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DAFTAR PUSTAKA

Aathmika Nandan, Yi Mei Zhou, Demoe, L., Waheed, A., Jain, P. and Widjaja, E. (2023). Incidence and risk factors of post-stroke seizures and epilepsy: systematic review and meta-analysis. *Journal of international medical research*, 51(11). doi:https://doi.org/10.1177/03000605231213231.

Abdussamed Vural, Turgut Dolanbay and Hilal Yagar (2025). Hemoglobin, albumin, lymphocyte and platelet (HALP) score for predicting early and late mortality in elderly patients with proximal femur fractures. *PLOS ONE*, [online] 20(1), p.e0313842. doi:https://doi.org/10.1371/journal.pone.0313842.

Azzahra, V. and Ronoatmodjo, S. (2022) 'Faktor-Faktor yang Berhubungan dengan Kejadian Stroke pada Penduduk Usia >15 Tahun di Provinsi Daerah Istimewa Yogyakarta (Analisis Riskesdas 2018)', Jurnal Epidemiologi Kesehatan Indonesia, 6(2). Available at: https://scholarhub.ui.ac.id/epidkes/vol6/iss2/6/

Bao, Y. *et al.* (2022) 'Malnutrition and the Risk of Early Neurological Deterioration in Elderly Patients with Acute Ischemic Stroke', Neuropsychiatric Disease and Treatment, 18, pp. 1779–1787. doi: 10.2147/NDT.S366851.

Bellwald, S., Balasubramaniam, R., Nagler, M., Burri, M.S., Fischer, S.D.A., Hakim, A., Dobrocky, T., Yu, Y., Scalzo, F., Heldner, M.R., Wiest, R., Mono, M.-L., Sarikya, H., El-Koussy, M., Mordasini, P., Fischer, U., Schroth, G., Gralla, J., Mattle, H.P. and Arnold, M. (2018). Association of anemia and hemoglobin decrease during acute stroke treatment with infarct growth and clinical outcome. *PLOS ONE*, 13(9), p.e0203535. doi:https://doi.org/10.1371/journal.pone.0203535.

Bersano, A. and Gatti, L. (2023). Pathophysiology and Treatment of Stroke: Present Status and Future Perspectives. International journal of molecular sciences, 24(19), 14848. https://doi.org/10.3390/ijms241914848.

Bouillanne, O., Morineau, G., Dupont, C., Coulombel, I., Vincent, J.-P., Nicolis, I., Benazeth, S., Cynober, L. and Aussel, C. (2005). Geriatric Nutritional Risk Index: a new index for evaluating at-risk elderly medical patients. The American Journal of Clinical Nutrition, 82(4), pp.777–783. doi:https://doi.org/10.1093/ajcn/82.4.777.

Bouziana, S.D. and Tziomalos, K. (2011). Malnutrition in Patients with Acute Stroke. Journal of Nutrition and Metabolism, [online] 2011, pp.1–7. doi:https://doi.org/10.1155/2011/167898.

Candelario-Jalil, E., Dijkhuizen, R.M. and Magnus, T. (2022). Neuroinflammation, Stroke, Blood-Brain Barrier Dysfunction, and Imaging Modalities. Stroke, 53(5). doi:https://doi.org/10.1161/strokeaha.122.036946.

UNIVERSITAS
GADJAH MADA
Hubungan Hemoglobin, Albumin, Lymphocyte, Platelet (HALP) Score terhadap Early Neurological Deterioration (END) pada Pasien Stroke Iskemik Akut di RSUP Dr. Sardjito Yogyakarta
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Cecchini, M., Filippini, T., Whelton, P.K., Iamandii, I., Silvia Di Federico, Boriani, G. and Vinceti, M. (2024). Alcohol Intake and Risk of Hypertension: A Systematic Review and Dose-Response Meta-Analysis of Nonexperimental Cohort Studies. *Hypertension*, 81(8). doi:https://doi.org/10.1161/hypertensionaha.124.22703.

Chalos, V., van der Ende, N.A.M., Lingsma, H.F., Mulder, M.J.H.L., Venema, E., Dijkland, S.A., Berkhemer, O.A., Yoo, A.J., Broderick, J.P., Palesch, Y.Y., Yeatts, S.D., Roos, Y.B.W.E.M., van Oostenbrugge, R.J., van Zwam, W.H., Majoie, C.B.L.M., van der Lugt, A., Roozenbeek, B., Dippel, D.W.J., Berkhemer, O.A. and Fransen, P.S.S. (2020). National Institutes of Health Stroke Scale. *Stroke*, 51(1), pp.282–290. doi:https://doi.org/10.1161/strokeaha.119.026791.

