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DAFTAR PUSTAKA

Abourehab, M. A. S., Alqahtani, A. M., Youssif, B. G. M., & Gouda, A. M. (2021). Globally Approved EGFR Inhibitors: Insights into Their Syntheses, Target Kinases, Biological Activities, Receptor Interactions, and Metabolism. *Molecules*, *26*(21), 6677. https://doi.org/10.3390/molecules26216677

Adnan, M., Siddiqui, A. J., Ashraf, S. A., Bardakci, F., Alreshidi, M., Badraoui, R., Noumi, E., Tepe, B., Sachidanandan, M., & Patel, M. (2023). Network Pharmacology, Molecular Docking, and Molecular Dynamics Simulation to Elucidate the Molecular Targets and Potential Mechanism of Phoenix dactylifera (Ajwa Dates) against Candidiasis. *Pathogens*, *12*(11), 1369. https://doi.org/10.3390/pathogens12111369

Alotaibi, N. M., Alotaibi, M. O., Alshammari, N., Adnan, M., & Patel, M. (2023). Network Pharmacology Combined with Molecular Docking, Molecular Dynamics, and In Vitro Experimental Validation Reveals the Therapeutic Potential of Thymus vulgaris L. Essential Oil (Thyme Oil) against Human Breast Cancer. *ACS Omega*, *8*(50), 48344–48359. https://doi.org/10.1021/acsomega.3c07782

Amelia, T., Kartasasmita, R. E., Ohwada, T., & Tjahjono, D. H. (2022). Structural Insight and Development of EGFR Tyrosine Kinase Inhibitors. *Molecules*, *27*(3), 819. https://doi.org/10.3390/molecules27030819

Anju, T., Rai, N. K. S. R., & Kumar, A. (2022). Sauropus androgynus (L.) Merr.: A multipurpose plant with multiple uses in traditional ethnic culinary and ethnomedicinal preparations. *Journal of Ethnic Foods*, *9*(1), 10. https://doi.org/10.1186/s42779-022-00125-8

Asiamah, I., Obiri, S. A., Tamekloe, W., Armah, F. A., & Borquaye, L. S. (2023). Applications of molecular docking in natural products-based drug discovery. *Scientific African*, *20*, e01593. https://doi.org/10.1016/j.sciaf.2023.e01593

Attia, S. L., Odhiambo, S. A., Mogaka, J. N., Ondondo, R., Schadler, A., McQuerry, K., Fuchs, G. J., Williams, J. E., McGuire, M. K., Waterman, C., Schulze, K., & Owuor, P. M. (2024). Impact of Maternal Moringa oleifera Leaf Supplementation on Milk and Serum Vitamin A and Carotenoid Concentrations in a Cohort of Breastfeeding Kenyan Women and Their Infants. *Nutrients*, *16*(19), 3425. https://doi.org/10.3390/nu16193425

Awaludin, A., Kartina, K., Maulianawati, D., Manalu, W., Andriyanto, A., Septiana, R., Arfandi, A., & Lalang, Y. (2020). Short Communication: Phytochemical screening and toxicity of ethanol extract of Sauropus androgynus. *Biodiversitas Journal of Biological Diversity*, *21*(7). https://doi.org/10.13057/biodiv/d210712

Baby, K., Maity, S., Mehta, C. H., Nayak, U. Y., Shenoy, G. G., Pai, K. S. R., Harikumar, K. B., & Nayak, Y. (2023). Computational drug repurposing of Akt-1 allosteric inhibitors for non-small cell lung cancer. *Scientific Reports*, *13*(1), 7947. https://doi.org/10.1038/s41598-023-35122-7

Ballard, O., & Morrow, A. L. (2013). Human Milk Composition. *Pediatric Clinics of North America*, *60*(1), 49–74. https://doi.org/10.1016/j.pcl.2012.10.002

Bazzano, A. N., Hofer, R., Thibeau, S., Gillispie, V., Jacobs, M., & Theall, K. P. (2016). A Review of Herbal and Pharmaceutical Galactagogues for Breast-Feeding. *Ochsner Journal*, *16*(4), 511–524.

Beloribi-Djefaflia, S., Vasseur, S., & Guillaumond, F. (2016). Lipid metabolic reprogramming in cancer cells. *Oncogenesis*, *5*(1), e189–e189. https://doi.org/10.1038/oncsis.2015.49

Bernard, V., Young, J., & Binart, N. (2019). Prolactin—A pleiotropic factor in health and disease. *Nature Reviews Endocrinology*, *15*(6), 356–365. https://doi.org/10.1038/s41574-019-0194-6

Bhati, V., Sharma, R., Pandita, D., & Kumar, A. (2024). Use of Network Pharmacological Approaches in Signal Analysis. In A. Kumar, *Signal Analysis in Pharmacovigilance* (1st edn, pp. 175–180). CRC Press. https://doi.org/10.1201/9781032629940-13

Biswas, S. K., Banerjee, S., Baker, G. W., Kuo, C.-Y., & Chowdhury, I. (2022). The Mammary Gland: Basic Structure and Molecular Signaling during Development. *International Journal of Molecular Sciences*, *23*(7), 3883. https://doi.org/10.3390/ijms23073883

