

DAFTAR PUSTAKA

- Abbas AK, Lichtman AH, Pillai S. Cellular and Molecular Immunology. Elsevier. 2021;8(4): 63-85.
- Abbasifard M, Khorramdelazad H,. The Bio-mission of interleukin-6 in the pathogenesis of COVID-19. Life Sci. 2020;257:1-8.
- Abraham, *et al* 'Time to recovery and its predictors among adults hospitalized with COVID-19: A prospective cohort study in Ethiopia', *PLoS ONE*, 2020. 15(12), 1–11.
- Ali N. Elevated level of C-reactive protein may be an early marker to predict risk for severity of COVID-19. J Med Virol. 2020;92(11):2409– 11.
- Aziz M, Fatima R, Assaly R,. Elevated interleukin-6 and severe COVID-19:A meta-analysis. In Wiley Public Health Emergency Collection.2020:1-4.
- Bajaj V.,Gadi N., Spihlman A.P., Wu S.C., Choi C.H.,and Moulton V.R. Aging, Immunity, and COVID-19: How Age Influences the Host Immune to Coronavirus Infections?.Front Physiol. 2021. 11:571416.
- Bhaskar S, Sinha A, Banach M, Mittoo S, Weissert R, Kass JS, et al. Cytokine Storm in COVID-19 Immunopathological Mechanisms, Clinical Considerations, and Therapeutic Approaches.Front Immunol. 2020;11.
- Bhatraju PK, Ghassemieh BJ, Nicholas M, Kim R, Jerome KR, Nalla AK *et al.*,. COVID-19 in critically ill patients in the Seattle region. In Case series.NEJM. 2020:1-15.
- BPS.2020. *Sumatera Barat Dalam Angka*.
- Candrawati, N. W. and Cassidy, W. R. 'Interpretasi nilai Cycle Threshold (CT) Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) SARS-CoV-2 pada pasien hamil dengan uji antibodi SARS-CoV-2 positif dan COVID-19 asimtomatik', *Intisari Sains Medis*, 2021;12(3):822 - 827.
- Cecere, T. E., Todd, S. M., & Leroith, T. Regulatory T cells in arterivirus and coronavirus infections: do they protect against disease or enhance it?Viruses. 2012;4(5):833-846.
- Cen, Y; Chen, X; Shen, Y; Zhang, XH; Lei, Y; Xu, C; Jiang, et al.,. *Risk Factors for disease progression in patients with mild to moderate Coronavirus disease 2019 a multi centre observational*. Clin Microbiol and Infect. 2020; 26(9): 1242–1247.
- Chen J, Xu X, Hu J, et al. Clinical Course And Risk Factors For Recurrence Of Positive SARS-CoV-2 RNA: A Retrospective Cohort Study From Wuhan, China.PMC. 2020;12(17): 16675–16689.
- de Frel D.L., Atsma D.E., Pijl H., Seidell J.C., Leenen P.J.M., Dik WE.A and van Rossum E.F.C.The Impact of Obesity and Lifestyle on the Immune System Susceptibility to Infections Such as COVID-19. Front Nutr. 2020.7:597600.
- Driggin E, Madhavan MV, Bikdeli B,Chuich T,Laracy J, Bondy-Zoccai G,et al.*Cardiovascular consideration for patients, health care worker and health systems during the Coronavirus disease 2019 (COVID 19) pandemic*. J Am Coll Cardiol.2020;75(18):2352-2371.

- Cruz AS, Frias AM, Oliveira AI, dias L, Matos AR, Carvalho A *et al.*,. Interleukin-6 is a biomarker for the development of fatal severe acute respiratory syndrome coronavirus-2 Pneumonia. *Front Immunol.* 2020; 12:1-10.
- El-Shabrawy M, Alsadik ME, El-Shafei M, Abdelmoaty AA, Alazzouni AS, Esawy MM, et al. Interleukin-6 and C-reactive protein/albumin ratio as predictors of COVID-19 severity and mortality. *Egypt J Bronchol.* 2021;15(1):1–7.
- Escalera, Juan Pablo; Antezana; Lizon, NF; Ferrufino; Maldonado, A; Alanoca, et al.2020. *Risk Factors for mortality in patients with Coronavirus Diseases 2019 (COVID 19) in Bolivia : an analysis of the first 107 confirmed cases.* *Le Infozioni in Medicina*,n.2020;2:238-242.
- Fadl, N., Ali, E. and Salem, T. Z. ‘COVID-19: Risk Factors Associated with Infectivity and Severity’, *Scand J Immunol*, 2021; 93(6):1–14.