Chen, S., Huang, Z., Qi, J., Wei, B., E, Y., Liu, C., Zhang, Y. and Zhang, X. (2025). Low hemoglobin, albumin, lymphocyte, and platelet score increases symptomatic intracranial hemorrhage risk in thrombectomy patients. *Frontiers in Neurology*, 16. doi:https://doi.org/10.3389/fneur.2025.1588875.

Desai, A., Oh, D., Rao, E.M., Sahoo, S., Mahajan, U.V., Labak, C.M., Rohit Mauria, Shah, V.S., Nguyen, Q., Herring, E., Elder, T., Stout, A. and Shammassian, B.H. (2023). Impact of anemia on acute ischemic stroke outcomes: A systematic review of the literature. *Impact of anemia on acute ischemic stroke outcomes: A systematic review of the literature*, 18(1), pp.e0280025–e0280025. doi:https://doi.org/10.1371/journal.pone.0280025.

Di Vincenzo, O., Luisi, M. L. E., Alicante, P., Ballarin, G., Biffi, B., Gheri, C. F., & Scalfi, L. (2023). The Assessment of the Risk of Malnutrition (Undernutrition) in Stroke Patients. Nutrients, 15(3), 683. https://doi.org/10.3390/nu15030683.

Geng, H.-H., Wang, Q., Li, B., Cui, B.-B., Jin, Y.-P., Fu, R.-L., Zhang, Q., Wang, J.-J. and Wang, P.-X. (2017). Early neurological deterioration during the acute phase as a predictor of long-term outcome after first-ever ischemic stroke. Medicine, 96(51), p.e9068. doi:https://doi.org/10.1097/md.0000000000009068.

Chua, Z.X., Yeh Lai Amanda, C., Lam, T.J.R., Ong, J.S.P., Lim, S.Y.W., Kumar, S., Lim, M.J.R., Tan, B.Y.Q., Aik, J. and Ho, A.F.W. (2024). Impact of smoke-free legislation on stroke risk: A systematic review and meta-analysis. *European Stroke Journal*. doi:https://doi.org/10.1177/23969873241293566.

DávalosA., Toni, D., Iweins, F., Lesaffre, E., Bastianello, S. and Castillo, J. (1999). Neurological Deterioration in Acute Ischemic Stroke. *Stroke*, 30(12), pp.2631–2636. doi:https://doi.org/10.1161/01.str.30.12.2631.

UNIVERSITAS
GADJAH MADA
Hubungan Hemoglobin, Albumin, Lymphocyte, Platelet (HALP) Score terhadap Early Neurological Deterioration (END) pada Pasien Stroke Iskemik Akut di RSUP Dr. Sardjito Yogyakarta
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Farag, C.M., Antar, R., Akosman, S., Ng, M. and Whalen, M.J. (2023). What is hemoglobin, albumin, lymphocyte, platelet (HALP) score? A comprehensive literature review of HALP's prognostic ability in different cancer types. *Oncotarget*, 14(1), pp.153–172. doi:https://doi.org/10.18632/oncotarget.28367.

Gorgui, J., Gorshkov, M., Khan, N. and Daskalopoulou, S.S. (2014). Hypertension as a Risk Factor for Ischemic Stroke in Women. *Canadian Journal of Cardiology*, 30(7), pp.774–782. doi:https://doi.org/10.1016/j.cjca.2014.01.007.

Ha, S.H. and Kim, B.J. (2024). Dyslipidemia Treatment and Cerebrovascular Disease: Evidence Regarding the Mechanism of Stroke. *Journal of Lipid and Atherosclerosis*, 13(2), pp.139–139. doi:https://doi.org/10.12997/jla.2024.13.2.139.

Hong, J.M., Kim, D.S. and Kim, M. (2021). Hemorrhagic Transformation After Ischemic Stroke: Mechanisms and Management. *Frontiers in Neurology*, 12. doi:https://doi.org/10.3389/fneur.2021.703258.

Huang, H., Zhang, J., Lin, J., & Shi, S. (2024). Efficacy and safety of mesenchymal stem cells in patients with acute ischemic stroke: a meta-analysis. BMC neurology, 24(1), 48. https://doi.org/10.1186/s12883-024-03542-1.

Huang, Z.-X., Huang, Y., Zeng, J., Hao, H., Petroski, G.F., Lu, H., Liu, X. and Liu, Z. (2020) 'Admission glucose levels may increase the risk for early neurological deterioration in females with acute ischemic stroke', *Frontiers in Neurology*, 11, 548892. doi:10.3389/fneur.2020.548892.

Hui, C., Tadi, P. and Patti, L. (2024). *Ischemic stroke*. [online] National Library of Medicine. Available at: https://www.ncbi.nlm.nih.gov/books/NBK499997/.

