SKRIPSI

HUBUNGAN KADAR HEMOGLOBIN, TROMBOSIT, DAN *NEUTROPHIL LYMPHOCYTE RATIO* DENGAN STADIUM KLINIS KANKER SERVIKS

HANIF GUSNERI SYAHBIRAN

04011182025022

PROGRAM STUDI PENDIDIKAN DOKTER

FAKULTAS KEDOKTERAN

UNIVERSITAS SRIWIJAYA

2023

SKRIPSI

HUBUNGAN KADAR HEMOGLOBIN, TROMBOSIT, DAN *NEUTROPHIL LYMPHOCYTE RATIO* DENGAN STADIUM KLINIS KANKER SERVIKS

Diajukan untuk memenuhi salah satu syarat memperoleh gelar

Sarjana Kedokteran (S.Ked)

HANIF GUSNERI SYAHBIRAN

04011182025022

PROGRAM STUDI PENDIDIKAN DOKTER

FAKULTAS KEDOKTERAN

UNIVERSITAS SRIWIJAYA

2023

HALAMAN PENGESAHAN
HUBUNGAN KADAR HEMOGLOBIN, TROMBOSIT, DAN *NEUTROPHIL LYMPHOCYTE RATIO* DENGAN STADIUM KLINIS KANKER SERVIKS

LAPORAN AKHIR SKRIPSI

Diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Kedokteran di Universitas Sriwijaya

Oleh:

Hanif Gusneri Syahbiran

04011182025022

Palembang, 27 November 2023

Fakultas Kedokteran Universitas Sriwijaya

Pembimbing I

dr. Nurmalia Purnama Sari, Sp.PK, Msi.Med
NIP. 197210312002122003

Pembimbing II
Dr. dr. Phey Liana, Sp.PK(K)
NIP. 198108032006042001

Penguji I
dr. Kemas Ya'kub Rahadiyanto, Sp.PK, M.Kes
NIP. 197210121999031005

Penguji II
dr. Raissa Nurwany, Sp.OG
NIP. 1990021272015042003

Mengetahui,

Koordinator Program Studi
Pendidikan Dokter

dr. Susilawati, M.Kes
NIP. 197802272010122001

Wakil Dekan I

Prof. Dr. dr. Irfannuddin, Sp.KO., M.Pd.Ked
NIP. 197306131999031001

HALAMAN PERSETUJUAN

Karya tulis ilmiah berupa laporan akhir skripsi dengan judul "Hubungan Kadar Hemoglobin, Trombosit, dan *Neutrophil Lymphocyte Ratio* dengan Stadium Klinis Kanker Serviks" telah dipertahankan di hadapan Tim Penguji Karya Tulis Ilmiah Program Studi Pendidikan Dokter Fakultas Kedokteran Universitas Sriwijaya pada tanggal 27 November 2023.

Palembang, 27 November 2023
Tim Penguji Karya Ilmiah berupa laporan akhir skripsi

Pembimbing I

dr. Nurmalia Purnama Sari, SpPK, Msi.Med
NIP. 197210312002122003 .....

Pembimbing II
Dr. dr. Phey Liana, Sp.PK(K)
NIP. 198108032006042001 .....

Penguji I
dr. Kemas Ya'kub Rahadiyanto, Sp.PK, M.Kes
NIP. 197210121999031005 .....

Penguji II
dr. Raissa Nurwany, Sp.OG
NIP. 1990021272015042003 .....

Mengetahui,

Koordinator Program Studi
Pendidikan Dokter

dr. Susilawati, M.Kes.
NIP. 197802272010122001

Wakil Dekan I

Prof. Dr. dr. Irfannuddin, Sp.KO., M.Pd.Ked
NIP. 197306131999031001

HALAMAN PERNYATAAN INTEGRITAS

Yang bertanda tangan dibawah ini :

Nama : Hanif Gusneri Syahbiran

NIM : 04011182025022

Judul : Hubungan Kadar Hemoglobin, Trombosit, dan *Neutrophil Lymphocyte Ratio* dengan Stadium Klinis Kanker Serviks

Menyatakan bahwa Skripsi saya merupakan hasil karya sendiri didampingi tim pembimbing dan bukan hasil penjiplakan/*plagiat*. Apabila ditemukan unsur penjiplakan/*plagiat* dalam Skripsi ini, maka saya bersedia menerima sanksi akademik dari Universitas Sriwijaya sesuai aturan yang berlaku.

Demikian, pernyataan ini saya buat dalam keadaan sadar dan tanpa ada paksaan dari siapapun.

Palembang, 27 November 2023

Hanif Gusneri Syahbiran

HALAMAN PERNYATAAN PERSETUJUAN PUBLIKASI

Sebagai civitas akademik Universitas Sriwijaya, saya yang bertanda tangan dibawah ini:

Nama : Hanif Gusneri Syahbiran

NIM : 04011182025022

Judul : Hubungan Kadar Hemoglobin, Trombosit, dan *Neutrophil Lymphocyte Ratio* dengan Stadium Klinis Kanker Serviks

Memberikan izin kepada Pembimbing dan Universitas Sriwijaya untuk mempublikasikan hasil penelitian saya untuk kepentingan akademik apabila dalam waktu 1 (satu) tahun tidak mempublikasikan karya saya. Dalam kasus ini saya setuju untuk mendapatkan Pembimbing sebagai penulis koresponding (corresponding author).

Demikian, pernyataan ini saya buat dalam keadaan sadar dan tanpa paksaan dari siapapun.

Palembang, 27 November 2023

Hanif Gusneri Syahbiran

NIM. 04011182025022

ABSTRAK

HUBUNGAN KADAR HEMOGLOBIN, TROMBOSIT, DAN *NEUTROPHIL LYMPHOCYTE RATIO* DENGAN STADIUM KLINIS KANKER SERVIKS

(*Hanif Gusneri Syahbiran*, November 2023)
Fakultas Kedokteran Universitas Sriwijaya
Email: hanifgs75@gmail.com

Latar Belakang. Kanker adalah kondisi medis yang dicirikan dengan pertumbuhan yang cepat, menyebar ke jaringan sekitarnya, dan mampu menyebar ke organ lain yang lebih jauh (metastasis). Kanker serviks terjadi ketika sel-sel abnormal pada serviks tumbuh tidak terkendali. Secara dunia, angka kematian kanker serviks 13,3/100.000 di tahun 2020 yang disebabkan oleh sebagian besar baru terdiagnosis stadium terminal akibat akses deteksi dini dan pencegahan terbatas. Pada kasus kanker, sering terjadi penurunan hemoglobin (anemia), peningkatan trombosit, dan neutrophil lymphocyte ratio. Penelitian ini bertujuan untuk menganalisis hubungan kadar hemoglobin, trombosit, dan *neutrophil lymphocyte ratio* dengan stadium klinis kanker serviks.

Metode. Jenis penelitian yang digunakan adalah observasional analitik dengan pendekatan korelasi. Sampel pada penelitian ini adalah data rekam medis pasien yang terdiagnosis Kanker Serviks berusia ≥ 18 tahun di RSUP Dr. Mohammad Hoesin Palembang pada bulan Agustus 2022 hingga Juli 2023 yang memenuhi kriteria inklusi dan eksklusi. Pengambilan sampel dilakukan secara total sampling.

Hasil. Terdapat 153 sampel yang memenuhi kriteria inklusi dan eksklusi. Perbedaan yang signifikan kadar hemoglobin, leukosit, neutrofil, trombosit, dan NLR antara stadium awal dan lanjut kanker serviks ($p<0,001$, $p=0,001$, $p<0.001$, $p<0,001$, $p<0,001$). Korelasi yang cukup signifikan ditemukan kadar hemoglobin, trombosit, dan neutrophil lymphocyte ratio dengan stadium klinis kanker serviks ($r=-0,419, p<0,001; r=0,315, p<0,001; r=0,313, p<0,001$).