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GADJAH MADA
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Blanes-Mira, C., Fernández-Aguado, P., de Andrés-López, J., Fernández-Carvajal, A., Ferrer-Montiel, A., & Fernández-Ballester, G. (2022). Comprehensive Survey of Consensus Docking for High-Throughput Virtual Screening. *Molecules*, *28*(1), 175. https://doi.org/10.3390/molecules28010175

Brilhante, R. S. N., Sales, J. A., Pereira, V. S., Castelo-Branco, D. D. S. C. M., Cordeiro, R. D. A., De Souza Sampaio, C. M., De Araújo Neto Paiva, M., Santos, J. B. F. D., Sidrim, J. J. C., & Rocha, M. F. G. (2017). Research advances on the multiple uses of Moringa oleifera: A sustainable alternative for socially neglected population. *Asian Pacific Journal of Tropical Medicine*, *10*(7), 621–630. https://doi.org/10.1016/j.apjtm.2017.07.002

Budiono, B., Pertami, S. B., Arifah, S. N., & Lestari, S. R. (2021). *Molecular docking analysis of Polyscias scutellaria active compounds as inhibitor of dopamine D2 receptors to increase prolactin secretion*. 030034. https://doi.org/10.1063/5.0052655

Chen, C.-C., Boxer, R. B., Stairs, D. B., Portocarrero, C. P., Horton, R. H., Alvarez, J. V., Birnbaum, M. J., & Chodosh, L. A. (2010). Akt is required for Stat5 activation and mammary differentiation. *Breast Cancer Research*, *12*(5), R72. https://doi.org/10.1186/bcr2640

Chen, C.-C., Stairs, D. B., Boxer, R. B., Belka, G. K., Horseman, N. D., Alvarez, J. V., & Chodosh, L. A. (2012). Autocrine prolactin induced by the Pten–Akt pathway is required for lactation initiation and provides a direct link between the Akt and Stat5 pathways. *Genes & Development*, *26*(19), 2154–2168. https://doi.org/10.1101/gad.197343.112

Chen, F., Chen, B., Guan, W., Chen, J., Lv, Y., Qiao, H., Wang, C., & Zhang, Y. (2017). Metabolic Transition of Milk Lactose Synthesis and Up-regulation by AKT1 in Sows from Late Pregnancy to Lactation. *Cell Biochemistry and Biophysics*, *75*(1), 131–138. https://doi.org/10.1007/s12013-016-0778-x

Chen, J., Jiang, C. C., Jin, L., & Zhang, X. D. (2016). Regulation of PD-L1: A novel role of pro-survival signalling in cancer. *Annals of Oncology*, *27*(3), 409–416. https://doi.org/10.1093/annonc/mdv615

Cheng, F., Li, W., Liu, G., & Tang, Y. (2013). In Silico ADMET Prediction: Recent Advances, Current Challenges and Future Trends. *Current Topics in Medicinal Chemistry*, *13*(11), 1273–1289. https://doi.org/10.2174/15680266113139990033

Chidlow, J. H., & Sessa, W. C. (2010). Caveolae, caveolins, and cavins: Complex control of cellular signalling and inflammation. *Cardiovascular Research*, *86*(2), 219–225. https://doi.org/10.1093/cvr/cvq075

Chiș, A., Noubissi, P. A., Pop, O.-L., Mureșan, C. I., Fokam Tagne, M. A., Kamgang, R., Fodor, A., Sitar-Tăut, A.-V., Cozma, A., Orășan, O. H., Hegheș, S. C., Vulturar, R., & Suharoschi, R. (2023). Bioactive Compounds in Moringa oleifera: Mechanisms of Action, Focus on Their Anti-Inflammatory Properties. *Plants*, *13*(1), 20. https://doi.org/10.3390/plants13010020

Ciarloni, L., Mallepell, S., & Brisken, C. (2007). Amphiregulin is an essential mediator of estrogen receptor α function in mammary gland development. *Proceedings of the National Academy of Sciences*, *104*(13), 5455–5460. https://doi.org/10.1073/pnas.0611647104

Connelly, L., Barham, W., Pigg, R., Saint-Jean, L., Sherrill, T., Cheng, D., Chodosh, L. A., Blackwell, T. S., & Yull, F. E. (2010). Activation of nuclear factor kappa B in mammary epithelium promotes milk loss during mammary development and infection. *Journal of Cellular Physiology*, *222*(1), 73–81. https://doi.org/10.1002/jcp.21922

Daina, A., Michielin, O., & Zoete, V. (2017). SwissADME: A free web tool to evaluate pharmacokinetics, drug-likeness and medicinal chemistry friendliness of small molecules. *Scientific Reports*, *7*(1), 42717. https://doi.org/10.1038/srep42717

Darmawati, D., Kamil, H., Rosmawati, R., Rizkia, M., & Fajri, N. (2023). The Effectiveness of Katuk Leaf Extract (Sauropus Androgynus) on Breastmilk Production. *Jurnal Keperawatan Soedirman*, *18*(2), 64. https://doi.org/10.20884/1.jks.2023.18.2.7296