Huppertz, V., Guida, S., Holdoway, A., Strilciuc, S., Baijens, L., Schols, J.M.G.A., van Helvoort, A., Lansink, M. and Muresanu, D.F. (2022). Impaired Nutritional Condition After Stroke From the Hyperacute to the Chronic Phase: A Systematic Review and Meta-Analysis. *Frontiers in Neurology*, 12. doi:https://doi.org/10.3389/fneur.2021.780080.

Imam, Y.Z., Chandra, P., Singh, R., Hakeem, I., Sally Al Sirhan, Kotob, M., Akhtar, N., Kamran, S., Salman Al Jerdi, Muhammad, A., Khawaja Hasan Haroon, Hussain, S., Perkins, J.D., Osama Elalamy, Alhatou, M., Ali, L., Abdelmoneim, M.S., Joseph, S., Morgan, D. and Ryan Ty Uy (2024). Incidence, clinical features, and outcomes of posterior circulation ischemic stroke: insights from a large multiethnic stroke database. *Frontiers in Neurology*, 15. doi:https://doi.org/10.3389/fneur.2024.1302298.

Iqbal, A.M. and Jamal, S.F. (2023). Essential hypertension. [online] National Library of Medicine. Available at: https://www.ncbi.nlm.nih.gov/books/NBK539859/.

UNIVERSITAS
GADJAH MADA
Hubungan Hemoglobin, Albumin, Lymphocyte, Platelet (HALP) Score terhadap Early Neurological Deterioration (END) pada Pasien Stroke Iskemik Akut di RSUP Dr. Sardjito Yogyakarta
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

J, K., Hh, R., O, H. and Z, S. (2003). Nutritional Risk Screening (NRS 2002): A New Method Based on an Analysis of Controlled Clinical Trials. [online] Clinical nutrition (Edinburgh, Scotland). Available at: https://pubmed.ncbi.nlm.nih.gov/12765673/.

Javed, N., Hanif, H., Sachidanantham, A., Tanveer, T., Khan, M., Mehboob, S., Sadikan, M.Z. and Maryam, S. (2026). Correlation and Prognostic Significance of the Hemoglobin, Albumin, Lymphocyte, and Platelet (HALP) Score in Acute Ischemic Stroke Survivors. *Cureus*. [online] doi:https://doi.org/10.7759/cureus.102355.

Jin, D., Yang, J., Zhu, H., Wu, Y., Liu, H., Wang, Q., Zhang, X., Dong, Y., Luo, B., Shan, Y., Zhang, L., Wang, P. and Du, J. (2023). Risk factors for early neurologic deterioration in single small subcortical infarction without carrier artery stenosis: predictors at the early stage. *BMC Neurology*, [online] 23(1). doi:https://doi.org/10.1186/s12883-023-03128-3.

Kazumitsu Nawata (2023). Risk factors for heart, cerebrovascular, and kidney diseases: evaluation of potential side effects of medications to control hypertension, hyperglycemia, and hypercholesterolemia. *Frontiers in cardiovascular medicine*, 10. doi:https://doi.org/10.3389/fcvm.2023.1103250.

Kesari, A. and Noel, J.Y. (2023). Nutritional Assessment. [online] PubMed. Available at:https://www.ncbi.nlm.nih.gov/books/NBK580496/.

Khattak, S., Townend, J.N. and Thomas, M.R. (2024). Impact of antiplatelet therapy on microvascular thrombosis during ST-elevation myocardial infarction. *Frontiers in Molecular Biosciences*, 11. doi:https://doi.org/10.3389/fmolb.2024.1287553.

Kroc, Ł., Fife, E., Piechocka-Wochniak, E., Sołtysik, B. and Kostka, T. (2021). Comparison of Nutrition Risk Screening 2002 and Subjective Global Assessment Form as Short Nutrition Assessment Tools in Older Hospitalized Adults. Nutrients, 13(1), p.225. doi:https://doi.org/10.3390/nu13010225.

Lee, S.Y., Kim, D.Y., Sohn, M.K., Lee, J., Lee, S.-G., Shin, Y.-I., Kim, S.-Y., Oh, G.-J., Lee, Y.H., Lee, Y.-S., Joo, M.C., Lee, S.Y., Ahn, J., Chang, W.H., Choi, J.Y., Kang, S.H., Kim, I.Y., Han, J. and Kim, Y.-H. (2020). Determining the cut-off score for the Modified Barthel Index and the Modified Rankin Scale for assessment of functional independence and residual disability after stroke. PLOS ONE, 15(1), p.e0226324. doi:https://doi.org/10.1371/journal.pone.0226324.