Kesimpulan. Terdapat hubungan hemoglobin, trombosit, dan *neutrophil lymphocyte ratio* dengan stadium klinis kanker serviks.

Kata kunci. Hemoglobin, trombosit, *neutrophil lymphocyte ratio,* kanker serviks

ABSTRACT

THE RELATIONSHIP BETWEEN HEMOGLOBIN LEVEL, PLATELET COUNT, AND NEUTROPHIL LYMPHOCYTE RATIO WITH THE CLINICAL STAGE OF CERVICAL CANCER

(*Hanif Gusneri Syahbiran*, November 2023)
Faculty of Medicine Sriwijaya University
Email: hanifgs75@gmail.com

Background. Cancer is a medical condition characterized by rapid growth, spreading to surrounding tissue, and being able to spread to other more distant organs (metastasis). Cervical cancer occurs when abnormal cells in the cervix grow uncontrolled. Worldwide, the death rate for cervical cancer is 13.3/100,000 in 2020, which is caused by the majority being diagnosed in the terminal stage due to limited access to early detection and prevention. In cancer cases, there is often a decrease in hemoglobin (anemia), an increase in platelets and neutrophil lymphocyte ratio. This study aims to analyze the relationship between hemoglobin, platelet, and neutrophil-lymphocyte ratio levels with the clinical stage of cervical cancer.

Methods. The type of research used is analytic observational with a correlation approach. The samples in this study is medical record data of patients diagnosed with Cervical Cancer aged ≥ 18 years at RSUP Dr. Mohammad Hoesin Palembang from August 2022 to July 2023 which meets the inclusion and exclusion criteria. Sampling is carried out by total sampling.

Results. There were 153 samples that met the inclusion and exclusion criteria. Significant differences in levels of hemoglobin, leukocytes, neutrophils, platelets, and NLR between early and advanced stages of cervical cancer ($p<0.001$, $p=0.001$, $p<0.001$, $p<0.001$, $p<0.001$). A significant correlation was found between hemoglobin levels, platelets, and the neutrophil-lymphocyte ratio with the clinical stage of cervical cancer ($r=-0.419$, $p<0.001$; $r=0.315$, $p<0.001$; $r=0.313$, $p<0.001$).

Conclusion. There was an association of hemoglobin, platelets, and neutrophil lymphocyte ratio with clinical stage of cervical cancer.

Key words. *hemoglobin, platelet, neutrophil lymphocyte ratio, cervical cancer*

RINGKASAN

HUBUNGAN KADAR HEMOGLOBIN, TROMBOSIT, DAN *NEUTROPHIL LYMPHOCYTE RATIO* DENGAN STADIUM KLINIS KANKER SERVIKS

Karya tulis ilmiah berupa skripsi, 27 November 2023

Hanif Gusneri Syahbiran; Dibimbing oleh dr. Nurmalia Purnama Sari, Sp.PK, Msi.Med dan Dr. dr. Phey Liana, Sp.PK(K)

Pendidikan Dokter Umum, Fakultas Kedokteran, Universitas Sriwijaya

xv + 112 halaman, 9 tabel, 4 gambar, 7 lampiran.

RINGKASAN

Kanker adalah kondisi medis yang dicirikan dengan pertumbuhan yang cepat, menyebar ke jaringan sekitarnya, dan mampu menyebar ke organ lain yang lebih jauh (metastasis). Kanker serviks terjadi ketika sel-sel abnormal pada serviks tumbuh tidak terkendali. Secara dunia, angka kematian kanker serviks 13,3/100.000 di tahun 2020 yang disebabkan oleh sebagian besar baru terdiagnosis stadium terminal akibat akses deteksi dini dan pencegahan terbatas. Pada kasus kanker, sering terjadi penurunan hemoglobin (anemia), peningkatan trombosit, dan neutrophil lymphocyte ratio. Penelitian ini bertujuan untuk menganalisis hubungan kadar hemoglobin, trombosit, dan *neutrophil lymphocyte ratio* dengan stadium klinis kanker serviks. Jenis penelitian yang digunakan adalah observasional analitik dengan pendekatan korelasi. Sampel pada penelitian ini adalah data rekam medis pasien yang terdiagnosis Kanker Serviks berusia ≥ 18 tahun di RSUP Dr. Mohammad Hoesin Palembang pada bulan Agustus 2022 hingga Juli 2023 yang memenuhi kriteria inklusi dan eksklusi. Pengambilan sampel dilakukan secara total sampling. Terdapat 153 sampel yang memenuhi kriteria inklusi dan eksklusi. Perbedaan yang signifikan kadar hemoglobin, leukosit, neutrofil, trombosit, dan NLR antara stadium awal dan lanjut kanker serviks ($p<0,001$, $p=0,001$, $p<0.001$, $p<0,001$, $p<0,001$). Korelasi yang cukup signifikan ditemukan kadar hemoglobin, trombosit, dan neutrophil lymphocyte ratio dengan stadium klinis kanker serviks ($r=-0,419, p<0,001; r=0,315, p<0,001; r=0,313, p<0,001$). Terdapat hubungan hemoglobin, trombosit, dan *neutrophil lymphocyte ratio* dengan stadium klinis kanker serviks.

Kata kunci. Hemoglobin, Trombosit, *neutrophil lymphocyte ratio,* kanker serviks.

SUMMARY

THE RELATIONSHIP BETWEEN HEMOGLOBIN LEVEL, PLATELET COUNT, AND NEUTROPHIL LYMPHOCYTE RATIO WITH THE CLINICAL STAGE OF CERVICAL CANCER

Scientific paper, November 2023

Hanif Gusneri Syahbiran; supervised by dr. Nurmalia Purnama Sari, Sp.PK, Msi.Med and Dr. dr. Phey Liana, Sp.PK(K)

Study Program of Medical Education, Faculty of Medicine, Sriwijaya University

xv + 112 pages, 9 tables, 4 pictures, 7 attachments

SUMMARY

Cancer is a medical condition characterized by rapid growth, spreading to surrounding tissue, and being able to spread to other more distant organs (metastasis). Cervical cancer occurs when abnormal cells in the cervix grow uncontrolled. Worldwide, the death rate for cervical cancer is 13.3/100,000 in 2020, which is caused by the majority being diagnosed in the terminal stage due to limited access to early detection and prevention. In cancer cases, there is often a decrease in hemoglobin (anemia), an increase in platelets and neutrophil lymphocyte ratio. This study aims to analyze the relationship between hemoglobin, platelet, and neutrophil-lymphocyte ratio levels with the clinical stage of cervical cancer. The type of research used is analytic observational with a correlation approach. The samples in this study is medical record data of patients diagnosed with Cervical Cancer aged ≥ 18 years at RSUP Dr. Mohammad Hoesin Palembang from August 2022 to July 2023 which meets the inclusion and exclusion criteria. Sampling is carried out by total sampling. There were 153 samples that met the inclusion and exclusion criteria. Significant differences in levels of hemoglobin, leukocytes, neutrophils, platelets, and NLR between early and advanced stages of cervical cancer ($p<0.001$, $p=0.001$, $p<0.001$, $p<0.001$, $p<0.001$). A significant correlation was found between hemoglobin levels, platelets, and the neutrophil-lymphocyte ratio with the clinical stage of cervical cancer ($r=-0.419$, $p<0.001$; $r=0.315$, $p<0.001$; $r=0.313$, $p<0.001$). There was an association of hemoglobin, platelets, and neutrophil lymphocyte ratio with clinical stage of cervical cancer.