Das, R., & Woo, J. (2024). Identifying the Multitarget Pharmacological Mechanism of Action of Genistein on Lung Cancer by Integrating Network Pharmacology and Molecular Dynamic Simulation. *Molecules*, *29*(9), 1913. https://doi.org/10.3390/molecules29091913

Desbriyani, C., Hadisaputro, S., Suherni, T., Suwondo, A., & Supriyana, S. (2017). Effect of Consuming Temulawak (curcuma Xanthorrhiza Roxb.) Extract on Breast Milk Production

UNIVERSITAS
GADJAH MADA
Kajian In Silico Mekanisme Aktivitas Galaktagog Kombinasi Katuk (Sauropus androgynus), Kelor (Moringa oleifera), Dan Temulawak (Curcuma xanthorrhiza): Studi Network Pharmacology, Prediksi Farmakokinetik, Molecular Docking, dan Molecular Dynamics.
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in Postpartum Mothers. *Belitung Nursing Journal*, *3*(5), 603–611. https://doi.org/10.33546/bnj.188

Dror, D. K., & Allen, L. H. (2018). Overview of Nutrients in Human Milk. *Advances in Nutrition*, *9*, 278S-294S. https://doi.org/10.1093/advances/nmy022

Drugs and Lactation Database (LactMed®). (2025). Domperidone. In *Drugs and Lactation Database (LactMed®)*. National Institute of Child Health and Human Development. http://www.ncbi.nlm.nih.gov/books/NBK501371/

Durrant, J. D., & McCammon, J. A. (2011). Molecular dynamics simulations and drug discovery. *BMC Biology*, *9*(1), 71. https://doi.org/10.1186/1741-7007-9-71

Fan, J., Fu, A., & Zhang, L. (2019). Progress in molecular docking. *Quantitative Biology*, *7*(2), 83–89. https://doi.org/10.1007/s40484-019-0172-y

Farah, E., Barger, M. K., Klima, C., Rossman, B., & Hershberger, P. (2021). Impaired Lactation: Review of Delayed Lactogenesis and Insufficient Lactation. *Journal of Midwifery & Women's Health*, *66*(5), 631–640. https://doi.org/10.1111/jmwh.13274

Ferreira, L. L. G., & Andricopulo, A. D. (2019). ADMET modeling approaches in drug discovery. *Drug Discovery Today*, *24*(5), 1157–1165. https://doi.org/10.1016/j.drudis.2019.03.015

Foong, S. C., Tan, M. L., Foong, W. C., Marasco, L. A., Ho, J. J., & Ong, J. H. (2020). Oral galactagogues (natural therapies or drugs) for increasing breast milk production in mothers of non-hospitalised term infants. *Cochrane Database of Systematic Reviews*, *2020*(5). https://doi.org/10.1002/14651858.CD011505.pub2

Fu, L., Shi, S., Yi, J., Wang, N., He, Y., Wu, Z., Peng, J., Deng, Y., Wang, W., Wu, C., Lyu, A., Zeng, X., Zhao, W., Hou, T., & Cao, D. (2024). ADMETlab 3.0: An updated comprehensive online ADMET prediction platform enhanced with broader coverage, improved performance, API functionality and decision support. *Nucleic Acids Research*, *52*(W1), W422–W431. https://doi.org/10.1093/nar/gkae236

Fungtammasan, S., & Phupong, V. (2022). The effect of Moringa oleifera capsule in increasing breast milk volume in early postpartum patients: A double-blind, randomized controlled trial. *European Journal of Obstetrics & Gynecology and Reproductive Biology: X*, *16*, 100171. https://doi.org/10.1016/j.eurox.2022.100171

Gao, S., Tang, L., Ma, J., Wang, K., Yao, H., Tong, J., & Zhang, H. (2024). Evaluation of the mechanism of Gong Ying San activity on dairy cows mastitis by network pharmacology and metabolomics analysis. *PLOS ONE*, *19*(4), e0299234. https://doi.org/10.1371/journal.pone.0299234

Garbacz, A., Juszczak, P., Nowicki, M., Łukasz Kowalczewski, P., & Człapka-Matyasik, M. (2024). Exploring galactagogue use among breastfeeding women: Insights from an observational study. *PLOS ONE*, *19*(10), e0310867. https://doi.org/10.1371/journal.pone.0310867

Garti, H., Bukari, M., & Wemakor, A. (2023). Early initiation of breastfeeding, bottle feeding, and experiencing feeding challenges are associated with malnutrition. *Food Science & Nutrition*, *11*(9), 5129–5136. https://doi.org/10.1002/fsn3.3472

Genheden, S., & Ryde, U. (2015). The MM/PBSA and MM/GBSA methods to estimate ligand-binding affinities. *Expert Opinion on Drug Discovery*, *10*(5), 449–461. https://doi.org/10.1517/17460441.2015.1032936