Li, X.-Y., Kong, X.-M., Yang, C.-H., Cheng, Z.-F., Jia-Jie Lv, Guo, H. and Liu, X.-H. (2024). Global, regional, and national burden of ischemic stroke, 1990–2021: an analysis of data from the global burden of disease study

UNIVERSITAS
GADJAH MADA
Hubungan Hemoglobin, Albumin, Lymphocyte, Platelet (HALP) Score terhadap Early Neurological Deterioration (END) pada Pasien Stroke Iskemik Akut di RSUP Dr. Sardjito Yogyakarta
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

2021. EClinicalMedicine, [online] 75, pp.102758–102758. doi:https://doi.org/10.1016/j.eclinm.2024.102758.

Lin, Y.-J., Guo, A.-B., Huang, M.-M., Liang, X., Xie, Y. and Li, L.-L. (2025). Clinical application of the HALP score for predicting early neurological deterioration in older patients with acute cerebral infarction. *Biomedical Reports*, [online] 24(2), pp.1–9. doi:https://doi.org/10.3892/br.2025.2097.

Liu, H., Zhang, F., Li, Y., Liu, L., Song, X., Wang, J., Dang, Y. and Qi, X. (2024). The HALP score predicts no-reflow phenomenon and long-term prognosis in patients with ST-segment elevation myocardial infarction after primary percutaneous coronary intervention. *Coronary Artery Disease*, [online] 36(4), pp.273–280. doi:https://doi.org/10.1097/mca.0000000000001446.

Lu, H., Wang, C., Yang, M., Lin, Y. and Jiang, W. (2025). Admission monocyte-to-albumin ratio predicts 3-month functional outcomes after acute ischemic stroke: a retrospective cohort study. *Frontiers in Neurology*, 16. doi:https://doi.org/10.3389/fneur.2025.1705544.

Mekala, K.C. and Bertoni, A.G. (2020). Chapter 4 - Epidemiology of diabetes mellitus. [online] ScienceDirect. Available at: https://www.sciencedirect.com/science/article/abs/pii/B9780128148334000046

Menteri Kesehatan Republik Indonesia. Pedoman Nasional Pelayanan Kedokteran Tata Laksana Stroke. Menteri Kesehatan Republik Indonesia, editor. 2019

Miano, N., Di Marco, M., Alaimo, S., Coppolino, G., L'Episcopo, G., Leggio, S., Scicali, R., Piro, S., Purrello, F. and Di Pino, A. (2023). Controlling Nutritional Status (CONUT) Score as a Potential Prognostic Indicator of In-Hospital Mortality, Sepsis and Length of Stay in an Internal Medicine Department. Nutrients, 15(7), p.1554. doi:https://doi.org/10.3390/nu15071554.

Mistry, E.A., Yeatts, S.D., Khatri, P., Mistry, A.M., Detry, M., Viele, K., Harrell, F.E. and Lewis, R.J. (2022). National Institutes of Health Stroke Scale as an Outcome in Stroke Research: Value of ANCOVA Over Analyzing Change From Baseline. Stroke, 53(4). doi:https://doi.org/10.1161/strokeaha.121.034859.

Mohanty, S., Tripathi, B., Bhatia, K., Gupta, B. and Mittal, M. (2015). Predictors of early neurological deterioration in patients with acute ischaemic stroke with special reference to blood urea nitrogen (BUN)/creatinine ratio & urine specific gravity. Indian Journal of Medical Research, 141(3), p.299. doi:https://doi.org/10.4103/0971-5916.156564.

Mosenzon, O., Cheng, A.Y., Rabinstein, A.A. and Sacco, S. (2023). Diabetes and Stroke: What Are the Connections? *Journal of Stroke*, [online] 25(1), pp.26–38. doi:https://doi.org/10.5853/jos.2022.02306.

UNIVERSITAS
GADJAH MADA
Hubungan Hemoglobin, Albumin, Lymphocyte, Platelet (HALP) Score terhadap Early Neurological Deterioration (END) pada Pasien Stroke Iskemik Akut di RSUP Dr. Sardjito Yogyakarta
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Motokawa, K., Yasuda, J., Mikami, Y., Edahiro, A., Morishita, S., Shirobe, M., Ohara, Y., Nohara, K., Hirano, H. and Watanabe, Y. (2020). The Mini Nutritional Assessment-Short Form as a predictor of nursing home mortality in Japan: A 30-month longitudinal study. Archives of Gerontology and Geriatrics, [online] 86, p.103954. doi:https://doi.org/10.1016/j.archger.2019.103954.

Mount, C.A. and Das, J.M. (2023) 'Cerebral Perfusion Pressure', in StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing.

Nieboer, D., van der Ploeg, T. and Steyerberg, E.W. (2016). Assessing Discriminative Performance at External Validation of Clinical Prediction Models. *PLOS ONE*, 11(2), p.e0148820. doi:https://doi.org/10.1371/journal.pone.0148820.