Key words. *hemoglobin, platelet, neutrophil lymphocyte ratio, cervical cancer*

KATA PENGANTAR

Alhamdulillah, puji syukur kepada Allah SWT yang telah melimpahkan segala rahmat, karunia dan nikmat-Nya sehingga penulis dapat menyelesaikan penyusunan skripsi dengan judul "Hubungan Kadar Hemoglobin, Trombosit, dan *Neutrophil Lymphocyte Ratio* dengan Stadium Klinis Kanker Serviks"

Penulis menyadari bahwa skripsi ini masih jauh dari kata sempurna dan penulis telah memperoleh banyak bantuan dari berbagai pihak, untuk itu dengan penuh hormat dan kerendahan hati perkenankanlah penulis mengucapkan terima kasih kepada:

1. dr. Nurmalia Purnama Sari, Sp.PK., M.Si.Med. dan DR. dr. Phey Liana, Sp.PK(K) selaku dosen pembimbing yang telah meluangkan waktunya untuk memberikan semangat, dukungan, bimbingan beserta arahan dengan penuh kesabaran kepada penulis selama proses penyusunan skripsi.
2. dr. Kemas Ya'kub Rahadiyanto, Sp.PK., M.Kes dan dr. Raissa Nurwany, Sp.OG selaku dosen penguji yang berkenan memberikan waktu dan perhatiannya demi memperbaiki skripsi ini.
3. dr. Wahyudi Nurhidayat, Sp.Onk.Rad(K), MARS yang juga turut membantu dan memberikan saran, semangat, dukungan, beserta arahan dengan penuh kesabaran pada penulis selama proses penyusunan skripsi.
4. Seluruh keluarga tersayang yang telah memberikan motivasi, semangat, dukungan, nasihat, kasih sayang, dan doa yang tiada hentinya untuk proses pendidikan penulis hingga saat ini.
5. Seluruh teman yang telah banyak memberikan bantuan dan dukungan pada masa preklinik.

Terimakasih atas segala dukungan, semangat, dan doa yang sangat berarti bagi penulis. Semoga Allah SWT memberikan balasan atas semua kebaikan yang telah diberikan. Penulis mengharapkan saran dan kritik yang membangun dan semoga penyusunan skripsi ini dapat memberikan manfaat.

Palembang, 18 Agustus 2023

Hanif Gusneri Syahbiran

DAFTAR ISI

Halaman

DAFTAR GAMBAR

Halaman

DAFTAR TABEL

Halaman

DAFTAR LAMPIRAN

Halaman

DAFTAR SINGKATAN

NLR	: *Neutrophil Lymphocyte Ratio*
HPV	: *Human Pappilomavirus*
FIGO	: *The International Federation of Gynecology and Obstetrics*
PI3K/Akt	: *Phosphatidylinositol 3-kinase*
hTERT	: *Human telomerase reverse transcriptase*
HDACs	: *Histone deacetylases*
ROS	: *Reactive Oxygen Species*

BAB 1
PENDAHULUAN

1.1 Latar Belakang

Kanker adalah kondisi medis yang dicirikan dengan pertumbuhan yang cepat, menyebar ke jaringan sekitarnya, dan mampu menyebar ke organ lain yang lebih jauh (metastasis).[1] Secara dunia, kanker serviks merupakan kanker keempat yang paling sering terjadi pada perempuan di seluruh dunia, setelah kanker payudara (2,1 juta kasus), kanker usus besar (0,8 juta kasus), dan kanker paru-paru (0,7 juta kasus).[2] Kanker serviks adalah salah satu penyebab utama kematian pada perempuan di seluruh dunia, sekitar 530.000 kasus baru dan 275.000 kematian setiap tahun.[3] Insiden kanker serviks berdasarkan usia adalah 13,1 per 100.000 perempuan di seluruh dunia dan bervariasi secara signifikan di setiap negara.[2] Sebagian besar kasus baru dan kematian (masing-masing sekitar 85% dan 90%) terjadi di negara-negara dengan penghasilan rendah dan menengah.[4]

Berdasarkan laporan *International Agency for Research on Cancer* (IARC) Globocan 2020, kasus kanker serviks di Indonesia terbanyak kedua yang diderita oleh perempuan setelah kanker payudara, dengan jumlah 36.633 kasus baru dan 21.003 kematian.[5] Jika tidak ditangani dengan baik, diperkirakan jumlah kematian akibat kanker serviks akan terus meningkat dan mencapai 12 juta pada tahun 2030. Setiap tahun, diperkirakan terdapat 180.000 kasus baru kanker serviks di Indonesia, dengan angka kematian mencapai 75% pada tahun pertama. Hal ini disebabkan oleh sebagian besar pasien yang baru terdiagnosis sudah berada pada stadium lanjut (70% kasus) dan sudah berada pada stadium terminal pada saat didiagnosis. Kematian akibat kanker serviks terutama terjadi pada populasi dengan kondisi ekonomi menengah kebawah, sehingga akses terhadap deteksi dini dan pencegahan kanker serviks sangat terbatas.[6] Penyebab utama lesi pra-kanker dan kanker serviks adalah infeksi *Human Pappilomavirus* (HPV) dengan HPV tipe 16 dan 18 yang berisiko tinggi dan sering ditemui pada manusia. Infeksi dapat terjadi melalui kontak seksual.[7]

Pada kasus kanker, anemia dapat terjadi karena patogenesis yang kompleks. Pada kebanyakan kasus, hal ini melibatkan berbagai faktor yang berkaitan dengan aktivasi respon imun kronis yang diinduksi oleh kanker, yang diakibatkan oleh efek penekanan langsung dan tidak langsung dari sitokin pada eritropoiesis. Selain itu, pelepasan sitokin proinflamasi pada pasien kanker sering dikaitkan dengan peningkatan *reactive oxygen species* (ROS), baik sebagai komponen respons imun atau sebagai konsekuensi dari peningkatan metabolisme. ROS dapat menghambat eritropoiesis, mengganggu status nutrisi, dan memperburuk anemia.[8]

Peningkatan jumlah trombosit pada tumor disebabkan oleh sitokin yang disekresikan tumor yang berperan dalam menstimulasi pertumbuhan megakariosit dan trombopoiesis. Sitokin yang paling sering ditemukan adalah *Interleukin* (IL)-1, IL-3, IL-6, IL-11, *granulocyte–macrophage colony-stimulating factor*, *leukemia inhibitory factor*, dan lain-lain.[9] Trombosit juga berperan dalam intravasasi dan ekstravasasi sel tumor dalam proses metastasis.[10]

Mekanisme *Neutrophil Lymphocyte Ratio* (NLR) yang tinggi masih belum jelas, tetapi penelitian terbaru melaporkan peningkatan rasio neutrofil-limfosit berkaitan dengan peningkatan sitokin yang meningkatkan fungsi makrofag tumor, termasuk: IL-1, IL-6, IL-7, IL-8 , IL-12, IL-17, *granulocyte colony-stimulating factor* (G-CSF) dan *monocyte chemoattractant protein-1*.[11] NLR yang meningkat juga karena perkembangan dan proses metastasis dari kanker tersebut.[10]

Penelitian yang dilakukan oleh Shin dkk., 805 pasien dengan kanker serviks stadium 1B sampai 2A sebelum terapi dilaporkan bahwa kadar hemoglobin pada stadium IB2 lebih rendah dibandingkan dengan pasien dengan stadium IB1, yang signifikan secara statistik, dan berhubungan negatif.[12]

Penelitian yang dilakukan oleh Sivaprasad dkk., 52 pasien dengan diagnosis kanker serviks di India dilaporkan bahwa trombosit memiliki korelasi positif yang kuat dengan ukuran tumor dan stadium kanker serviks.[13] Penelitian yang dilakukan oleh Li X, 380 pasien dengan diagnosis *squamous cervical carcinoma* dilaporkan bahwa trombosit memiliki korelasi positif yang signifikan dengan stadium kanker serviks secara statistik.[14] Penelitian yang dilakukan oleh Murata dkk., sebanyak