Girnius, N., Edwards, Y. J. K., & Davis, R. J. (2018). The cJUN NH2-terminal kinase (JNK) pathway contributes to mouse mammary gland remodeling during involution. *Cell Death & Differentiation*, *25*(9), 1702–1715. https://doi.org/10.1038/s41418-018-0081-z

Golan, Y., & Assaraf, Y. G. (2020). Genetic and Physiological Factors Affecting Human Milk Production and Composition. *Nutrients*, *12*(5), 1500. https://doi.org/10.3390/nu12051500

Gopalakrishnan, L., Doriya, K., & Kumar, D. S. (2016). Moringa oleifera: A review on nutritive importance and its medicinal application. *Food Science and Human Wellness*, *5*(2), 49–56. https://doi.org/10.1016/j.fshw.2016.04.001

Govoni, L., Ricchi, A., Molinazzi, M. T., Galli, M. C., Putignano, A., Artioli, G., Foà, C., Palmieri, E., & Neri, I. (2019). Breastfeeding Pathologies: Analysis of Prevalence, Risk and Protective Factors. *Acta Bio Medica Atenei Parmensis*, *90*(4-S), 56–62. https://doi.org/10.23750/abm.v90i4-S.8240

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GADJAH MADA
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Gromnatska, N., Kiselova, M., & Adegbile, T. (2022a). Early Prognosis of Hypogalactia in Breastfeeding Mothers: New Opportunities for Primary Prevention. *Georgian Medical News*, (328–329), 27–33.

Gromnatska, N., Kiselova, M., & Adegbile, T. (2022b). Early Prognosis of Hypogalactia in Breastfeeding Mothers: New Opportunities for Primary Prevention. *Georgian Medical News*, (328–329), 27–33.

Groner, B., Fritsche, M., Stöcklin, E., Berchtold, S., Merkle, C., Moriggl, R., & Pfitzner, E. (2000). Regulation of the trans-activation potential of STAT5 through its DNA-binding activity and interactions with heterologous transcription factors. *Growth Hormone & IGF Research*, *10*, S15–S20. https://doi.org/10.1016/S1096-6374(00)80004-0

Grzeskowiak, L. E., Wlodek, M. E., & Geddes, D. T. (2019). What Evidence Do We Have for Pharmaceutical Galactagogues in the Treatment of Lactation Insufficiency?—A Narrative Review. *Nutrients*, *11*(5), 974. https://doi.org/10.3390/nu11050974

Grzeskowiak, L., Smithers, L., Amir, L., & Grivell, R. (2018). Domperidone for increasing breast milk volume in mothers expressing breast milk for their preterm infants: A systematic review and meta-analysis. *BJOG: An International Journal of Obstetrics & Gynaecology*, *125*(11), 1371–1378. https://doi.org/10.1111/1471-0528.15177

Hannan, F. M., Elajnaf, T., Vandenberg, L. N., Kennedy, S. H., & Thakker, R. V. (2023). Hormonal regulation of mammary gland development and lactation. *Nature Reviews Endocrinology*, *19*(1), 46–61. https://doi.org/10.1038/s41574-022-00742-y

Haricharan, S., & Li, Y. (2014). STAT signaling in mammary gland differentiation, cell survival and tumorigenesis. *Molecular and Cellular Endocrinology*, *382*(1), 560–569. https://doi.org/10.1016/j.mce.2013.03.014

Hassiotou, F., & Geddes, D. (2013). Anatomy of the human mammary gland: Current status of knowledge. *Clinical Anatomy*, *26*(1), 29–48. https://doi.org/10.1002/ca.22165

Heikkila, K., Sacker, A., Kelly, Y., Renfrew, M. J., & Quigley, M. A. (2011). Breast feeding and child behaviour in the Millennium Cohort Study. *Archives of Disease in Childhood*, *96*(7), 635–642. https://doi.org/10.1136/adc.2010.201970

Herawati, Y., Kalsum, U., Arsana, I. W., Mustofa, E., Rahardjo, B., Mintaroem, K., Yuniarti, L., Hadiyati, L., & Sardjono, T. W. (2024). Molecular docking analysis of Carica papaya leaf's bioactive components as prolactin production modulator. *Journal of Applied Biology & Biotechnology*. https://doi.org/10.7324/JABB.2024.155147

Hollingsworth, S. A., & Dror, R. O. (2018). Molecular Dynamics Simulation for All. *Neuron*, *99*(6), 1129–1143. https://doi.org/10.1016/j.neuron.2018.08.011

Hopkins, A. L. (2008). Network pharmacology: The next paradigm in drug discovery. *Nature Chemical Biology*, *4*(11), 682–690. https://doi.org/10.1038/nchembio.118

Horta, B. L., Loret De Mola, C., & Victora, C. G. (2015). Breastfeeding and intelligence: A systematic review and meta-analysis. *Acta Paediatrica*, *104*(S467), 14–19. https://doi.org/10.1111/apa.13139

Horta, B. L., Rollins, N., Dias, M. S., Garcez, V., & Pérez-Escamilla, R. (2023). Systematic review and meta-analysis of breastfeeding and later overweight or obesity expands on previous study for World Health Organization. *Acta Paediatrica*, *112*(1), 34–41. https://doi.org/10.1111/apa.16460

