

BAB 5

KESIMPULAN DAN SARAN

5.1 Kesimpulan

Berdasarkan dari kajian pustaka pada 5 jurnal ilmiah terkait efektivitas dan efek samping Molnupiravir pada pasien COVID-19 dapat disimpulkan bahwa:

1. Molnupiravir sebagai antivirus dengan dosis 800 mg dua kali sehari selama 5 hari secara per oral memiliki efektivitas yang baik yaitu dapat mempercepat proses *viral clearance* (9 - 11,7 hari), memperpendek waktu rawat inap (11,5 hari), namun belum signifikan menurunkan nilai *C-reactive protein* (CRP) (1,00 mg/L → 1,46 mg/L).
2. Molnupiravir dilaporkan dapat menyebabkan peningkatan ALT pada 2/77 pasien (1,89%) 1 kali dibawah batas atas ULN ALTyaitu < 40 U/L (dan 1/53 pasien (2,6%), serta gangguan gastrointestinal seperti diare (3,77%, 50%) dan muntah (11,1%) dan peningkatan AST yang tidak signifikan.

5.2 Saran

Berdasarkan hasil kajian pustaka pada lima jurnal ilmiah terkait yang telah dilakukan mengenai efektivitas dan efek samping Molnupiravir pada pasien COVID-19 dapat disarankan agar:

1. Penelitian ini perlu dilakukan penelitian yang lebih lanjut mengenai efektivitas dan efek samping Molnupiravir pada pasien COVID-19.
2. Pada penelitian ini penggunaan Molnupiravir belum didukung oleh *evidence based* yang kuat.

DAFTAR PUSTAKA

- (PDPI), P. D. P. I. 2020, Pneumonia COVID-19 Diagnosis dan Penatalaksanaan Di Indonesia, Perhimpunan Dokter Paru Indonesia, Jakarta.
- Angelina, E., dan Raharjo, S. B. 2022, Molnupiravir dan Nirmatrevir/Ritonavir Sebagai Terapi Oral COVID-19, *JMJ*, **10(1)**: 37-49.
- Azer, S. A. 2020, COVID-19: Pathophysiology, diagnosis, complications and investigational therapeutics, *In New Microbes and New Infections*, **37**: 1-8.
- Bai, Y., Yao, L., Wei, T., Tian, F., Jin, D. Y., Chen, L., and Wang, M. 2020, Presumed Asymptomatic Carrier Transmission of COVID-19, *JAMA - Journal of the American Medical Association*, **323(14)**: 1406–1407.
- Burhan, E., Susanto, A. D., Isbaniah, F., Nasution, S. A., Ginanjar, E., Pitoyo, C. W., Susilo, A., Firdaus, I., Santoso, A., Juzar, D. A., Arif, S. K., Wulung, N. G. H. L., Muchtar, F., Pulungan, A. B., Sjakti, H. A., Prawira, Y., dan Putri, N. D. 2020, PEDOMAN TATALAKSANA COVID-19: Edisi 3. PDPI, PERKI, PAPDI, PERDATIN dan IDAI, Jakarta.
- Burhan, E., Susanto, A. D., Isbaniah, F., Nasution, S. A., Ginanjar, E., Pitoyo, C. W., Susilo, A., Firdaus, I., Santoso, A., Juzar, D. A., Arif, S. K., Wulung, N. G. H. L., Muchtar, F., Pulungan, A. B., Yanuarso, P. B., Sjakti, H. A., Prawira, Y., dan Putri, N. D. 2022, PEDOMAN TATALAKSANA COVID-19: Edisi 4. PDPI, PERKI, PAPDI, PERDATIN dan IDAI, Jakarta.
- Cai, G., Bosse, Y., Xiao, F., Kheradmand, F., and Amos, C. I. 2020, Tobacco Smoking Increases the Lung Gene Expression of ACE2, the Receptor of SARS-CoV-2, *American Journal of Respiratory and Critical Care Medicines*, **201(12)**: 1557-1559.
- Cegolon, L., Pol, R., Simonetti, O., Larese Filon, F., and Luzzati, R. 2023, Molnupiravir, Nirmatrelvir/Ritonavir, or Sotrovimab for High-Risk COVID-19 Patients Infected by the Omicron Variant:

Hospitalization, Mortality, and Time until Negative Swab Test in Real Life, *Pharmaceuticals*, **721 (16)**: 1-26.