2.267 dengan diagnosis kanker serviks di Kobe dilaporkan bahwa trombositosis berkorelasi signifikan dengan stadium lanjut FIGO.[15]

Studi yang dilakukan oleh Prabawa dkk., 282 pasien dengan kanker serviks dilaporkan bahwa Korelasi positif yang kuat (r=0,638) ditemukan antara stadium kanker serviks dan NLR dan nilai median NLR dan rasio trombosit limfosit secara signifikan lebih tinggi pada stadium lanjut dibandingkan dengan stadium awal.[16] Penelitian yang dilakukan oleh Huang Q dkk., 2.804 pasien dengan kanker serviks dilaporkan bahwa NLR berhubungan positif dengan ukuran tumor dan juga menunjukkan hubungan yang signifikan dengan stadium *The International Federation of Gynecology and Obstetrics* (FIGO) lanjut.[17]

Berdasarkan latar belakang yang telah dibahas, penelitian ini belum ditemukan publikasi di Palembang sehinga perlu dilakukan penelitian mengenai hubungan hemoglobin, trombosit, dan *neutrophil lymphocyte ratio* dengan stadium klinis kanker serviks untuk membantu membantu screening kanker serviks karena sebagian besar pasien baru terdiagnosis pada stadium lanjut.

1.2 Rumusan Masalah

Bagaimana hubungan hemoglobin, trombosit, dan *neutrophil lymphocyte ratio* dengan stadium klinis kanker serviks?

1.3 Tujuan Penelitian

1.3.1 Tujuan Umum

Menganalisis hubungan hemoglobin, trombosit, dan *neutrophil lymphocyte ratio* dengan stadium klinis kanker serviks.

1.3.2 Tujuan Khusus

1. Mengidentifikasi status demografi (usia dan status pernikahan), riwayat paritas, dan riwayat penggunaan kontrasepsi hormonal pada kanker serviks.

2. Mengidentifikasi hasil pemeriksaan *complete blood count*, rasio neutrofil limfosit, dan stadium kanker serviks.
3. Menganalisis perbedaan status demografi (usia dan status pernikahan), riwayat paritas, dan riwayat penggunaan kontrasepsi hormonal berdasarkan stadium kanker serviks
4. Menganalisis perbedaan hasil pemeriksaan *complete blood count* dan *neutrophil lymphocyte ratio* berdasarkan stadium kanker serviks
5. Menganalisis korelasi kadar hemoglobin, trombosit, dan *neutrophil lymphocyte ratio* dengan stadium klinis pada kanker serviks.

1.4 Hipotesis

Terdapat hubungan hemoglobin, trombosit, dan *neutrophil lymphocyte ratio* dengan stadium kanker serviks.

1.5 Manfaat Penelitian

1.5.1 Manfaat Teoritis

Hasil penelitian ini diharapkan dapat dijadikan sebagai informasi mengenai hubungan hemoglobin, trombosit, dan *neutrophil lymphocyte ratio* dengan stadium klinis kanker serviks.

1.5.2 Manfaat Kebijakan

Hasil penelitian ini dapat dibuat kebijakan berupa pemeriksaan hitung darah lengkap wajib dilakukan di daerah-daerah yang tidak memiliki fasilitas untuk melakukan biopsi.

1.5.3 Manfaat Masyarakat

Jika ditemukan hubungan pada penelitian ini, pemeriksaan hemoglobin, trombosit, dan *neutrophil lymphocyte ratio* dapat digunakan untuk membantu screening kanker serviks.

DAFTAR PUSTAKA

1. Budhy T. Mengapa terjadi kanker. Edisi Kedua. Surabaya: Airlangga University Press; 2019. 1–2 p.
2. Buskwofie A, David-West G, Clare CA. A Review of Cervical Cancer: Incidence and Disparities. J Natl Med Assoc [Internet]. 2020 [cited 2023 Jul 23];112(2):229–32. Available from: https://doi.org/10.1016/j.jnma.2020.03.002
3. Olusola P, Banerjee HN, Philley J V., Dasgupta S. Human Papilloma Virus-Associated Cervical Cancer and Health Disparities. Cells [Internet]. 2019 [cited 2023 Jul 23];8(6):1–6. Available from: https://doi.org/10.3390/cells8060622
4. Bhatla N, Aoki D, Sharma DN, Sankaranarayanan R. Cancer of the cervix uteri: 2021 update. Int J Gynaecol Obstet [Internet]. 2021 [cited 2023 Jul 23];155(S1):28–44. Available from: https://doi.org/10.1002/ijgo.13865
5. World Health Organization. Estimated number of cancer cases in Indonesia [Internet]. 2021 [cited 2023 Jul 23]. Available from: https://gco.iarc.fr/today/data/factsheets/populations/360-indonesia-fact-sheets.pdf
6. Agustiansyah P, Sanif R, Nurmaini S, Irfannuddin, Legiran. Epidemiology and Risk Factors for Cervical Cancer. Bioscmed [Internet]. 2021 [cited 2023 Jul 23];5(7):624–31. Available from: https://doi.org/10.32539/bsm.v5i7.326
7. Zhang S, Xu H, Zhang L, Qiao Y. Cervical cancer: Epidemiology, risk factors and screening. Chin J Cancer Res [Internet]. 2020;32(6):720–8. Available from: http://article.cjcrcn.org/en/article/doi/10.21147/j.issn.1000-9604.2020.06.05?viewType=HTML
8. Natalucci V, Virgili E, Calcagnoli F, Valli G, Agostini D, Zeppa SD, et al. Cancer related anemia: An integrated multitarget approach and lifestyle interventions. Nutrients [Internet]. 2021 [cited 2023 Jul 23];13(2):1–37. Available from: https://doi.org/10.3390/nu13020482
9. Menczer J. Preoperative Elevated Platelet Count and Thrombocytosis in Gynecologic Malignancies. Arch Gynecol Obstet [Internet]. 2017 [cited 2023 Jul 23];295(1):9–15. Available from: https://doi.org/10.1007/s00404-016-4212-9

10. Hartono B, Pontoh VS, Merung MA. Penilaian Jumlah Neutrofil, Limfosit dan Trombosit, Kadar Protein Reaktif C, Kadar Albumin, Rasio Neutrofil Limfosit, serta Rasio Trombosit Limfosit Sebelum dan Setelah Terapi pada Penderita Karsinoma Payudara. JBM [Internet]. 2015 [cited 2023 Jun 14];7(3). Available from: https://doi.org/10.35790/jbm.7.3.2015.9487

11. Ittiamornlert P, Ruengkhachorn I. Neutrophil-Lymphocyte Ratio as a Predictor of Oncologic Outcomes in Stage IVB, Persistent, or Recurrent Cervical Cancer Patients Treated by Chemotherapy. BMC Cancer [Internet]. 2019 [cited 2023 Jul 23];19(1):6–7. Available from: https://doi.org/10.1186/s12885-019-5269-1

12. Shin NR, Lee YY, Kim SH, Choi CH, Kim TJ, Lee JW, et al. Prognostic value of pretreatment hemoglobin level in patients with early cervical cancer. Obstet Gynecol Sci [Internet]. 2014 [cited 2023 Jul 23];57(1):28–36. Available from: http://dx.doi.org/10.5468/ogs.2014.57.1.28

13. Sivaprasad S, Sheela S. Association of Thrombocytosis and its Prognostic Significance in Cervical Cancer. Journal of Clinical and Diagnostic Research [Internet]. 2023 [cited 2023 Jul 23];17(2):10–2. Available from: https://doi.org/10.7860/JCDR/2023/60820.17488

14. Li X, Tan C, Zhang W, Zhou J, Wang Z, Wang S, et al. Correlation between platelet and hemoglobin levels and pathological characteristics and prognosis of early-stage squamous cervical carcinoma. Med Sci Monit [Internet]. 2015 [cited 2023 Jul 23];21:3921–8. Available from: http://www.medscimonit.com/abstract/index/idArt/895016