Hospital, A., Gelpi, J., Goñi, R., & Orozco, M. (2015). Molecular dynamics simulations: Advances and applications. *Advances and Applications in Bioinformatics and Chemistry*, 37. https://doi.org/10.2147/AABC.S70333

Hughes, K., Blanck, M., Pensa, S., & Watson, C. J. (2016). Stat3 modulates chloride channel accessory protein expression in normal and neoplastic mammary tissue. *Cell Death & Disease*, *7*(10), e2398–e2398. https://doi.org/10.1038/cddis.2016.302

Hughes, K., & Watson, C. J. (2018). The Multifaceted Role of STAT3 in Mammary Gland Involution and Breast Cancer. *International Journal of Molecular Sciences*, *19*(6), 1695. https://doi.org/10.3390/ijms19061695

Jena, M. K., Khan, F. B., Ali, S. A., Abdullah, A., Sharma, A. K., Yadav, V., Kancharla, S., Kolli, P., Mandadapu, G., Sahoo, A. K., Rath, P. K., Taneera, J., Kumar, S., Mohanty, A. K., Goh, K. W., Ming, L. C., & Ardianto, C. (2023). Molecular complexity of mammary glands

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GADJAH MADA
Kajian In Silico Mekanisme Aktivitas Galaktagog Kombinasi Katuk (Sauropus androgynus), Kelor (Moringa oleifera), Dan Temulawak (Curcuma xanthorrhiza): Studi Network Pharmacology, Prediksi Farmakokinetik, Molecular Docking, dan Molecular Dynamics.
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

development: A review of lactogenic differentiation in epithelial cells. *Artificial Cells, Nanomedicine, and Biotechnology*, *51*(1), 491–508. https://doi.org/10.1080/21691401.2023.2252872

Jin, X., Perrella, S. L., Lai, C. T., Taylor, N. L., & Geddes, D. T. (2024). Causes of Low Milk Supply: The Roles of Estrogens, Progesterone, and Related External Factors. *Advances in Nutrition*, *15*(1), 100129. https://doi.org/10.1016/j.advnut.2023.10.002

Jullien, S., Mateescu, I., & Carai, S. (2023). Hypogalactia After Delivery: A Man-Made Problem. *Journal of Global Health*, *13*, 03053. https://doi.org/10.7189/jogh.13.03053

Kabotyanski, E. B., Huetter, M., Xian, W., Rijnkels, M., & Rosen, J. M. (2006). Integration of Prolactin and Glucocorticoid Signaling at the β-Casein Promoter and Enhancer by Ordered Recruitment of Specific Transcription Factors and Chromatin Modifiers. *Molecular Endocrinology*, *20*(10), 2355–2368. https://doi.org/10.1210/me.2006-0160

Karo, D. B., & Mufdlilah, M. (2023). The Effectiveness of Galactagogue Content on Breast Milk Production: A Scoping Review. *Jurnal Aisyah : Jurnal Ilmu Kesehatan*, *8*(4). https://doi.org/10.30604/jika.v8i4.2381

Katoch, O. R. (2022). Determinants of malnutrition among children: A systematic review. *Nutrition*, *96*, 111565. https://doi.org/10.1016/j.nut.2021.111565

Kavarthapu, R., Anbazhagan, R., & Dufau, M. L. (2021). Crosstalk between PRLR and EGFR/HER2 Signaling Pathways in Breast Cancer. *Cancers*, *13*(18), 4685. https://doi.org/10.3390/cancers13184685

Kemenkes RI. (2024). *Hasil Utama Survei Kesehatan Indonesia (SKI) 2023—Badan Kebijakan Pembangunan Kesehatan*. https://www.badankebijakan.kemkes.go.id/daftar-frequently-asked-question-seputar-hasil-utama-ski-2023/hasil-utama-ski-2023/

Kemenkes RI. (2025). *SSGI (Survei Status Gizi Indonesia) 2024 Dalam Angka*. Kementerian Kesehatan RI.

Khaliq, A., Wraith, D., Miller, Y., & Nambiar, S. (2022). Association of Infant Feeding Indicators and Infant Feeding Practices with Coexisting Forms of Malnutrition in Children under Six Months of Age. *Nutrients*, *14*(20), 4242. https://doi.org/10.3390/nu14204242

Kim, S. Y., & Yi, D. Y. (2020). Components of human breast milk: From macronutrient to microbiome and microRNA. *Clinical and Experimental Pediatrics*, *63*(8), 301–309. https://doi.org/10.3345/cep.2020.00059

Kittelson, K. S., Martins, A. C. F., Santos, R. P., Celante, G., & Da Silva Gomes, R. (2026). Reproducibility, validation, and failure modes across classical and AI-driven molecular docking. *Journal of Computer-Aided Molecular Design*, *40*(1), 137. https://doi.org/10.1007/s10822-026-00849-8