Cevik, M., Kuppalli, K., Kindrachuk, J., and Peiris, M. 2020, Virology, Transmission, and Pathogenesis of SARS-CoV-2, *The BMJ*, **371**: 1-6.

Chen, T., Wu, D., Chen, H., Yan, W., Yang, D., Chen, G., Ma, K., Xu, D., Yu, H., Wang, H., Wang, T., Guo, W., Chen, J., Ding, C., Zhang, X., Huang, J., Han, M., Li, S., Luo, X., Zhao, J., and Ning, Q. 2020, Clinical characteristics of 113 deceased patients with coronavirus disease 2019: Retrospective study, *The BMJ*, **368**: 1-12.

Daulay, W., Anhar, C. A., dan Purnama, A. 2023, Analisis D-Dimer dan CRP Pada Pasien COVID-19 dengan Komorbid Diabetes Melitus, *The Journal of Medical Laboratory*, **11(1)**: 54-62.

Del Borgo, C., Garattini, S., Bortignon, C., Carraro, A., Di Trento, D., Gasperin, A., Grimaldi, A., De Maria, S. G., Corazza, S., Tieghi, T., Belvisi, V., Kertusha, B., De Masi, M., D'Onofrio, O., Bagaglini, G., Bonanni, G., Zuccalà, P., Fabietti, P., Tortellini, E., Guardiani, M., Spagnoli, A., Marocco, R., Fegatelli, D. A., and Lichtner, M. 2023, Effectiveness, Tolerability and Prescribing Choice of Antiviral Molecules Molnupiravir, Remdesivir and Nirmatrelvir/r: A Real-World Comparison in the First Ten Months of Use, *Viruses*, **15**: 1-15.

European Medicines Agency. 2022, Use of Molnupiravir For The Treatment Of COVID-19, Committee for Medicinal Products for Human Use (CHMP) Assessment report, The Netherlands.

FDA, 2022, Fact Sheet For Healthcare Providers: Emergency use authorization for LAGEVRIO™ (Molnupiravir) capsules. Food and Drug Administration. Diakses pada 23 Januari 2023. <https://www.fda.gov/media/155054/download>.

Fischer Ii, W. A., Eron, J. J., Holman, W., Cohen, M. S., Fang, L., Szewczyk, L. J., Sheahan, T. P., Baric, R., Mollan, K. R., Wolfe, C. R., Duke, E. R., Azizad, M. M., Borroto-Esoda, K., Wohl, D. A., Coombs, R. W., Loftis, A. J., Alabanza, P., Lipansky, F., and Painter, W. P. 2022, A phase 2a clinical trial of molnupiravir in patients with COVID-19 shows accelerated SARS-CoV-2 RNA clearance and elimination of infectious virus, *Science Translation Medicines*, **14**: 1-10.

- Harrison, A. G., Lin, T., and Wang, P. 2020, Mechanisms of SARS-CoV-2 Transmission and Pathogenesis, *In Trends in Immunology*, **41**(12): 110-1115.
- Jayk Bernal, A., Gomes da Silva, M. M., Musungaie, D. B., Kovalchuk, E., Gonzalez, A., Delos Reyes, V., Martín-Quirós, A., Caraco, Y., Williams-Diaz, A., Brown, M. L., Du, J., Pedley, A., Assaid, C., Strizki, J., Grobler, J. A., Shamsuddin, H. H., Tipping, R., Wan, H., Paschke, J. R., Johnson, M. G., and De Anda, C. 2022, Molnupiravir for Oral Treatment of Covid-19 in Nonhospitalized Patients, *New England Journal of Medicine*, **386**(6): 509–520.
- Kabinger, F., Stiller, C., Schmitzová, J., Dienemann, C., Kokic, G., Hillen, H. S., Höbartner, C., and Cramer, P. 2021, Mechanism of molnupiravir-induced SARS-CoV-2 mutagenesis, *Nature Structural and Molecular Biology*, **28**(9): 740–746.
- Keputusan Menteri Kesehatan Republik Indonesia. 2020, Pedoman Pencegahan dan Pengendalian Coronavirus Diseases (COVID-19), Kementerian Kesehatan RI, Jakarta.
- Khade, S. M., Yabaji, S. M., and Srivastava, J. 2021, An Update on COVID-19: SARS-CoV-2 Life Cycle, Immunopathology, and BCG Vaccination, *Preparative Biochemistry and Biotechnology*, **51**(7): 650–658.
- Lam, T. T. Y., Jia, N., Zhang, Y. W., Shum, M. H. H., Jiang, J. F., Zhu, H. C., Tong, Y. G., Shi, Y. X., Ni, X. B., Liao, Y. S., Li, W. J., Jiang, B. G., Wei, W., Yuan, T. T., Zheng, K., Cui, X. M., Li, J., Pei, G. Q., Qiang, X., Cheung, W. Y. M., Li, L. F., Sun, F. F., Qin, S., Huang, J. C., Leung, G. M., Holmes, E. C., Hu, Y. L., and Cao, W. C. 2020, Identifying SARS-CoV-2-related Coronaviruses in Malayan Pangolins, *Nature*, **583**(7815): 282–285.
- Laurini, G. S., Montanaro, N., and Motola, D. 2023, Safety Profile of Molnupiravir in the Treatment of COVID-19: A Descriptive Study Based on FAERS Data, *Journal of Clinical Medicine*, **12**(1): 1-8.
- Levani, Y., Prastyo, A. D., dan Mawaddatunnadila. 2021, Coronavirus Disease 2019 (COVID-19): Patogenesis, Manifestasi Klinis dan Pilihan Terapi, *Jurnal Kedokteran dan Kesehatan*, **17**(1): 44-57.
- Liu, Y., Ge, L., Fan, S., Xu, A., Wang, X., Dong, X., Xu, M., Fan, W., Zhong, W., and Liang, X. 2022, Disease Progression of Hospitalized Elderly

