic diseases, exposure to viral or bacterial infections, or permanent use of painkillers. Figure 2, the percentage of white blood cells (WBCs) in dialysis patients is almost normal because the highest rate was 66.7% normal, while the other ratios lose the lowest percentage. This shows that there is nothing to do with WBCs in renal failure disease. Figure 2, the relationship between the ratio of lymphocytes and neutrophils with kidney function is shown: the P-Value ratio of urea with P-Value lymphocytes was 0.919 and with neutrophils, P-Value was 0.398, and P-Value and NLR were 0.333, > 0.05. The P-value creatinine ratio with lymphocytes was 0.535, the P-value neutrophil was 0.723, and the P-value and NLR 0.0.286 were > 0.05.

The P-Value ratio for albumin with lymphocytes was 0.825, the P-Value for neutrophils was 0.574, and the P-Value for cell ratio rate was 0.923 > 0.05. Since the relationship between kidney intake, neutrophil, and lymphocyte NLR and the P-value is < 0.05, this indicates that there is no correlation between the immune system and renal failure disease. . In our finding an NLR > 3.88 is significant. However, the Average NLR ratio in previous studies was 3.7 in a severe form of the disease in HD patients [22]

## Conclusion

The data indicated that there was no relationship between NLR and kidney disease or kidney failure, and to clarify and verify our results, we will continue to research and open the field to research.

## References


[1] R. Badrachalam, “602 A Study Of Association Between Neutrophil -Lymphocyte Ratio And Proteinuria Among Chronic Kidney Disease Patients,” Apr. 2023.

[2] P. Li et al., “Neutrophil-to-lymphocyte ratio and platelet-to-lymphocyte ratio in evaluation of inflammation in non-dialysis patients with end-stage renal disease (ESRD),” BMC Nephrol, vol. 21, no. 1, p. 511, Dec. 2020, Doi: 10.1186/s12882-020-02174-0.

[3] Y. Mae et al., “Prognostic Value of Neutrophil-To-Lymphocyte Ratio and Platelet-To-Lymphocyte Ratio for Renal Outcomes in Patients with Rapidly Progressive Glomerulonephritis,” JCM, vol. 9, no. 4, p. 1128, Apr. 2020, doi: 10.3390/jcm9041128.

[4] K. J. Mayne et al., “Neutrophil-to-lymphocyte and platelet-to-lymphocyte ratios: associations with mortality in a hemodialysis cohort,” Clinical Kidney Journal, vol. 16, no. 3, pp. 512–520, Mar. 2023, doi: 10.1093/ckj/sfac248.

[5] A. V. Mureșan et al., “The Predictive Value of NLR, MLR, and PLR in the Outcome of End-Stage Kidney Disease Patients,” Biomedicines, vol. 10, no. 6, p. 1272, May 2022, doi: 10.3390/biomedicines10061272.

[6] H. Nakayama, H. Iizuka, T. Kato, and K. Usuki, “Is higher lymphocyte count a potential strategy for preventing chronic kidney disease in patients receiving long-term dasatinib treatment?,” Journal of Pharmaceutical Health Care and Sciences, vol. 9, no. 1, p. 4, Jan. 2023, doi: 10.1186/s40780-022-00270-x.

[7] M. Subramani, M. Anbarasan, S. Deepalatha, L. Narayanan, and P. Vasudevan, “Role of neutrophil-lymphocyte ratio as a prognostic marker for type 2 diabetic nephropathy among Indians,” Biomedical Informatics, 2023.

[8] P. K. Uduagbamen, A. T. Oyelese, A. O. AdebolaYusuf, M. U. Thompson, B. A. A. Alalade, and O. Ehioghae, “Neutrophil Lymphocyte Ratio as an Inflammatory Marker in Chronic Kidney Disease: Determinants and Correlates,” Open Journal of Nephrology, vol. 12, no. 1, Art. no. 1, Jan. 2022, Doi: 10.4236/ojneph.2022.121003.

[9] P.-H. Wang et al., “Protective Effect of BCG and Neutrophil-to-Lymphocyte Ratio on Latent Tuberculosis in End Stage Renal Disease,” Infect Dis Ther, vol. 12, no. 7, pp. 1907–1920, Jul. 2023, Doi: 10.1007/s40121-023-00839-5.