Kristiyanti, R., Khuzaiyah, S., Chabibah, N., & Khanifah, M. (2020). Effectiveness of Moringa Oleifera Extract to Increase Breastmilk Production in Postpartum Mother with Food Restriction. *Proceedings of the 1st Borobudur International Symposium on Humanities, Economics and Social Sciences (BIS-HESS 2019)*. 1st Borobudur International Symposium on Humanities, Economics and Social Sciences (BIS-HESS 2019). https://doi.org/10.2991/assehr.k.200529.123

Kuenzi, B. M., & Ideker, T. (2020). A census of pathway maps in cancer systems biology. *Nature Reviews Cancer*, *20*(4), 233–246. https://doi.org/10.1038/s41568-020-0240-7

LaRocca, J., Pietruska, J., & Hixon, M. (2011). Akt1 Is Essential for Postnatal Mammary Gland Development, Function, and the Expression of Btn1a1. *PLoS ONE*, *6*(9), e24432. https://doi.org/10.1371/journal.pone.0024432

Lawrence, R. A. (2022). Induced Lactation and Relactation (Including Nursing an Adopted Baby) and Cross-Nursing. In *Breastfeeding* (pp. 628–645). Elsevier. https://doi.org/10.1016/B978-0-323-68013-4.00019-5

Lawrence, R. M., & Lawrence, R. A. (2022). Medications, Herbal Preparations, and Natural Products in Breast Milk. In *Breastfeeding* (pp. 326–392). Elsevier. https://doi.org/10.1016/B978-0-323-68013-4.00011-0

Lee, M., Shin, H., Park, M., Kim, A., Cha, S., & Lee, H. (2022). Systems pharmacology approaches in herbal medicine research: A brief review. *BMB Reports*, *55*(9), 417–428. https://doi.org/10.5483/BMBRep.2022.55.9.102

UNIVERSITAS
GADJAH MADA
Kajian In Silico Mekanisme Aktivitas Galaktagog Kombinasi Katuk (Sauropus androgynus), Kelor (Moringa oleifera), Dan Temulawak (Curcuma xanthorrhiza): Studi Network Pharmacology, Prediksi Farmakokinetik, Molecular Docking, dan Molecular Dynamics.
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Lee, S., & Kelleher, S. L. (2016). Biological underpinnings of breastfeeding challenges: The role of genetics, diet, and environment on lactation physiology. *American Journal of Physiology-Endocrinology and Metabolism*, *311*(2), E405–E422. https://doi.org/10.1152/ajpendo.00495.2015

Li, S., & Rosen, J. M. (1995). Nuclear Factor I and Mammary Gland Factor (STAT5) Play a Critical Role in Regulating Rat Whey Acidic Protein Gene Expression in Transgenic Mice. *Molecular and Cellular Biology*, *15*(4), 2063–2070. https://doi.org/10.1128/MCB.15.4.2063

Li, S., & Zhang, B. (2013). Traditional Chinese medicine network pharmacology: Theory, methodology and application. *Chinese Journal of Natural Medicines*, *11*(2), 110–120. https://doi.org/10.1016/S1875-5364(13)60037-0

Li, W.-J., Gao, Y.-C., Hu, X., Tan, Y.-T., Deng, J.-J., Pan, H.-F., & Tao, S.-S. (2025). Association between breastfeeding and the risk of autoimmune diseases: A systematic review and meta-analysis. *Autoimmunity Reviews*, *24*(6), 103801. https://doi.org/10.1016/j.autrev.2025.103801

Lim, T. K. (2016). Curcuma zanthorrhiza. In T. K. Lim, *Edible Medicinal and Non-Medicinal Plants* (pp. 371–388). Springer International Publishing. https://doi.org/10.1007/978-3-319-26065-5_16

Liu, J., Wang, Y., Liu, L., Ma, G., Zhang, Y., & Ren, J. (2023). Effect of Moringa leaf flavonoids on the production performance, immune system, and rumen fermentation of dairy cows. *Veterinary Medicine and Science*, *9*(2), 917–923. https://doi.org/10.1002/vms3.993

Loret De Mola, C., Horta, B. L., Gonçalves, H., Quevedo, L. D. A., Pinheiro, R., Gigante, D. P., Dos Santos Motta, J. V., & Barros, F. C. (2016). Breastfeeding and mental health in adulthood: A birth cohort study in Brazil. *Journal of Affective Disorders*, *202*, 115–119. https://doi.org/10.1016/j.jad.2016.05.055

Mahato, D. K., Kargwal, R., Kamle, M., Sharma, B., Pandhi, S., Mishra, S., Gupta, A., Mahmud, M. M. C., Gupta, M. K., Singha, L. B., & Kumar, P. (2022). Ethnopharmacological properties and Nutraceutical potential of Moringa oleifera. *Phytomedicine Plus*, *2*(1), 100168. https://doi.org/10.1016/j.phyplu.2021.100168

Maideen, N. M. P., Barakat, I. R., & Jumale, A. H. (2023). Domperidone-associated Ventricular Arrhythmia and Sudden Cardiac Death: ADescriptive Literature Review. *New Emirates Medical Journal*, *5*, e180723218857. https://doi.org/10.2174/0250688204666230718142031