- Fara, A., Mitrev, Z., Rosalia, R.A. & Assas, B.M. ‘Cytokine storm and COVID-19: a chronicle of pro-inflammatory cytokines’, *Open Biol*,2020;10(9): 200160
- Farkas J. Pulmcrit. Lymphocyte Ratio (NLR): Free upgrade to your WBC [Internet]. 2019 [cited 2021 Jan 31]. Available from: <https://emcrit.org/pulmcrit/nlr/>.
- Ferdinand K, Batieste T, Fleurestil M. *Contemporary and Future Concepts on Hypertension in Africans: COVID 19 and Beyond.* [J Natl Med Assoc.](#) 2020; 112(3): 315–323.
- Forget P, Khalifa C, Defour JP, Latinne D, Van Pel MC, De Kock M. What is the normal value of the neutrophil-to-lymphocyte ratio? *BMC Res Notes.* 2017;10(1):1–4
- Gao, F. *et al.* ‘Obesity Is a Risk Factor for Greater COVID-19 Severity’, *Diabetes Care*,2020; 43(7):E72–E74.
- Gao, M. *et al.* ‘Associations between body-mass index and COVID-19 severity in 6.9 million people in England: a prospective, community-based, cohort study’, *Lancet Diabetes Endocrinol*, 2021;9(6):350–359.
- Gatbadge T, Peterson BM, Awada J, Buck AS, Ramirez DA, Pinchera B *et al.*, Systematic review and meta analysis of sex specific covid-19 clinical outcomes. In *Frontiers Medicine*2020;1-9.
- Gelzo M, Cacciapuoti S, Pinchera B, De Rosa A, Cerneria G, Scialo F *et al.*. Prognostic role of neutrophil to lymphocyte ratio in COVID-19 Patients: Still valid in patients that had started therapy? In Brief research report article *Front. Public health.*2021:1-7.
- Gennaro, F. Di, Pizzol, D., Marotta, C., Antunes, M., Racalbutto, V., Veronese, N., & Smith, L. Coronavirus Diseases (COVID-19) Current Status and Future Perspectives:A Narrative Review. *International Journal of Environmental Research and Public Health**Environmental Research and Public Health*,2020;7(2690):1–11.
- Gokce MI, Hamidi N, Suer E, Tangal S, Huseynov A, Ibiş A. The neutrophil-to-lymphocyte ratio in clinical practice. *J Can Urol Assoc.* 2016;10(3-4):142.
- Gubernatorova EO, Gorshkova EA, Polinova AI, Drutskaya MS,.IL-6: Relevance for immunopathology of SARS-CoV-2 In *Cytokine and Growth Factor Reviews*, ELSEVIER. 2020;53:13-24.

- Hall JE, Hall ME, editors. Guyton and Hall Textbook of Medical Physiology. 14th ed. Elsevier. 2021.
- Hamid S, Mir MY, Rohela GK. Novel coronavirus disease (COVID-19): a pandemic (epidemiology, pathogenesis and potential therapeutics). *New Microbes New Infect.* 2020;35:100679.
- Hiroshi, S. *et al.* Hubungan antara neutrophil praterapeutik dengan rasio limfosit dan respon patologis terhadap kemoterapi neoadjuvant pada dengankanker kerongkongan. *Jurnal Bedah Dunia.* 2012;36 (3):617–622.
- Hoffmann M, Kleine-Weber H, Schroeder S, Kruger N, Herrier T, Erichsen S, Schiergens TS *et al.*,. *Clinically Proven Protease Inhibitor.* *Cell.*2020; (20):30229-4.
- Huang, C. *et al.* Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet.* 2020;395(10223):497–506.
- Huang I, Pranata R. Lymphopenia in severe coronavirus disease- (COVID-19): Systematic review and meta-analysis. *J Intensive Care* 2020;8(1):1–10.
- Imran, M. M., Ahmed, U., Usman, U., Ali, M., Shaukat, A., & Gul, N. Neutrophil /Lymphocyte Ratio- A Marker of COVID-19 Pneumonia Severity. *Int J Clin Pract.* 2021;75(4):13698.
- Kim SJ, Lee JY, Yang JW, Lee KH, Effenberger M, Szpirt W *et al.*. Immunopathogenesis and treatment of cytokine storm in COVID-19. *Theranostics.* 2021;11(1):316-327.
- Koh HK, Geller AC, Vanderweele TJ. Deaths from COVID-19. *JAMA.* 2020;325(2):1.