- Patients with Omicron BA.2 Treated with Molnupiravir, *Infectious Diseases and Therapy*, **11(6)**: 2241–2251.
- Liu, Y., Fan, S., Xu, A., Ge, L., Wang, X., Dong, X., Xu, M., Fan, W., Zhong, W., and Liang, X. 2023, Efficacy and Safety of Molnupiravir In Patients with Omicron Variant Vaccine Breakthrough COVID-19 Infection: A Randomized, Controlled Trial, *Frontiers in Pharmacology*, **14**: 1-9.
- Mali, K. R., Eerike, M., Raj, G. M., Bisoi, D., Priyadarshini, R., Ravi, G., Chaliserry, L. F., and Janti, S. S. 2022, Efficacy and Safety of Molnupiravir in COVID-19 Patients: A Systematic Review, *Irish Journal of Medical Science*, Springer Science and Business Media Deutschland, India.
- Najjar-Debbiny, R., Gronich, N., Weber, G., Khoury, J., Amar, M., Stein, N., Goldstein, L. H., and Saliba, W. 2023, Effectiveness of Molnupiravir in High-Risk Patients: A Propensity Score Matched Analysis, *Clinical Infectious Diseases*, **76(3)**: 453–460.
- Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, M., and Agha, R. 2020, The Socio-economic Implications of the Coronavirus Pandemic (COVID-19): A review, *International Journal of Surgery*, **78**: 185-193.
- Okoli, C., and Schabram, K. 2010, A Guide to Conducting a Systematic Literature Review of Information Systems Research, *Sprouts*, 1-50.
- Painter, W. P., Holman, W., Bush, J. A., Almazedi, F., Malik, H., Eraut, N. C. J. E., Morin, M. J., Szewczyk, L. J., and Painter, G. R. 2021, Human Safety, Tolerability, and Pharmacokinetics of Molnupiravir, A Novel broad-spectrum Oral Antiviral Agent with Activity Against SARS-CoV-2, *Antimicrobial Agents and Chemotherapy*, **65(5)**: 1-14.
- Parohan, M., Yaghoubi, S., and Seraji, A. 2020, Liver Injury is Associated with Severe Coronavirus Disease 2019 (COVID-19) Infection: A systematic review and meta-analysis of retrospective studies, In *Hepatology Research*, **50(8)**: 924-935.
- Pontolillo, M., Ucciferri, C., Borrelli, P., Di Nicola, M., Vecchiet, J., and Falasca, K. 2022, Molnupiravir as an Early Treatment for COVID-19: A Real Life Study, *Pathogens*, **11(10)**: 1-12.