McBride, G. M., Stevenson, R., Zizzo, G., Rumbold, A. R., Amir, L. H., Keir, A., & Grzeskowiak, L. E. (2023). Women's experiences with using domperidone as a galactagogue to increase breast milk supply: An Australian cross-sectional survey. *International Breastfeeding Journal*, *18*(1), 11. https://doi.org/10.1186/s13006-023-00541-9

McBride, G. M., Stevenson, R., Zizzo, G., Rumbold, A. R., Amir, L. H., Keir, A. K., & Grzeskowiak, L. E. (2021). Use and Experiences of Galactagogues While Breastfeeding Among Australian Women. *PLOS ONE*, *16*(7), e0254049. https://doi.org/10.1371/journal.pone.0254049

Mehta, A., Rathi, A. K., Kushwaha, K. P., & Singh, A. (2018). Relactation in lactation failure and low milk supply. *Sudanese Journal of Paediatrics*, 39–47. https://doi.org/10.24911/SJP.2018.1.6

Meng, X., Lyu, C., Ma, J., Zhang, X., Hu, C., Su, X., Ning, C., Xie, W., & Zhang, S. (2021). Metabolomics and Network Pharmacology-Based Investigation into the Mechanisms Underlying the Therapeutic Effect of a New Chinese Traditional Medicine (Cui Nai Ling) on Bromocriptine-Induced Hypogalactia. *Evidence-Based Complementary and Alternative Medicine*, *2021*, 1–17. https://doi.org/10.1155/2021/8857449

Merecz-Sadowska, A., Sadowski, A., Zielińska-Bliźniewska, H., Zajdel, K., & Zajdel, R. (2025). Network Pharmacology as a Tool to Investigate the Antioxidant and Anti-Inflammatory Potential of Plant Secondary Metabolites—A Review and Perspectives. *International Journal of Molecular Sciences*, *26*(14). Scopus. https://doi.org/10.3390/ijms26146678

UNIVERSITAS GADJAH MADA
Kajian In Silico Mekanisme Aktivitas Galaktagog Kombinasi Katuk (Sauropus androgynus), Kelor (Moringa oleifera), Dan Temulawak (Curcuma xanthorrhiza): Studi Network Pharmacology, Prediksi Farmakokinetik, Molecular Docking, dan Molecular Dynamics.
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Modak, A., Ronghe, V., & Gomase, K. P. (2023). The Psychological Benefits of Breastfeeding: Fostering Maternal Well-Being and Child Development. *Cureus*. https://doi.org/10.7759/cureus.46730

Modak, K., Dey, A., Bharti, K. K., Gautam, M. K., Mondal, S., Dutta, P. P., & Gangwar, M. (2026). Plant-derived molecules as multitarget modulators of NF-κB, PI3K/Akt, MAPK, and AMPK/mTOR signaling in chronic diseases. *Biochemical and Biophysical Research Communications*, *828*, 154097. https://doi.org/10.1016/j.bbrc.2026.154097

Mohammad, A., Zheoat, A., Oraibi, A., Manaithiya, A., S. Almaary, K., Allah Nafidi, H., Bourhia, M., Kilani-Jaziri, S., & A. Bin Jardan, Y. (2024). Integrating virtual screening, pharmacoinformatics profiling, and molecular dynamics: Identification of promising inhibitors targeting 3CLpro of SARS-CoV-2. *Frontiers in Molecular Biosciences*, *10*, 1306179. https://doi.org/10.3389/fmolb.2023.1306179

Morato, A., Accornero, P., & Hovey, R. C. (2023). ERBB Receptors and Their Ligands in the Developing Mammary Glands of Different Species: Fifteen Characters in Search of an Author. *Journal of Mammary Gland Biology and Neoplasia*, *28*(1), 10. https://doi.org/10.1007/s10911-023-09538-w

Muhammed, M. T., & Aki-Yalcin, E. (2024). Molecular Docking: Principles, Advances, and Its Applications in DrugDiscovery. *Letters in Drug Design & Discovery*, *21*(3), 480–495. https://doi.org/10.2174/1570180819666220922103109

Muktamath, V. U., Sunitha, N. H., Ravi, Y., R. Hegde, P., Biradar, S., Saptagiri, T. V., & Ilager, S. (2025). Understanding Insufficient Maternal Milk Production: Clinical Causes and Remedies. In *Clinical Guidance in Breastfeeding—Physiology, Success, and Challenge [Working Title]*. IntechOpen. https://doi.org/10.5772/intechopen.1009947

Muro-Valdez, J. C., Meza-Rios, A., Aguilar-Uscanga, B. R., Lopez-Roa, R. I., Medina-Díaz, E., Franco-Torres, E. M., & Zepeda-Morales, A. S. M. (2023). Breastfeeding-Related Health Benefits in Children and Mothers: Vital Organs Perspective. *Medicina*, *59*(9), 1535. https://doi.org/10.3390/medicina59091535