- Lagunas-Rangel, F. A. Neutrophil-to-lymphocyte ratio and lymphocyte-to-C-reactive protein ratio in patients with severe coronavirus disease 2019 (COVID-19): A meta-analysis. *J Med Virol.* 2020;92(10): 1733– 1734.
- Lee, J. S., Kim, N. Y., Na, S. H., Youn, Y. H., & Shin, C. S. Reference values of neutrophil-lymphocyte ratio, lymphocyte-monocyte ratio, platelet-lymphocyte ratio, and mean platelet volume in healthy adults in South Korea. *Medicine.* 2018;97(26):1–5.
- Li, B. *et al.* Prevalence and impact of cardiovascular metabolic diseases on COVID-19 in China. *Clin Res Cardiol.* 2020;109(5):531–538.
- Li, G., & Fan, Y. Coronavirus infections and immune responses. *J Med Virol.* 2020;92(4):424-432.
- Li, X. *et al.*. Predictive effects of body mass index on immune reconstitution among HIV-infected HAART users in China. *BMC.* 2019;19(1):1–9.
- Lingeswaran, M., Goyal, T., Ghosh, R., & Suri, S. Inflammation , Immunity and Immunogenetics in COVID-19 : A Narrative Review. *Indian of Clinical Biochemistry.* 2020;35(3):260–273.
- Liu, J., Liu, Y., Xiang, P., Pu, L., Xiong, H., Li, C., Zhang, *et al.*,. Neutrophil-to-lymphocyte ratio predicts severe illness patients with 2019 novel coronavirus in the early stage. *J Transl Med.* 2020;18(1):206-215.
- Liu, Y., Yang, Y., Zhang, C., Huang, F., Wang, F., Yuan, J., *et al.*,. Clinical and biochemical indexes from 2019-nCoV infected patients linked. *Sci China Life Sci.* 2020;63(3):364–374.

- Liu T, Zhang J, Yang Y, Ma H, Li Z, Zhang J, et al. The role of interleukin-6 in monitoring severe case of coronavirus disease 2019. *EMBO Mol Med.* 2020;12(7):e12421.
- Liu F, Li L, Xu M, Wu J, Luo D, Zhu Y, et al. Prognostic value of interleukin-6, C-reactive protein, and procalcitonin in patients with COVID-19. *J Clin Virol.* 2020;127:104370.
- Long H, Yang AP, Liu JP, Tao WG, Li HM,. The diagnostic and predictive of role of NLR, d-NLR and PLR in COVID-19 patients. *Int Immunopharmacol.* 2020;84:1-7.
- Luan YY, Yao YM. The clinical significance and potential role of C- reactive protein in chronic inflammatory and neurodegenerative diseases. *Front Immunol.* 2018;9:1–8.
- Martines, R. B. *et al.* Pathology and pathogenesis of SARS-CoV-2 associated with fatal coronavirus disease, united states. *Emerg Infect Dis.* 2020;26(9): 2005–2015.
- McGonagle, D., Sharif, K., O'Regan, A., & Bridgewood, C. The Role of Cytokines including Interleukin-6 in COVID-19 induced Pneumonia and Macrophage Activation Syndrome-Like Disease. *Autoimmun Rev.* 2020; 19(6):102537.
- Meng Y, Wu P, Lu W, Liu K, Ma K, Peng Y *et al.*, 2020. Sex specific clinical characteristic and prognosis of coronavirus disease-19 infection in Wuhan, China: A retrospective study of 168 severe patients. In research Article. *Plos Pathogens.* 2020; 1-13.
- Mojtabavi H, Saghazadeh A, Rezaei N,. Interleukin-6 and severe COVID-19: A Systematic review and meta analysis. *Eur Cytokine Netw.* 2020;31(2):44-49
- Mousavizadeh L, Ghasemi S,. Genotype and phenotype of COVID-19: Their roles in pathogenesis. *J Microbiol Immunol Infect.* 2020;54(2):159-163.
- Naushan S. Leukocyte count (WBC). *Medscape [emedicine].* 2015. Available from: <https://emedicine.medscape.com/article/2054452->
- Onder G, Rezza G, Brusaferro S, 2020. Case fatality rate and characteristic of patients dying in relation to COVID-19 in Italy. In *JAMA.* 2020;18 :75-76.
- Ou, X., Liu, Y., Lei, X., Li, P., Mi, D., Ren, L., Wang, J. Characterization of spike glycoprotein of SARS-CoV-2 on virus entry and its immune cross-reactivity with SARS-CoV. *Nat Commun.* 2020;11(1):1620.