15. Murata Y, Miyahara Y, Suzuki K, Wakahashi S, Sudo T, Nagao S, et al. Leukocytosis and thrombocytosis as prognostic factors for women with uterine cervical cancer. Eur J Gynaecol Oncol [Internet]. 2020 [cited 2023 Jul 23];41(1):93–7. Available from: https://www.ejgo.net/articles/10.31083/j.ejgo.2020.01.4886

16. Prabawa IPY, Bhargah A, Liwang F, Tandio DA, Tandio AL, Lestari AAW, et al. Pretreatment neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) as a predictive value of hematological markers in cervical cancer. Asian Pac J Cancer Prev [Internet]. 2019 [cited 2023 Jul 23];20(3):863–8. Available from: https://doi.org/10.31557/APJCP.2019.20.3.863

17. Huang QT, Man QQ, Hu J, Yang YL, Zhang YM, Wang W, et al. Prognostic Significance of Neutrophil-to-Lymphocyte Ratio in Cervical Cancer: A Systematic Review and Meta-Analysis of Observational Studies. Oncotarget [Internet]. 2017 [cited 2023 Jul 23];8(10):16755–64. Available from: https://doi.org/10.18632/oncotarget.15157

18. Sheard R, Mothoneos J, Cancer Council Australia, N.S.W. Cancer Council. Understanding cervical cancer : a guide for people with cancer, their families and friends. 2021. 8 p.

19. World Health Organization. Cervical Cancer. 2022.

20. Casanova R. Beckmann and Ling's Obstetrics and Gynecology. 8th ed. Philadelphia: Wolters Kluwer; 2019. 965–966 p.

21. Johnson CA, James D, Marzan A, Armaos M. Cervical Cancer: An Overview of Pathophysiology and Management. Semin Oncol Nurs [Internet]. 2019 [cited 2023 Jul 23];35(2):166–74. Available from: https://doi.org/10.1016/j.soncn.2019.02.003

22. Louie KS, De Sanjose S, Diaz M, Castellsagué X, Herrero R, Meijer CJ, et al. Early Age at First Sexual Intercourse and Early Pregnancy are Risk Factors for Cervical Cancer in Developing Countries. Br J Cancer [Internet]. 2009 [cited 2023 Jul 23];100(7):1191–7. Available from: https://doi.org/10.1038/sj.bjc.6604974

23. Cohen PA, Jhingran A, Oaknin A, Denny L. Cervical cancer. The Lancet [Internet]. 2019 [cited 2023 Jul 23];393(10167):169–82. Available from: https://doi.org/10.1016/S0140-6736(18)32470-X

24. Gupta SM, Mania-Pramanik J. Molecular Mechanisms in Progression of HPV-Associated Cervical Carcinogenesis. J Biomed Sci [Internet]. 2019 [cited 2023 Jul 23];26(1):11–2. Available from: https://doi.org/10.1186/s12929-019-0520-2

25. Singh S, Narayan N, Sinha R, Sinha P, Sinha VP, Upadhye JJ. Awareness about Cervical Cancer Risk Factors and Symptoms. Int J Reprod Contracept Obstet Gynecol [Internet]. 2018 [cited 2023 Jul 23];7(12):4987–91. Available from: http://dx.doi.org/10.18203/2320-1770.ijrcog20184953

26. National Cancer Institute. Cervical Cancer Symptoms [Internet]. 2022 [cited 2023 Jul 23]. p. 1. Available from: https://www.cancer.gov/types/cervical/symptoms

27. Campos-Parra AD, Pérez-Quintanilla M, Martínez-Gutierrez AD, Pérez-Montiel D, Coronel-Martínez J, Millan-Catalan O, et al. Molecular Differences between Squamous Cell Carcinoma and Adenocarcinoma Cervical Cancer Subtypes: Potential Prognostic Biomarkers. Curr Oncol [Internet]. 2022 [cited 2023 Jul 23];29(7):4689–702. Available from: http://dx.doi.org/10.3390/curroncol29070372

28. American Cancer Society. Cervical Cancer [Internet]. 2020 [cited 2023 Jul 23]. Available from: https://www.cancer.org/content/dam/CRC/PDF/Public/8599.00.pdf

29. Lee SI, Atri M. 2018 FIGO staging system for uterine cervical cancer: Enter Cross-sectional Imaging. Radiology [Internet]. 2019 [cited 2023 Jul 23];292(1):15–24. Available from: https://doi.org/10.1148/radiol.2019190088

30. The National Comprehensive Cancer Network. Cervical Cancer. NCCN Foundation; 2022. 47–51 p.

31. Fowler JR, Maani E V, Dunton CJ, Jack BW. Cervical Cancer Continuing Education Activity. In: StatPearls [Internet]. StatPearls; 2022. Available from: https://www.ncbi.nlm.nih.gov/books/NBK431093/

32. Laelago Ersado T. Cervical Cancer Prevention and Control. In: A Global Public Health Treatise [Internet]. IntechOpen; 2021. p. 2–5. Available from: www.intechopen.com

33. Ghebreyesus T. Global strategy towards eliminating cervical cancer as a public health problem [Internet]. World Health Organization. World Health Organization; 2020 [cited 2023 Jul 23]. 25–26 p. Available from: https://www.who.int/publications/i/item/9789240014107

34. American College of Obstetricians and Gynecologists. Cervical Cancer Screening Guidelines. In 2023 [cited 2023 Jul 23]. p. 2–3. Available from: https://www.acog.org/clinical/clinical-guidance/practice-advisory/articles/2021/04/updated-cervical-cancer-screening-guidelines

35. Ahmed MH, Ghatge MS, Safo MK. Hemoglobin: Structure, Function and Allostery. In: Subcellular Biochemistry. Virginia: Springer; 2020. p. 345–82.

36. Kosmachevskaya O V., Topunov AF. Alternate and Additional Functions of Erythrocyte Hemoglobin. Biochemistry (Mosc) [Internet]. 2018 [cited 2023 Jul 23];83(12–13):1575–6. Available from: https://doi.org/10.1134/S0006297918120155

37. World Health Organization. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. 2011.

38. Maakaron J. Anemia [Internet]. Medscape. 2021. p. 3. Available from: https://emedicine.medscape.com/article/198475-overview#a5

39. Saad J, Asuka E, Schoenberger L. Physiology, Platelet Activation. In: StatPearls [Internet]. StatPearls; 2023. p. 1. Available from: https://www.ncbi.nlm.nih.gov/books/NBK482478/

40. Fountain JH, Lappin SL. Physiology, Platelet. In: StatPearls [Internet]. 2023. p. 1. Available from: https://www.ncbi.nlm.nih.gov/books/NBK470328/

41. Heng S, Benjapibal M. Preoperative Thrombocytosis and Poor Prognostic Factors in Endometrial Cancer. APJCP [Internet]. 2015 Jan 6 [cited 2023 Aug 17];15(23):10231–6. Available from: http://koreascience.or.kr/journal/view.jsp?kj=POCPA9&py=2015&vnc=v15n23&sp=10231

42. Buonacera A, Stancanelli B, Colaci M, Malatino L. Neutrophil to Lymphocyte Ratio: An Emerging Marker of the Relationships between the Immune System and Diseases. Int J Mol Sci [Internet]. 2022 [cited 2023 Jul 23];23(7). Available from: https://doi.org/10.3390/ijms23073636

43. Hibino S, Kawazoe T, Kasahara H, Itoh S, Ishimoto T, Sakata-Yanagimoto M, et al. Inflammation-Induced Tumorigenesis and Metastasis. Int J Mol Sci [Internet]. 2021 [cited 2023 Jul 23];22(11):1–4. Available from: https://doi.org/10.3390/ijms22115421