[10] S. Wang et al., “High Neutrophil-To-Lymphocyte Ratio Is an Independent Risk Factor for End Stage Renal Diseases in IgA Nephropathy,” Frontiers in Immunology, vol. 12, 2021, Accessed: Aug. 26, 2023. [Online]. Available: https://www.frontiersin.org/articles/10.3389/fimmu.2021.700224
[11] L. Xue et al., “Correlations of peripheral blood neutrophil-lymphocyte ratio and lymphocyte-monocyte ratio with renal function and prognosis in patients with lupus nephritis,” Am J Transl Res, vol. 14, no. 1, pp. 336–342, Jan. 2022, Accessed: Aug. 26, 2023. [Online]. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8829601/
[12] Y. Zhang et al., “Dynamic changes of neutrophil-to-lymphocyte ratio in brain-dead donors and delayed graft function in kidney transplant recipients,” Renal Failure, vol. 44, no. 1, pp. 1907–1913, Dec. 2022, Doi: 10.1080/0886022X.2022.2141646.
[13] W.-M. Zhao, S.-M. Tao, and G.-L. Liu, “Neutrophil-to-lymphocyte ratio in relation to the risk of all-cause mortality and cardiovascular events in patients with chronic kidney disease: a systematic review and meta-analysis,” Renal Failure, vol. 42, no. 1, pp. 1059–1066, Jan. 2020, doi: 10.1080/0886022X.2020.1832521.
[14] Y. Zhu et al., “Higher neutrophil to lymphocyte ratio is associated with renal dysfunction and cardiac adverse remodeling in elderly with metabolic syndrome,” Frontiers in Cardiovascular Medicine, vol. 9, 2022, Accessed: Aug. 26, 2023. [Online]. Available: https://www.frontiersin.org/articles/10.3389/fcvm.2022.921204
[15] G. Zou and H. Gao, “and early renal fibrosis and renal prognosis in.”
[16] “Neutrophil: lymphocyte ratio predicts short-term outcome of COVID-19 in hemodialysis patients | Clinical Kidney Journal | Oxford Academic.” https://academic.oup.com/ckj/article/14/1/124/5998261 (accessed Aug. 27, 2023).
[17] “Association of neutrophil-to-lymphocyte ratio and platelet-to-lymphocyte ratio with diabetic kidney disease in patients with type 2 diabetes,” Oct. 25, 2022. https://www.researchsquare.com (accessed Aug. 26, 2023).
[18] “Neutrophil-lymphocyte ratio, high-sensitivity C-reactive protein and monocyte chemoattractant protein-1 as novel markers for patients with type 2 diabetic kidney disease,” Jul. 06, 2023. https://www.researchsquare.com (accessed Aug. 26, 2023).
[19] I. M. Sabry, M. M. M. Mahdy, S. H. A. Elhalawany, and M. M. A. Ahmed, “Study of Neutrophil–Lymphocyte Ratio, Interleukin-6 (IL-6) and Tumor Necrosis Factor-Alpha (TNF-α) in Type 2 Diabetes with Diabetic Nephropathy,” QJM: An International Journal of Medicine, vol. 116, no. Supplement_1, p. hcad069.450, Jun. 2023, Doi: 10.1093/qjmed/hcad069.450.
[20] A. J. Butt et al., “Neutrophil-to-Lymphocyte ratio and Monocyte-to-HDL ratio as a Biomarker of Urolithiasis,” Comp Clin Pathol, Jun. 2023, Doi: 10.1007/s00580-023-03488-9.
[21] Q. Han et al., “A high neutrophil to lymphocyte ratio is associated with poor nutritional status in chronic kidney disease patients,” British Journal of Nutrition, vol. 128, no. 10, pp. 1990–1996, Nov. 2022, doi: 10.1017/S000711452100516X.
[22] Y.-T. Yan et al., “Association of preoperative neutrophil–lymphocyte ratio with acute kidney injury in patients with non-cardiac surgery: difference among surgical types,” Int Urol Nephrol, Mar. 2023, Doi: 10.1007/s11255-023-03567-4.
[23] S. M. Eljamay, G. K. Fannoush, F. A. Ismaeil, F. M. Eljamay, “Nutritional Practices during the Coronavirus Pandemic (COVD-19),” Afro-Asian Journal of Scientific Research (AAJSR),vol. 1, no. 2, pp. 352–359, April-June 2023.
[24]Eljamay SM, Younus MM, Eljamay FM. Side Effects of Receiving Different Types of COVID-19 Vaccines 2023 .المجلة الليبية للدراسات الأكاديمية المعاصرة .Jul 14:54-65.
[25]S. M. Eljamay, J. E. Elhassadi, N. R. Ben Haleim, F. M. Eljamay, “Endometriosis and its Relationship to Marital Status,” North African Journal of Scientific Publishing (NAJSP), vol. 1,no. 2, pp. 7–12, April-June 2023.
[26]Aburas OA, Dhaw AM, Boras E, Eljamay SM, Elhsadi RA. How of COVID-19 Epidemic Spread and the effect of Heritance factor. Data Sciences Indonesia (DSI). 2022 Dec 18;2(2):76-83.
[27]Eljamay SM, Bumaluma MA, Eljamay FM. The Awareness of Diseases Caused by Parasites, Methods of Prevention, and their Relationship to the Educational Level. African Journal of Advanced Pure and Applied Sciences (AJAPAS). 2023 Jul 3:1-8.