Nguyen, D.T., Mai, T.D., Dao, P.V., Ha, H.T., Fabus, M., Fleming, M. and Tran, M.C. (2025) 'Early neurological deterioration in patients with minor stroke: A single-center study conducted in Vietnam', *PLOS ONE*, 20(5), e0323700. doi:10.1371/journal.pone.0323700.

Nogles T.E., Galuska M.A. (2023), 'Middle cerebral artery stroke. StatPearls. StatPearls Publishing

Ozturk, U., Sebnem Nergiz and Ozturk, O. (2024). 'The Association Between HALP Score and Infection in Acute Ischemic Stroke Patients'. *Journal of Stroke and Cerebrovascular Diseases*, pp.107929–107929. doi:https://doi.org/10.1016/j.jstrokecerebrovasdis.2024.107929.

Pan, B., Jin, X., Jun, L., Qiu, S., Zheng, Q. and Pan, M. (2019). The relationship between smoking and stroke. *Medicine*, [online] 98(12). doi:https://doi.org/10.1097/md.0000000000014872.

Pappan, N., Rehman, A. and Awosika, A.O. (2024). *Dyslipidemia*. [online] PubMed. Available at: https://www.ncbi.nlm.nih.gov/books/NBK560891/.

Pelin Aladag and Ahmet Avci (2025). The brand-new predictor index of fulminant process in patients with acute myocarditis: hemoglobin, albumin, lymphocyte and platelet (HALP) score. *Frontiers in Nutrition*, 12. doi:https://doi.org/10.3389/fnut.2025.1674368.

Pereira, D.F.C., Parron Fernandes, K.B., Aguiar, A.F. and Casonatto, J. (2024). The Impact of Undernutrition Risk on Rehabilitation Outcomes in Ischemic Stroke Survivors: A Hospital-Based Study. Brain & Neurorehabilitation, 17(1).doi:https://doi.org10.12786/bn.2024.17.e7.

Pop, N., Tit, D., Diaconu, C., Munteanu, M., Babes, E., Stoicescu, M., Popescu, M. and Bungau, S. (2021). The Alberta Stroke Program Early CT score (ASPECTS): A predictor of mortality in acute ischemic stroke. Experimental and Therapeutic Medicine, 22(6). doi:https://doi.org/10.3892/etm.2021.10805.

UNIVERSITAS
GADJAH MADA
Hubungan Hemoglobin, Albumin, Lymphocyte, Platelet (HALP) Score terhadap Early Neurological Deterioration (END) pada Pasien Stroke Iskemik Akut di RSUP Dr. Sardjito Yogyakarta
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Ramesh, N., Rangan, A., Thirugnanam, G., Kalappan, M. (2024). Correlation of Hemoglobin, Albumin, Lymphocyte, and Platelets (HALP) Score With Outcome of Acute Ischemic Stroke. Cureus. doi:https://doi.org/10.7759/cureus.67979.

Rashid, A.S., Huang-Link, Y., Johnsson, M., Wetterhäll, S. and Gauffin, H. (2022). Predictors of Early Neurological Deterioration and Functional Outcome in Acute Ischemic Stroke: The Importance of Large Artery Disease, Hyperglycemia and Inflammatory Blood Biomarkers. *Neuropsychiatric Disease and Treatment*, [online] 18, pp.1993–2002. doi:https://doi.org/10.2147/NDT.S365758.

Rhodes, C.E. and Varacallo, M. (2022). *Physiology, oxygen transport*. [online] PubMed. Available at: https://www.ncbi.nlm.nih.gov/books/NBK538336/.

Roy-O'Reilly, M. and McCullough, L.D. (2018). Age and Sex Are Critical Factors in Ischemic Stroke Pathology. *Endocrinology*, [online] 159(8), pp.3120–3131. doi:https://doi.org/10.1210/en.2018-00465.

Ryu, J.C., Bae, J.H., Ha, S.H., Chang, J.Y. and Kang, D.W. *et al.* (2022) 'Blood pressure variability and early neurological deterioration according to the chronic kidney disease risk categories in minor ischemic stroke patients', *PLOS ONE*, 17(9), e0274180. doi:10.1371/journal.pone.0274180.

Sabbouh, T. and Torbey, M.T. (2017). Malnutrition in Stroke Patients: Risk Factors, Assessment, and Management. Neurocritical Care, [online] 29(3), pp.374–384. doi:https://doi.org/10.1007/s12028-017-0436-1.

Sadri, S. and Burcu Tunay (2024). Is HALP score a predictor of poor prognosis in patients with hematologic malignancies admitted to the intensive care unit? *The Egyptian Journal of Internal Medicine*, 36(1). doi:https://doi.org/10.1186/s43162-024-00339-z.

