

PERBEDAAN RASIO NEUTROFIL-LIMFOSIT (NLR), RASIO *C-REACTIVE PROTEIN-ALBUMIN* (CAR) DAN KADAR *MATRIX METALLOPROTEINASE 2* (MMP-2) PADA PASIEN KANKER PAYUDARA DENGAN DAN TANPA METASTASIS

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ABSTRAK

Latar belakang. Kanker payudara merupakan tumor ganas yang paling sering didiagnosis pada wanita di dunia. Inflamasi merupakan komponen penting dari lingkungan mikro tumor dan berkontribusi terhadap perkembangan kanker. Peningkatan parameter inflamasi NLR, CAR, dan MMP-2 masing-masing berhubungan dengan kanker payudara, namun belum ada yang menggabungkan parameter tersebut sebagai penanda progresivitas kanker.

Tujuan. Membuktikan perbedaan penanda inflamasi pada pasien kanker payudara dengan dan tanpa metastasis.

Metode. Penelitian analitik observasional dengan pendekatan *cross-sectional* dilakukan pada 80 pasien kanker payudara tanpa metastasis dan metastasis pada Juni-Agustus 2025. Pengukuran NLR dilakukan dengan *hematology analyzer*. Pengukuran CAR dihitung secara manual dengan membagi antara kadar CRP serum yang diperiksa dengan metode *sandwich* ELISA dengan kadar albumin serum dengan metode BCG (*bromocresol green dye*). Penilaian MMP-2 dilakukan dengan metode ELISA. Uji komparatif menggunakan uji *T independen* dan *Mann-Whitney*.

Hasil. Terdapat perbedaan antara NLR, CAR, dan MMP-2 pada pasien kanker payudara tanpa metastasis dibandingkan dengan metastasis [masing-masing 2,69 (2,11 – 5,63) vs 4,92 (3,17 – 65,09), $p < 0,05$; 0,73 (0,49 – 1,10) vs 1,44 (1,13 – 5,57), $p < 0,05$; dan 238,05 (12,3 – 298,8) vs 421,45 (324,5 – 1585,1), $p < 0,05$].

Simpulan. Nilai NLR, CAR, dan kadar MMP-2 pada pasien kanker payudara tanpa metastasis lebih rendah daripada dengan metastasis.

Kata kunci: kanker payudara, metastasis, *Neutrophil-Lymphocyte Ratio*, *CRP-albumin ratio*, MMP-2.

COMPARISON OF NEUTROPHILE-LYMPHOCYTE RATIO (NLR), C-REACTIVE PROTEIN-ALBUMIN RATIO (CAR) AND MATRIX METALLOPROTEINASE 2 (MMP-2) LEVELS UN BREAST CANCER PATIENTS WITH AND WITHOUT METASTASIS

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ABSTRACT

Background. Breast cancer is the most frequently diagnosed malignant tumor in women worldwide. Inflammation is a crucial component of the tumor microenvironment and contributes to cancer progression. Elevated inflammatory parameters such as NLR, CAR, and MMP-2 are associated with breast cancer, but none have combined all three as markers of cancer progression.

Objective. To investigate the differences in inflammatory markers in breast cancer patients with and without metastasis

Method: An observational analytical study with a cross-sectional approach involving 80 breast cancer patients with and without metastases from June to August 2025. NLR measurements were performed using a hematology analyzer, whereas CAR were calculated manually using serum CRP levels examined with sandwich ELISA divided by serum albumin levels using BCG (bromocresol green dye) method. Serum MMP-2 was measured using ELISA method. Independent T-test and the Mann-Whitney test was employed for comparative tests.

Results: Difference in NLR and CAR as well as MMP-2 levels in breast cancer patients without metastasis compared to those with metastasis was observed [2.69 (2.11 – 5.63) vs 4.92 (3.17 – 65.09), $p < 0.05$; 0.73 (0.49 – 1.10) vs 1.44 (1.13 – 5.57), $p < 0.05$; and 238.05 (12.3 – 298.8) vs 421.45 (324.5 – 1585.1), $p < 0.05$].

Conclusion: NLR, CAR, and serum MMP-2 in breast cancer patients without metastasis are lower compared to metastatic breast cancer.

Keywords: breast cancer, metastasis, Neutrophil-Lymphocyte Ratio, CRP albumin ratio, MMP-2