44. Zahorec R. Neutrophil-to-Lymphocyte Ratio, Past, Present and Future Perspectives. Bratisl Lek Listy [Internet]. 2021 [cited 2023 Jul 23];122(7):474–88. Available from: https://doi.org/10.4149/BLL_2021_078

45. Candelaria M, Cetina L. Anemia in Cervical Cancer Patients. Med Oncol [Internet]. 2005 [cited 2023 Jul 23];22(2):161–8. Available from: https://doi.org/10.1385/MO:22:2:161

46. Rathod A, Deshmukh V, Kodgire J. Is Thrombocytosis a Valid Indicator of Advanced Stage and High Mortality of Gynecological Cancer? Int J Reprod Contracept Obstet Gynecol [Internet]. 2021 [cited 2023 Jul 23];10(11):4267. Available from: https://dx.doi.org/10.18203/2320-1770.ijrcog20214344

47. Wang JM, Wang Y, Huang YQ, Wang H, Zhu J, Shi JP, et al. Prognostic Values of Platelet-Associated Indicators in Resectable Cervical Cancer. Dose Response [Internet]. 2019 [cited 2023 Jul 23];17(3):1–11. Available from: https://doi.org/10.1177/1559325819874199

48. Zou P, Yang E, Li Z. Neutrophil-to-lymphocyte ratio is an independent predictor for survival outcomes in cervical cancer: a systematic review and meta-analysis. Sci Rep [Internet]. 2020 Dec 14;10(1):21917. Available from: https://www.nature.com/articles/s41598-020-79071-x

49. El Ibrahimi S. The Effect of Marriage on Stage at Diagnosis and Survival in The Effect of Marriage on Stage at Diagnosis and Survival in Women with

Cervical Cancer Women with Cervical Cancer [Internet]. 2013. Available from: http://dx.doi.org/10.34917/5363889

50. Stier EA, Engels E, Horner MJ, Robinson WT, Qiao B, Hayes J, et al. Cervical cancer incidence stratified by age in women with HIV compared with the general population in the United States, 2002–2016. AIDS [Internet]. 2021 Sep 1 [cited 2023 Nov 16];35(11):1851–6. Available from: https://journals.lww.com/10.1097/QAD.0000000000002962

51. Berben L, Floris G, Wildiers H, Hatse S. Cancer and aging: Two tightly interconnected biological processes. Cancers (Basel) [Internet]. 2021 Mar 2 [cited 2023 Nov 16];13(6):1–20. Available from: https://doi.org/10.3390/cancers13061400

52. Yuan R, Zhang C, Li Q, Ji M, He N. The impact of marital status on stage at diagnosis and survival of female patients with breast and gynecologic cancers: A meta-analysis. Gynecol Oncol [Internet]. 2021 Sep 1 [cited 2023 Nov 16];162(3):778–87. Available from: https://doi.org/10.1016/j.ygyno.2021.06.008

53. Shin HY, Park B, Suh M, Choi KS, Jun JK. Association of Late Marriage and Low Childbirth with Cervical Cancer Screening among Korean Women: Results from a Nationwide Survey. Cancers (Basel) [Internet]. 2022 Jan 1 [cited 2023 Nov 16];14(2). Available from: https://doi.org/10.3390/cancers14020327

54. Wulan RN, Abidin Z, Rosyida E, Aris E, Retnowari J, Sih E, et al. Relationship between Multiparity and the Types of Histopatology of Cervical Cancer. Indian J Public Health Res Dev [Internet]. 2020 Mar 23 [cited 2023 Nov 16];11(03):1229. Available from: http://medicopublication.com/index.php/ijphrd/article/view/1583

55. Kirana NWP, Mahendra INB, Suwardewa TGA, Winata IGS. Karakteristik Pasien Kanker Serviks yang Menjalani Radikal Histerektomi dan Limfadenektomi Pelvik Bilateral di RSUP Sanglah tahun 2018-2019. JMU [Internet]. 2023 [cited 2023 Nov 16];12(1):93–100. Available from: http://ojs.unud.ac.id/index.php/eum

56. Putri AR, Khaerunnisa S, Yuliati I. Cervical Cancer Risk Factors Association in Patients at the Gynecologic-Oncology Clinic of Dr. Soetomo Hospital Surabaya. Indonesian Journal of Cancer [Internet]. 2019 Dec 27 [cited 2023 Nov 16];13(4):104. Available from: https://indonesianjournalofcancer.or.id/e-journal/index.php/ijoc/article/view/610

57. Paramita S, Soewarto S, Widodo MAA, Sumitro SB. High parity and hormonal contraception use as risk factors for cervical cancer in East Kalimantan. Medical Journal of Indonesia [Internet]. 2010 Nov 1 [cited 2023 Nov 16];19(4):268. Available from: http://mji.ui.ac.id/journal/index.php/mji/article/view/414

58. Iversen L, Fielding S, Lidegaard Ø, Hannaford PC. Contemporary hormonal contraception and cervical cancer in women of reproductive age. Int J Cancer [Internet]. 2021 Aug 15 [cited 2023 Nov 16];149(4):769–77. Available from: https://doi.org/10.1002/ijc.33585

59. Kusmiyati Y, Prasistyami A, Wahyuningsih HP, Widyasih H, Adnani QES. Duration of hormonal contraception and risk of cervical cancer. Kesmas [Internet]. 2019 [cited 2023 Nov 16];14(1):9–13. Available from: https://journal.fkm.ui.ac.id/kesmas/article/view/2713

60. Hasugian SA, Lubis K, Doan H V. Profile of Histopathology of Cervical Cancer Tissues In Patients of The Dr Pirngadi Medan Hospital. J Bio [Internet]. 2020 Dec 10 [cited 2023 Nov 16];6(3):90. Available from: https://doi.org/10.24114/jbio.v6i3.19607

61. Kaseka PU, Kayira A, Chimbatata CS, Chisale MRO, Kamudumuli P, Wu TSJ, et al. Histopathological profile of cervical biopsies in northern Malawi: A retrospective cross-sectional study. BMJ Open [Internet]. 2022 Mar 11 [cited 2023 Nov 16];12(3). Available from: https://doi.org/10.1136/bmjopen-2020-048283

62. Bilir F, Batman D, Çorakci A, Yücesoy İ. Relationship between Hematological Inflammatory Markers and General Characteristics in Operable Cervical Cancer; State of the HALP index. Sakarya Med J [Internet]. 2023 Aug 16 [cited 2023 Nov 16];13(3). Available from: https://doi.org/10.31832/smj.1319887

63. Madeddu C, Gramignano G, Astara G, Demontis R, Sanna E, Atzeni V, et al. Pathogenesis and treatment options of cancer related anemia: Perspective for a targeted mechanism-based approach. Front Physiol [Internet]. 2018 Sep 20 [cited 2023 Nov 16];9. Available from: https://doi.org/10.3389/fphys.2018.01294

64. Jain A, Bobdey S, Sathwara J, Ganesh B, Saoba S, Khan A. Role of monocyte and lymphocyte counts in prognosis of cervical cancer. Int J Reprod Contracept Obstet Gynecol. 2016;2243–9.

65. Ali Abushofa F, Elsayed Azab A, Musa Al Ghawi H, Ali Abushofa F, Elsayed Azab A, Musa Al Ghawi H. Assessment of the haematological alterations in cervical cancer patients attending sabratha national cancer

institute, Western Libya. Hematology & Transfusion International Journal. 2021 Dec 30;9(6):125–32.