Scridon, A. (2022). Platelets and Their Role in Hemostasis and Thrombosis—From Physiology to Pathophysiology and Therapeutic Implications. *International Journal of Molecular Sciences*, [online] 23(21), p.12772. doi:https://doi.org/10.3390/ijms232112772.

Serón-Arbeloa, C., Labarta-Monzón, L., Puzo-Foncillas, J., Mallor-Bonet, T., Lafita-López, A., Bueno-Vidales, N., & Montoro-Huguet, M. (2022). Malnutrition Screening and Assessment. Nutrients, 14(12), 2392. https://doi.org/10.3390/nu14122392

Shahab F, Hunaifi I, Subagiartha IW. A Hemichorea and Hemiplegy as a Clinical Manifestation of Acute Ischemic Stroke. Jurnal Kedokteran [Internet]. 2020 [cited 2023 Sep 15];9(4):264–7. Available from: https://jku.unram.ac.id/index.php/jk/article/view/435/302.

UNIVERSITAS
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Hubungan Hemoglobin, Albumin, Lymphocyte, Platelet (HALP) Score terhadap Early Neurological Deterioration (END) pada Pasien Stroke Iskemik Akut di RSUP Dr. Sardjito Yogyakarta
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Sharma, Y., Avina, P., Ross, E., Horwood, C., Hakendorf, P. and Thompson, C. (2022). Validity of the Malnutrition Universal Screening Tool for Evaluation of Frailty Status in Older Hospitalised Patients. Gerontology and Geriatric Medicine, [online] 8, p.233372142211078. doi:https://doi.org/10.1177/23337214221107817.

Shi, H.-X., Li, C., Zhang, Y.-Q., Li, X., Liu, A.-F., Liu, Y.-E., Jiang, W.-J. and Lv, J. (2023). Predictors of Early Neurological Deterioration Occurring within 24 h in Acute Ischemic Stroke following Reperfusion Therapy: A Systematic Review and Meta-Analysis. *Journal of Integrative Neuroscience*, 22(2). doi:https://doi.org/10.31083/j.jin2202052.

Shimazu, S., Yoshimura, Y., Kudo, M., Nagano, F., Bise, T., Shiraishi, A. and Sunahara, T. (2021). Frequent and personalized nutritional support leads to improved nutritional status, activities of daily living, and dysphagia after stroke. *Nutrition*, 83(1), p.111091. doi:https://doi.org/10.1016/j.nut.2020.111091.

Siegler, J.E., Samai, A., Semmes, E. and Martin-Schild, S. (2016). Early Neurologic Deterioration after Stroke Depends on Vascular Territory and Stroke Etiology. *Journal of Stroke*, 18(2), pp.203–210. doi:https://doi.org/10.5853/jos.2016.00073.

Soysal, P., Veronese, N., Arik, F., Kalan, U., Smith, L. and Isik, A.T. (2019). Mini Nutritional Assessment Scale-Short Form can be useful for frailty screening in older adults. Clinical Interventions in Aging, Volume 14, pp.693–699. doi:https://doi.org/10.2147/cia.s196770.

Stratton, R.J., King, C.L., Stroud, M.A., Jackson, A.A. and Elia, M. (2006). 'Malnutrition Universal Screening Tool' predicts mortality and length of hospital stay in acutely ill elderly. British Journal of Nutrition, [online] 95(2), pp.325–330. doi:https://doi.org/10.1079/bjn20051622.

Sun, Y. and Langer, H.F. (2022). Platelets, Thromboinflammation and Neurovascular Disease. *Frontiers in Immunology*, 13. doi:https://doi.org/10.3389/fimmu.2022.843404.

Tadi, P. and Lui, F. (2024). Acute Stroke. [online] PubMed. Available at: https://www.ncbi.nlm.nih.gov/books/NBK535369/#article-17174.s2.

Takada, M., Yamagishi, K., Muraki, I., Shimizu, Y., Tanaka, M., Kihara, T., Umesawa, M., Imano, H., Sankai, T., Okada, T., Kitamura, A., Kiyama, M. and Iso, H. (2025). Risk of stroke accompanying alcohol consumption with or without single-occasion drinking. *Alcohol, Clinical and Experimental Research*. doi:https://doi.org/10.1111/acer.70046.

UNIVERSITAS
GADJAH MADA
Hubungan Hemoglobin, Albumin, Lymphocyte, Platelet (HALP) Score terhadap Early Neurological Deterioration (END) pada Pasien Stroke Iskemik Akut di RSUP Dr. Sardjito Yogyakarta
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Tawil, S.E. and Muir, K.W. (2017). Thrombolysis and thrombectomy for acute ischaemic stroke. *Clinical Medicine*, [online] 17(2), pp.161–165. doi:https://doi.org/10.7861/clinmedicine.17-2-161.