- Pimentel GD, Dela Vega MCM, Laviano A. High neutrophil to lymphocyte ratio as a prognostic marker in COVID-19 patients. *Clin Nutr ESPEN.* 2020;40:101–102.
- Ponti G, Maccaferri M, Ruini C, Tomasi A, and Ozben T. Biomarkers associated with COVID-19 disease progression. *Crit Rev Clin Lab Sci.* 2020;57(6):389-399.
- Prabawa. *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.* 2019; 20(3):863–868.
- Pradhan A, Olsson PE,. Sex difference in severity and mortality from COVID- 19: Are males more vulnerables?. In review *biology of sex difference.* *BMC.* 2020:1-11

- Praveen, T. *et al.*. Immune dysregulation in COVID-19 and its therapeutic implication. *J Clin Sci Res.* 2020;20(3):37-41
- Qin, C. *et al.* Dysregulation of Immune Response in Patients With Coronavirus 2019 (COVID-19) in Wuhan, China. *Clin Infect Dis.* 2020;71(15):762-768.
- Ragab, D., Salah Eldin, H., Taeimah, M., Khattab, R. and Salem, R.,. The COVID-19 cytokine storm; what we know so far. *Front Immunol.* 2020;11:1446.
- Ramos-Casals, M., Brito-Zerón, P., López-Guillermo, A., Khamashta, M. A., & Bosch, X. Adult syndrome. *Lancet.* 2014;383(9927):1503-1516.
- Rodriguez-Morales, A. J. *et al.* 'Clinical, laboratory and imaging features of COVID-19: A systematic review and meta-analysis'. *Travel Med Infect Dis.* 2020;34:101623.
- Rosales C. Neutrophil: A cell with many roles in inflammation or several cell types? *Front Physiol.* 2018;9:113.
- Rosenthal, N. *et al.* 'Risk Factors Associated with In-Hospital Mortality in a US National Sample of Patients with COVID-19'. *JAMA Open.* 2020;3(12):1–14.
- Ruiz SJ, Ventura PS, Vazquez JM, Adasme SIG, Garcia MM, Pol PT *et al.*,. Prognostic implication of neutrophil-lymphocyte ratio in COVID-19. In *Original Article.* WILEY. 2020:1-9
- Sabaka P, Koscalova A, Straka I, Hodosy J, Liptak R, Kmotorkova B *et al.*,. Role of interleukin 6 as a predictive factor for a severe course of COVID- 19: retrospective data analysis of patients from a long-term care facility during COVID-19 outbreak. In *Research article.* *BMC Infect Dis.* 2021;21(1):308.
- Samudrala AK, Kumar P, Choudhary R, Thakur N, Wadekar GS, Dayaramani R *et al.*,. Virology, pathogenesis, diagnosis and in-line treatment of COVID- 19. *Eur J Pharmacol.* 2020;883:173375.
- Sayah W, Berkane I, Guermache I, Sabri M, Lakhali FZ, Rahali SY *et al.*,. Interleukin-6, procalcitonin and neutrophil-to-lymphocyte ratio: Potential immune-inflammatory parameters to identify severe and fatal forms of COVID-19. In *Cytokine volume.* 2021;(141):1-8.
- Shah, S. *et al.* Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . *ELSEVIER.* 2020:2020–2022.
- Shen XF. *et al.* Neutrophil dysregulation during sepsis: an overview and update. *J Cell Mol Med.* 2017;21(9):1687–1697
- Sherwood L, Ward C. *Human Physiology: From Cells to Systems* 4th Canadian Edition. 2019. 223–224.
- Shi S, Liu X, Xiao J, Wang H, Chen L, Li J *et al.*,. Prediction of adverse clinical outcomes in patients with coronavirus disease 2019. In *Research Article,* WILEY. 2020:1-9.
- Sun H, Guo P, Zhang L, Wang F. Serum interleukin-6 concentration and the severity of COVID-19 Pneumonia: A retrospective study at a single center in Bengbu City, Anhui Province, China, in January and February 2020. *Med Sci Monit.* 2020;26:e926941.

- Susilo, A., Rumende, C. M., Pitoyo, C. W., Santoso, W. D., Yulianti, M., Sinto, R., ... Yuniastuti, E. Coronavirus Disease 2019 : Tinjauan Literatur Terkini. *Jurnal Penyakit Dalam Indonesia*, 2020; 7(1): 45–67.