66. Madeddu C, Sanna E, Nemolato S, Mulas O, Oppi S, Scartozzi M, et al. Pathogenic and Prognostic Roles of Paraneoplastic Leukocytosis in Cervical Cancer: Can Genomic-Based Targeted Therapies Have a Role? A Literature Review and an Emblematic Case Report. Diagnostics [Internet]. 2022 Aug 1 [cited 2023 Nov 16];12(8). Available from: https://doi.org/10.3390/diagnostics12081910

67. Lee Y young, Choi CH, Kim HJ, Kim TJ, Lee JW, Lee JH, et al. Pretreatment Neutrophil:Lymphocyte Ratio as a Prognostic Factor in Cervical Carcinoma. Anticancer Res [Internet]. 2012 [cited 2023 Nov 16];32(4):1555–62. Available from: https://ar.iiarjournals.org/content/32/4/1555.long

68. Lau D, Lechermann LM, Gallagher FA. Clinical Translation of Neutrophil Imaging and Its Role in Cancer. Mol Imaging Biol [Internet]. 2022 Apr 1 [cited 2023 Nov 16];24(2):221–34. Available from: https://doi.org/10.1007/s11307-021-01649-2

69. Lee YY, Choi CH, Sung CO, Do IG, Huh S, Song T, et al. Prognostic value of pre-treatment circulating monocyte count in patients with cervical cancer: Comparison with SCC-Ag level. Gynecol Oncol. 2012 Jan;124(1):92–7.

70. Eo WK, Kwon BS, Kim KH, Kim HY, Kim HB, Koh SB, et al. Monocytosis as a prognostic factor for survival in stage IB and IIA cervical cancer. J Cancer. 2018;9(1):64–70.

71. Kiss M, Caro AA, Raes G, Laoui D. Systemic Reprogramming of Monocytes in Cancer. Front Oncol [Internet]. 2020 Sep 17 [cited 2023 Nov 16];10(1399). Available from: https://doi.org/10.3389/fonc.2020.01399

72. Kietlińska Z. T and B lymphocyte counts and blast transformation in patients with Stage I cervical cancer. Gynecol Oncol [Internet]. 1984 Jun [cited 2023 Nov 16];18(2):247–56. Available from: https://linkinghub.elsevier.com/retrieve/pii/0090825884900337

73. Lee HJ, Kim JM, Chin YJ, Chong GO, Park SH, Lee YH, et al. Prognostic value of hematological parameters in locally advanced cervical cancer patients treated with concurrent chemoradiotherapy. Anticancer Res [Internet]. 2020 [cited 2023 Nov 16];40(1):451–8. Available from: https://doi.org/10.21873/anticanres.13973

74. Kushekhar K, Chellappa S, Aandahl EM, Taskén K. Role of Lymphocytes in Cancer Immunity and Immune Evasion Mechanisms. In: Biomarkers of the Tumor Microenvironment [Internet]. Cham: Springer International

Publishing; 2022 [cited 2023 Nov 16]. p. 159–82. Available from: https://doi.org/10.1007/978-3-030-98950-7_10

75. Wiranata S, Anjani IAW, Saputra IPGS, Sadvika IGAS, Prabawa IPY, Supadmanaba IG, et al. Pretreatment neutrophil-to-lymphocyte ratio and platelet-tolymphocyte ratio as a stage determination in breast cancer. OAMJMS [Internet]. 2020 Jan 2 [cited 2023 Nov 16];8(B):1058–63. Available from: https://doi.org/10.3889/oamjms.2020.5336

76. Chauhan J, Stavraka C, Grandits M, Palhares LCGF, Josephs DH, Lacy KE, et al. Clinical and Translational Significance of Basophils in Patients with Cancer. Cells [Internet]. 2022 Feb 1 [cited 2023 Nov 16];11(3):1–19. Available from: https://doi.org/10.3390/cells11030438

77. Koulis TA, Kornaga EN, Banerjee R, Phan T, Ghatage P, Magliocco AM, et al. Anemia, leukocytosis and thrombocytosis as prognostic factors in patients with cervical cancer treated with radical chemoradiotherapy: A retrospective cohort study. Clin Transl Radiat Oncol. 2017 Jun 1;4:51–6.

78. Karachaliou N, Pilotto S, Bria E, Rosell R. Platelets and their role in cancer evolution and immune system. Transl Lung Cancer Res [Internet]. 2015 [cited 2023 Nov 16];4(6):713–20. Available from: https://doi.org/10.3978/j.issn.2218-6751.2015.10.09

79. Jonska-Gmyrek J, Gmyrek L, Zolciak-Siwinska A, Kowalska M, Fuksiewicz M, Kotowicz B. Pretreatment neutrophil to lymphocyte and platelet to lymphocyte ratios as predictive factors for the survival of cervical adenocarcinoma patients. Cancer Manag Res. 2018;10:6029–38.

80. Shi H, Wang K, Yuan J, Mao W, Wu Z, Liu Q, et al. A high monocyte-to-lymphocyte ratio predicts poor prognosis in patients with radical cystectomy for bladder cancer. Transl Cancer Res. 2020 Sep 1;9(9):5255–67.

81. Fedewa SA, Cokkinides V, Virgo KS, Bandi P, Saslow D, Ward EM. Association of insurance status and age with cervical cancer stage at diagnosis: National cancer database, 2000-2007. Am J Public Health [Internet]. 2012 Sep [cited 2023 Nov 16];102(9):1782–90. Available from: https://doi.org/10.2105/AJPH.2011.300532

82. Kusuma F, Suryoadji KA, Adrian M, Utami TW, Winarto H, Anggraeni TD, et al. Socio-demographic Profiles of Cervical Cancer Patients at Cipto Mangunkusumo and Its Association with Cancer Stages at Diagnosis. CDK Journal [Internet]. 2009 [cited 2023 Nov 16];49(5). Available from: https://doi.org/10.55175/cdk.v49i5.227

83. White MC, Holman DM, Boehm JE, Peipins LA, Grossman M, Jane Henley S. Age and cancer risk: A potentially modifiable relationship. Am J Prev

Med [Internet]. 2014 [cited 2023 Nov 16];46(3). Available from: https://doi.org/10.1016/j.amepre.2013.10.029

84. Ding Z, Yu D, Li H, Ding Y. Effects of marital status on overall and cancer-specific survival in laryngeal cancer patients: a population-based study [Internet]. Vol. 11, Scientific Reports. Nature Research; 2021 Dec [cited 2023 Nov 16]. Available from: https://doi.org/10.1038/s41598-020-80698-z

85. Raju K, CV R, SR S. Clinicopathological correlation of invasive squamous cell carcinoma of uterine cervix: A cross-sectional study. Biomedical Research and Therapy [Internet]. 2019 Nov 26 [cited 2023 Nov 16];6(11):3443–51. Available from: https://doi.org/10.15419/bmrat.v6i11.573

86. Muñoz N, Franceschi S, Bosetti C, Moreno V, Herrero R, Smith J, et al. Role of parity and human papillomavirus in cervical cancer: the IARC multicentric case-control study. Lancet [Internet]. 2002 [cited 2023 Nov 16];359:1093–101. Available from: www.thelancet.com

87. Zidi S, Sahli M, Mezlini A, Yacoubli-Loueslati B. Association of Combined Tobacco Smoking, Hormonal Contraceptive use and Status Matrimonial with Cervical Cancer Evolution in Tunisian Women. Pathol Oncol Res [Internet]. 2020 Jan 1 [cited 2023 Nov 16];26(1):217–22. Available from: https://doi.org/10.1007/s12253-018-0442-4

88. Wamburu K, Busakhala N, Owuor K, Nyagero J. Association between stage at diagnosis and knowledge on cervical cancer among patients in a Kenyan tertiary hospital: a cross-sectional study. Pan Afr Med J [Internet]. 2016 [cited 2023 Nov 16];25:15. Available from: https://doi.org/10.11604/pamj.supp.2016.25.2.10684

89. Machida H, Matsuo K, Kobayashi Y, Momomura M, Takahashi F, Tabata T, et al. Significance of histology and nodal status on the survival of women with early-stage cervical cancer: validation of the 2018 FIGO cervical cancer staging system. J Gynecol Oncol [Internet]. 2022 May 1;33(3). Available from: https://ejgo.org/DOIx.php?id=10.3802/jgo.2022.33.e26