Tevik, K., Thürmer, H., Husby, M.I., de Soysa, A.K. and Helvik, A.-S. (2015). Nutritional risk screening in hospitalized patients with heart failure. Clinical Nutrition, 34(2), pp.257–264. doi:https://doi.org/10.1016/j.clnu.2014.03.014.

Tian, M., Li, Y., Wang, X., Tian, X., Pei, L. L., Wang, X., Zhang, L., Sun, W., Wu, J., Sun, S., Ning, M., Buonanno, F., Xu, Y., & Song, B. (2021). The Hemoglobin, Albumin, Lymphocyte, and Platelet (HALP) Score Is Associated With Poor Outcome of Acute Ischemic Stroke. Frontiers in neurology, 11, 610318. https://doi.org/10.3389/fneur.2020.610318.

Tian, T., Wang, L., Xu, J., Jia, Y., Xue, K., Huang, S., Shen, T., Luo, Y., Li, S. and Min, L. (2023). Prediction of early neurological deterioration in acute ischemic stroke patients treated with intravenous thrombolysis. *Journal of Cerebral Blood Flow & Metabolism*, [online] 43(12), pp.2049–2059. doi:https://doi.org/10.1177/0271678x231200117.

Tsalamandris, G., Hadjivassiliou, M., & Zis, P. (2023). The Role of Nutrition in Neurological Disorders. Nutrients, 15(22), 4713. https://doi.org/10.3390/nu15224713.

Vermeij, F.H., Scholte op Reimer, W.J.M., de Man, P., van Oostenbrugge, R.J., Franke, C.L., de Jong, G., de Kort, P.L.M. and Dippel, D.W.J. (2009). Stroke-Associated Infection Is an Independent Risk Factor for Poor Outcome after Acute Ischemic Stroke: Data from the Netherlands Stroke Survey. *Cerebrovascular Diseases*, 27(5), pp.465–471. doi:https://doi.org/10.1159/000210093.

Viviënne A. L. Huppertz, Pilz, W., Pilz, G., de, M., A. van Helvoort, J. M. G. A. Schols and Laura (2022). Malnutrition risk and oropharyngeal dysphagia in the chronic post-stroke phase. 13. doi:https://doi.org/10.3389/fneur.2022.939735.

Wang, Q. *et al*. (2023) 'Association of atherogenic index of plasma with early neurological deterioration in patients with acute ischemic stroke,' Clinical Neurology and Neurosurgery, 234, p. 108014. https://doi.org/10.1016/j.clineuro.2023.108014.

Warwick, H., Barber, P.A., Hill, M.D., Sevick, R.J., Demchuk, A.M., Hudon, M.E., Hu, W.Y. and Buchan, A.M. (2001). Use of the Alberta Stroke Program Early CT Score (ASPECTS) for Assessing CT Scans in Patients with Acute Stroke. *AJNR: American Journal of Neuroradiology*, [online] 22(8), p.1534. Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC7974585/?utm_source=chatgpt.com.

UNIVERSITAS
GADJAH MADA
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Webb, A.J.S. and Werring, D.J. (2022). New Insights Into Cerebrovascular Pathophysiology and Hypertension. *Stroke*, 53(4). doi:https://doi.org/10.1161/strokeaha.121.035850.

Wei, W., Wu, X., Jin, C., Mu, T., Gu, G., Min, M., Mu, S. and Han, Y. (2021). Predictive Significance of the Prognostic Nutritional Index (PNI) in Patients with Severe COVID-19. Journal of Immunology Research, 2021, pp.1–11. doi:https://doi.org/10.1155/2021/9917302.

Werring, D., Ozkan, H., Fergus Neil Doubal, Dawson, J., Freemantle, N., Hassan, A., Le, S.N., Mallon, D., mendel, R., Markus, H.S., Minhas, J.S. and Webb, A. (2024). Early neurological deterioration in acute lacunar ischaemic stroke: systematic review of incidence, mechanisms, and prospects for treatment. *International Journal of Stroke*. doi:https://doi.org/10.1177/17474930241273685.

World Health Organization (2025) *Stroke*. Available at: https://www.who.int/news-room/fact-sheets/detail/stroke (Accessed: 19 April 2026).

Xie, K., Zhang, C., Nie, S., Kang, S., Wang, Z. and Zhang, X. (2025). Prognostic nutritional index (PNI) as an influencing factor for in-hospital mortality in patients with stroke-associated pneumonia: a retrospective study. PeerJ, [online] 13, pp.e19028–e19028. doi:https://doi.org/10.7717/peerj.19028.