- Prastyowati, A. 2020, Mengenal Karakteristik Virus SARS-CoV-2 Penyebab Penyakit COVID-19 Sebagai Dasar Upaya Untuk Pengembangan Obat Antivirus Dan Vaksin, *Pusat Penelitian Bioteknologi*, **11(1)**: 1-10.
- Rabi, F. A., Al Zoubi, M. S., Al-Nasser, A. D., Kasasbeh, G. A., and Salameh, D. M. 2020, Sars-cov-2 and Coronavirus Disease 2019: What we know so far, *Pathogens*, **9(3)**: 1-14.
- Ramdhani, A., Ali, M., Uin, R., Gunung, S., and Bandung, D. 2014, Writing a Literature Review Research Paper: A step-by-step approach, *International Journal of Basics and Applied Sciences*, **3(1)**: 47-56.
- Ridwan, M., Ulum, B., dan Muhammad, F. 2021, Pentingnya Penerapan Literature Review pada Penelitian Ilmiah (The Importance Of Application Of Literature Review In Scientific Research), *Jurnal Masohi*, **2(1)**: 42-51.
- Rothon, H. A., and Byrareddy, S. N. 2020, The Epidemiology and Pathogenesis of Coronavirus Disease (COVID-19) Outbreak, *Journal of Autoimmunity*, **109**. Academic Press.
- Russell, T. W., Golding, N., Hellewell, J., Abbott, S., Wright, L., Pearson, C. A. B., van Zandvoort, K., Jarvis, C. I., Gibbs, H., Liu, Y., Eggo, R. M., Edmunds, W. J., and Kucharski, A. J. 2020, Reconstructing the Early Global Dynamics of Under-ascertained COVID-19 Cases and Infections, *BMC Medicine*, **18(1)**: 1-9.
- Saputro, T. A., Purwaningsih, N. V., Ainutajriani., dan Watoyani, T. 2022, Correlation between Corona Viruses Disease (Covid-19) and C-Reactive Protein (CRP) in Patients at Haji Hospital Surabaya, *Journal of Medical Laboratory Science Technology*, **5(1)**: 11-16.
- Sarker, Md. T., Hasan, A. Q. F., Rafi, Md. O., Hossain, Md. J., El-Mageed, H. R. A., Elsapagh, R. M., Capasso, R., & Emran, T. Bin. 2021, A Comprehensive Overview of the Newly Emerged COVID-19 Pandemic: Features, Origin, Genomics, Epidemiology, Treatment, and Prevention, *Biologics*, **1(3)**: 357–383.
- Singh, A. K., Singh, A., Singh, R., and Misra, A. 2021, Molnupiravir in COVID-19: A systematic review of literature, *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*, **15(16)**: 1-12.

- Tian, L., Pang, Z., Li, M., Lou, F., An, X., Zhu, S., Song, L., Tong, Y., Fan, H., and Fan, J. 2022, Molnupiravir and Its Antiviral Activity Against COVID-19, *Frontiers in Immunology*, **13**: 1-20.
- Ulhaq, Z. S., dan Rahmayanti, M. 2020, Panduan Penulisan Skripsi Literatur Review, Malang: Universitas Islam Negeri Maulana Malik Ibrahim.
- Vallamkondu, J., John, A., Wani, W. Y., Ramadevi, S. P., Jella, K. K., Reddy, P. H., and Kandimalla, R. 2020, SARS-CoV-2 pathophysiology and assessment of coronaviruses in CNS diseases with a focus on therapeutic targets, *Biochimica et Biophysica Acta - Molecular Basis of Disease*, **1886(10)**: 1-12.
- Van Doremalen, N., Bushmaker, T., Morris, D. H., Holbrook, M. G., Gamble, A., Williamson, B. N., Tamin, A., Harcourt, J. L., Thornburg, N. J., Gerber, S. I., Lloyd-Smith, J. O., de Wit, E., and Munster, V. J. 2020, Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1, *New England Journal of Medicine*, **382(16)**: 1564–1567.
- World Health Organization. 2022, Therapeutics and COVID-19: Living Guideline 3 March 2022, World Health Organization, Genewa.
- Zou, R., Peng, L., Shu, D., Zhao, L., Lan, J., Tan, G., Peng, J., Yang, X., Liu, M., Zhang, C., Yuan, J., Wang, H., Li, S., Lu, H., Zhong, W., & Liu, Y. (2022). Antiviral Efficacy and Safety of Molnupiravir Against Omicron Variant Infection: A Randomized Controlled Clinical Trial, *Frontiers in Pharmacology*, **13**: 1-6.