90. Kunos CA, Fabian D, Fredericks T, Baldwin L, Dietrich C, Miller RW, et al. Hemoglobin level associates with survival in women from Appalachian Kentucky with uterine cervix cancer. Front Oncol [Internet]. 2023 [cited 2023 Nov 16];13. Available from: https://doi.org/10.3389/fonc.2023.1132135

91. Wang X, Xu J, Zhang H, Qu P. The effect of albumin and hemoglobin levels on the prognosis of early-stage cervical cancer: a prospective, single-center–

based cohort study. BMC Womens Health [Internet]. 2023 Dec 1 [cited 2023 Nov 16];23(1). Available from: https://doi.org/10.1186/s12905-023-02713-5

92. Abdel-Razeq H, Hashem H. Recent update in the pathogenesis and treatment of chemotherapy and cancer induced anemia. Crit Rev Oncol Hematol [Internet]. 2020 Jan 1 [cited 2023 Nov 16];145. Available from: https://doi.org/10.1016/j.critrevonc.2019.102837

93. Tavares-Murta BM, Mendonça MAO, Duarte NL, da Silva JA, Mutão TS, Garcia CB, et al. Systemic leukocyte alterations are associated with invasive uterine cervical cancer. Int J Gynecol Cancer [Internet]. 2010 [cited 2023 Nov 16];20(7):1. Available from: https://doi.org/10.1111/igc.0b013e3181ef8deb

94. Lin EY, Pollard JW. Role of infiltrated leucocytes in tumour growth and spread. Br J Cancer [Internet]. 2004 Jun 1 [cited 2023 Nov 16];90(11):2053–8. Available from: https://doi.org/10.1038/sj.bjc.6601705

95. Xiong S, Dong L, Cheng L. Neutrophils in cancer carcinogenesis and metastasis. J Hematol Oncol [Internet]. 2021 Dec 1 [cited 2023 Nov 16];14(1). Available from: https://doi.org/10.1186/s13045-021-01187-y

96. Chen X, Li Y, Xia H, Chen YH. Monocytes in Tumorigenesis and Tumor Immunotherapy. Cells [Internet]. 2023 Jul 1 [cited 2023 Nov 16];12(13). Available from: https://doi.org/10.3390/cells12131673

97. Robinson A, Han CZ, Glass CK, Pollard JW. Monocyte Regulation in Homeostasis and Malignancy. Trends Immunol [Internet]. 2021 Feb 1 [cited 2023 Nov 16];42(2):104–19. Available from: https://doi.org/10.1016/j.it.2020.12.001

98. Wu ES, Oduyebo T, Cobb LP, Cholakian D, Kong X, Fader AN, et al. Lymphopenia and its association with survival in patients with locally advanced cervical cancer. Gynecol Oncol [Internet]. 2016 Jan 1 [cited 2023 Nov 16];140(1):76–82. Available from: https://doi.org/10.1016/j.ygyno.2015.11.013

99. Avila JP, Carvalho BM, Coimbra EC. A Comprehensive View of the Cancer-Immunity Cycle (CIC) in HPV-Mediated Cervical Cancer and Prospects for Emerging Therapeutic Opportunities. Cancers (Basel) [Internet]. 2023 Feb 1 [cited 2023 Nov 16];15(4). Available from: https://doi.org/10.3390/cancers15041333

100. Poto R, Gambardella AR, Marone G, Schroeder JT, Mattei F, Schiavoni G, et al. Basophils from allergy to cancer. Front Immunol [Internet]. 2022 Dec

12 [cited 2023 Nov 16];13. Available from: https://doi.org/10.3389/fimmu.2022.1056838

101. Shen WJ, Fu S, Li N, Li LL, Cao ZG, Li C, et al. Decreased mean platelet volume is associated with cervical cancer development. Asian Pac J Cancer Prev [Internet]. 2017 Jul 1 [cited 2023 Nov 16];18(7):1769–72. Available from: https://doi.org/10.22034/APJCP.2017.18.7.1769

102. Abu-Zaid A, Alsabban M, Abuzaid M, Al Omar O, Salem H, Al-Badawi IA. Preoperative thrombocytosis as a prognostic factor in endometrioid-type endometrial carcinoma. Ann Saudi Med [Internet]. 2017 Sep 1 [cited 2023 Nov 16];37(5):393–400. Available from: https://doi.org/10.5144/0256-4947.2017.393

103. Du JQ, Zhang F, Wang CQ, Zhu JF, Xu LX, Yang YH, et al. Effects of peripheral blood neutrophil/lymphocyte ratio levels and their changes on the prognosis of patients with early cervical cancer. Front Oncol [Internet]. 2023 [cited 2023 Nov 16];13. Available from: https://doi.org/10.3389/fonc.2023.1139809

104. Gennigens C, De Cuypere M, Seidel L, Hermesse J, Barbeaux A, Forget F, et al. Correlation between hematological parameters and outcome in patients with locally advanced cervical cancer treated by concomitant chemoradiotherapy. Cancer Med [Internet]. 2020 Nov 1 [cited 2023 Nov 16];9(22):8432–43. Available from: https://doi.org/10.1002/cam4.3465

105. Al-Saeed EF, Tunio MA, Al-Obaid O, Abdulla M, Al-Anazi A, Al-Shanifi J, et al. Correlation of pretreatment hemoglobin and platelet counts with clinicopathological features in colorectal cancer in Saudi population. Saudi J Gastroenterol [Internet]. 2014 [cited 2023 Nov 16];20(2):134–8. Available from: https://doi.org/10.4103/1319-3767.129479

106. Rüegg C. Leukocytes, inflammation, and angiogenesis in cancer: fatal attractions. J Leukoc Biol [Internet]. 2006 Jul 18 [cited 2023 Nov 29];80(4):682–4. Available from: https://doi.org/10.1189/jlb.0606394

107. Cerezo-Wallis D, Ballesteros I. Neutrophils in cancer, a love–hate affair. FEBS J [Internet]. 2022 [cited 2023 Nov 29];289(13):3692–703. Available from: https://doi.org/10.1111/febs.16022

108. Bednarska K, Klink M, Sułowska Z, Król E, Głowacka E, Romanowicz H, et al. Analysis of preoperative blood platelet parameters in terms of diversity of epithelial ovarian cancer. Medicine (United States) [Internet]. 2018 Mar 1 [cited 2023 Nov 16];97(12). Available from: https://doi.org/10.1097/MD.0000000000010180

109. Bambace NM, Holmes CE. The platelet contribution to cancer progression. Journal of Thrombosis and Haemostasis [Internet]. 2011 Feb [cited 2023 Nov 16];9(2):237–49. Available from: https://doi.org/10.1111/j.1538-7836.2010.04131.x

110. Dong J, Xue H, An F, Liu Y, Deng W, Gao Q. Correlation between the neutrophil-to-lymphocyte ratio and clinicopathological parameters in epithelial ovarian cancer patients and its effect on prognosis—a retrospective cohort study. Gland Surg [Internet]. 2022 Aug 1 [cited 2023 Nov 16];11(8):1367–73. Available from: https://doi.org/10.21037/gs-22-413

111. Uribe-Querol E, Rosales C. Neutrophils in cancer: Two sides of the same coin. J Immunol Res [Internet]. 2015 [cited 2023 Nov 16];2015. Available from: http://dx.doi.org/10.1155/2015/983698

112. Faria SS, Fernandes PC, Silva MJB, Lima VC, Fontes W, Freitas R, et al. The neutrophil-to-lymphocyte ratio: A narrative review. Ecancermedicalscience [Internet]. 2016 Dec 12 [cited 2023 Nov 16];10(702). Available from: https://doi.org/10.3332/ecancer.2016.702