Xie, Y., Xiong, Y., Sun, M., Zhao, Y. and Wu, M. (2024). Research trends in nutritional interventions for stroke: a bibliometric analysis and literature review. *Frontiers in Nutrition*, 11. doi:https://doi.org/10.3389/fnut.2024.1489222.

Xu, J., Zhang, X., Jin, A., Pan, Y., Li, Z., Meng, X. and Wang, Y. (2022). Trends and Risk Factors Associated With Stroke Recurrence in China, 2007-2018. *JAMA Network Open*, [online] 5(6), p.e2216341. doi:https://doi.org/10.1001/jamanetworkopen.2022.16341.

Xu, M., Chen, L., Hu, Y., Wu, J., Wu, Z., Yang, S., Kang, W., He, J. and Ren, W. (2023). The HALP (hemoglobin, albumin, lymphocyte, and platelet) score is associated with early-onset post-stroke cognitive impairment. *Neurological Sciences: Official Journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology*, [online] 44(1), pp.237–245. doi:https://doi.org/10.1007/s10072-022-06414-z.

Yazeed Alshuweishi, Basudan, A.M., Alfaifi, M., Hussam Daghistani and Alfhili, M.A. (2023). Association of the HALP Score with Dyslipidemia: A Large, Nationwide Retrospective Study. *Medicina*, 59(11), pp.2002–2002. doi:https://doi.org/10.3390/medicina59112002.

UNIVERSITAS
GADJAH MADA
Hubungan Hemoglobin, Albumin, Lymphocyte, Platelet (HALP) Score terhadap Early Neurological Deterioration (END) pada Pasien Stroke Iskemik Akut di RSUP Dr. Sardjito Yogyakarta
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Yoon, C.W. and Bushnell, C.D. (2023). Stroke in Women: A Review Focused on Epidemiology, Risk Factors, and Outcomes. *Journal of Stroke*, 25(1), pp.2–15. doi:https://doi.org/10.5853/jos.2022.03468.

Yousufuddin, M. and Young, N. (2019). Aging and Ischemic Stroke. *Aging*, 11(9), pp.2542–2544. doi:https://doi.org/10.18632/aging.101931.

Yu, Q., Mao, X., Zhang, F., Luo, S., Huang, Q., Chen, Q., Li, S., Zhang, J., Qiu, Y., Wu, Y., Pu, F., Hong, D. and Lin, J. (2022). Fasting blood glucose as a predictor of progressive infarction in men with acute ischemic stroke. *Journal of International Medical Research*, 50(10), p.030006052211324-030006052211324. doi:https://doi.org/10.1177/03000605221132416.

Zeng, H., Liu, L., Cai, A., Zhao, W., Liu, Y., Wang, L., Li, H. and Zeng, X. (2024). Prevalence and influencing factors of malnutrition in stroke patients with bulbar paralysis: a cross-sectional study in China. Frontiers in Nutrition, [online] 11. doi:https://doi.org/10.3389/fnut.2024.1392217.

Zhang, X., Zhang, X., Zhu, Y., Tao, J., Zhang, Z., Zhang, Y., Wang, Y., Ke, Y., Ren, C. and Xu, J. (2020). Predictive Value of Nutritional Risk Screening 2002 and Mini Nutritional Assessment Short Form in Mortality in Chinese Hospitalized Geriatric Patients. Clinical Interventions in Aging, Volume 15, pp.441–449. doi:https://doi.org/10.2147/cia.s244910.

Zhu, X., Zhang, Y., Wang, A., Zhang, X., Yu, G., Xiang, S., Wu, Y. and Meng, X. (2025). Association between HALP (hemoglobin, albumin, lymphocyte, and platelet) score and poor outcomes in acute ischemic stroke patients with type 2 diabetes mellitus: a study from the Third China National Stroke Registry. *Frontiers in neurology*, [online] 15, p.1461188. doi:https://doi.org/10.3389/fneur.2024.1461188.

Zierle-Ghosh, A. and Jan, A. (2023). *Physiology, Body Mass Index*. [online] National Library of Medicine. Available at: https://www.ncbi.nlm.nih.gov/books/NBK535456/.

Zuo, L., Dong, Y., Liao, X., Hu, Y., Pan, Y., Yan, H., Wang, X., Wang, W., Wang, Y., Raymond C.S. Seet, Wang, Y. and Li, Z. (2024). Low HALP (Hemoglobin, Albumin, Lymphocyte, and Platelet) Score Increases the Risk of Post-Stroke Cognitive Impairment: A Multicenter Cohort Study. *Clinical Interventions in Aging*, Volume 19, pp.81–92. doi:https://doi.org/10.2147/cia.s432885.