- Takahashi T, Ellingson MK, Wong P, Israelow B, Lucas C, White A *et al.*, Sex difference in immuno responses that underlied COVID-19 disease outcomes. *BMJ*. 2020:1-9
- Tanaka T, Narazaki M, Kishimoto T, 2014. IL-6 in inflammation, Immunity and disease. *Cold Spring Harb Perspect Biol*. 2014;6(10):1-15.
- Tank K, Chu KH, Tsang CS. Acute renal impairment in coronavirus-associated severe acute respiratory syndrome. In *Kidney international*. 2020;67:698- 705.
- Tessaro FHG, Ayala TS, Bella LM, Martins JO. *Macrophages from atype 1 diabetes mellitus mouse model present dysregulated P13K/AKT, ERK 1/2 AND SAPK/JNK Levels*. *Immunobiology*. 2020;225(2):1
- Tonglolangi, O. S., Pratinigrum, M. and Yadi, Y. Hubungan Nilai Ct Pada Pemeriksaan Real-Time Rt-Pcr Sars-Cov-2 Dengan Gejala Klinis'. *Jurnal Kedokteran Mulawarman*. 2021;8(3):89.
- Touyz RM, Li H, Delles C. ACE2 the Janus Faced Protein-From Cardiovasculer Protection to Severe Acute respiratory Syndrom Coronavirus and COVID 19. *Clinical Science*: 2020;134:747-50.
- Trunfio, M. *et al.* Diagnostic SARS-CoV-2 Cycle Threshold Value Predicts Disease Severity, Survival, and Six-Month Sequelae in COVID-19 Symptomatic Patients. *Viruses*. 2021;13(2):281.
- Vafadar Moradi E, Teimouri A, Rezaee R, Morovatdar N, Foroughian M, Layegh P, *et al.* Increased age, neutrophil-to-lymphocyte ratio (NLR) and white blood cells count are associated with higher COVID-19 mortality. *Am J Emerg Med*. 2021;40:11–14.
- Velavan T, Meyer C,. Mild versus severe COVID-19: Laboratory markers. *Int J Infect Dis*. 2020;95:304-307.
- Wang, Y. *et al.* Detectable serum SARS-CoV-2 viral load (RNAemia) is closely associated with drastically elevated interleukin 6 (IL-6) level in critically ill COVID-19 patients. *Clin Infect Dis*. 2020;1(165):1–13.
- Wang, Y. *et al.* 'NOTE: This preprint reports new research that has not been certified by peer review and should not be used to guide clinical practice. 1'. *medRxiv*. 2021;1(165):1–13.
- Wang, Z. *et al.* 'What are the risk factors of hospital length of stay in the novel coronavirus pneumonia (COVID-19) patients? A survival analysis in southwest China'. *PLoS ONE*. 2022;17(1):14–23.
- WHO . WHO-convened Global Study of Origins of SARS-CoV-2 : China Part (14 January-10 February 2021). Joint WHO-China Study Team report. 2021:120.
- Yang, J., Zheng, Y., Gou, X., Pu, K., Chen, Z., Guo, Q., Ji, R., Wang, H., Wang, Y., & Zhou, Y. Prevalence of comorbidities and its effects in coronavirus disease 2019 patients: A systematic review and meta-analysis. *Int J Infect Dis*. 2020;94:91–95.

- Yao, Y. *et al.* D-dimer as a biomarker for disease severity and mortality in COVID-19 patients: A case control study. *Journal of Intensive Care* 2020;8(1):1–11.
- Ye Q, Wang B, Mao J. The pathogenesis and treatment of the ‘Cytokine Storm’ in COVID-19. *J Infect.* 2020;80(6):607–613.
- Yusra, Y., & Pangestu, N. Pemeriksaan Laboratorium pada Coronavirus Disease 2019 (COVID-19). *Medica Hospitalia. J Med.* 2020;7(1A):304–319.
- Zahorec R. Ratio of Neutrophil to Lymphocyte Counts Rapid and Simple Parameter of Systemic Inflammation and Stress in Critically Ill. *Bratisl Lek Listy.* 2021; 102(1): 5-14
- Zhang, L. *et al.* D-dimer levels on admission to predict in-hospital inpatients with Covid-19. *J Thromb Haemost.* 2020; 18(6):1324–1329.
- Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, Cao B. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet.* 2020;395(10229):1054-1062.
- Zhu Z, Cai T, Fan L, Lou K, Hua X, Huang Z, 2020. Clinical value of immune-inflammatory parameters to asses the severity of coronavirus disease 2019. *Int J Infect Dis.* 2020;95:332-339.