Mustofa, Yuliani, F. S., Purwono, S., Sadewa, A. H., Damayanti, E., & Heriyanto, D. S. (2020). Polyherbal formula (ASILACT®) induces Milk production in lactating rats through Upregulation of α-Lactalbumin and aquaporin expression. *BMC Complementary Medicine and Therapies*, *20*(1), 368. https://doi.org/10.1186/s12906-020-03152-7

Nivatya, H. K., Singh, A., Kumar, N., Sonam, Sharma, L., Singh, V., Mishra, R., Gaur, N., & Mishra, A. K. (2025). Assessing molecular docking tools: Understanding drug discovery and design. *Future Journal of Pharmaceutical Sciences*, *11*(1), 111. https://doi.org/10.1186/s43094-025-00862-y

Nurlely, N., Nurrochmad, A., Fakhrudin, N., & Widyarini, S. (2025). Integrated LC-HRMS Analysis, Network Pharmacology, and Molecular Docking to Predict the Potential of Syzygium polyanthum in Alleviating Rheumatoid Arthritis. *Jurnal Pharmascience*, *12*(2), 314. https://doi.org/10.20527/jps.v12i2.23762

Ouzir, M., El Bairi, K., & Amzazi, S. (2016). Toxicological properties of fenugreek (Trigonella foenum graecum). *Food and Chemical Toxicology*, *96*, 145–154. https://doi.org/10.1016/j.fct.2016.08.003

Page, N., Wappett, M., O'Dowd, C. R., O'Rourke, M., Gavory, G., Zhang, L., Rountree, J. S. S., Jordan, L., Barker, O., Gibson, H., Boyd, C., Feutren-Burton, S., McLean, E., Trevitt, G., & Harrison, T. (2022). Identification and development of a subtype-selective allosteric AKT inhibitor suitable for clinical development. *Scientific Reports*, *12*(1), 15715. https://doi.org/10.1038/s41598-022-20208-5

Pareek, A., Pant, M., Gupta, M. M., Kashania, P., Ratan, Y., Jain, V., Pareek, A., & Chuturgoon, A. A. (2023). Moringa oleifera: An Updated Comprehensive Review of Its Pharmacological Activities, Ethnomedicinal, Phytopharmaceutical Formulation, Clinical, Phytochemical, and Toxicological Aspects. *International Journal of Molecular Sciences*, *24*(3), 2098. https://doi.org/10.3390/ijms24032098

Partiula, B., & Dougherty, R. (2017). The Dangers of Herbal Supplements: A Case of Acute Liver Injury From Fenugreek: 2273. *Official Journal of the American College of Gastroenterology | ACG*, *112*.

UNIVERSITAS
GADJAH MADA
Kajian In Silico Mekanisme Aktivitas Galaktagog Kombinasi Katuk (Sauropus androgynus), Kelor (Moringa oleifera), Dan Temulawak (Curcuma xanthorrhiza): Studi Network Pharmacology, Prediksi Farmakokinetik, Molecular Docking, dan Molecular Dynamics.
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https://journals.lww.com/ajg/fulltext/2017/10001/the_dangers_of_herbal_supplements__a_case_of_acute.2274.aspx

Peng, Y., Zhuang, K., & Huang, Y. (2024). Incidence and factors influencing delayed onset of lactation: A systematic review and meta-analysis. *International Breastfeeding Journal*, *19*(1), 59. https://doi.org/10.1186/s13006-024-00666-5

Pertami, S. B., Arifah, S. N., Atho'illah, M. F., & Budiono, B. (2021). Active Compounds from Polyscias scutellaria Stimulate Breast Milk Production: In Silico Study on Serotonergic 5-HT2A Receptors and Prolactin Receptors. *Tropical Journal of Natural Product Research*, *5*(7), 1223–1229. https://doi.org/10.26538/tjnpr/v5i7.10

Pham, Q., Patel, P., Baban, B., Yu, J., & Bhatia, J. (2020). Factors Affecting the Composition of Expressed Fresh Human Milk. *Breastfeeding Medicine*, *15*(9), 551–558. https://doi.org/10.1089/bfm.2020.0195

Pillay, J., & Davis, T. J. (2025). Physiology, Lactation. In *StatPearls*. StatPearls Publishing. http://www.ncbi.nlm.nih.gov/books/NBK499981/

Pinto, L., Silva, J. P. N., Monteiro, L., & Silva, P. M. A. (2026). Curcumin and Its Derivatives as Anticancer Agents in Head and Neck Cancer: Molecular Mechanisms and Preclinical Evidence. *International Journal of Molecular Sciences*, *27*(12), 5626. https://doi.org/10.3390/ijms27125626

Pires, D. E. V., Blundell, T. L., & Ascher, D. B. (2015). pkCSM: Predicting Small-Molecule Pharmacokinetic and Toxicity Properties Using Graph-Based Signatures. *Journal of Medicinal Chemistry*, *58*(9), 4066–4072. https://doi.org/10.1021/acs.jmedchem.5b00104

Primadhani, U. (2021). How to Increasing Prolactine Levels of Breastfeeding Mother with Consumption Katuk (Sauropus androgunus(L)Merr) Leaf. *Eureka Herba Indonesia*, *2*(2), 109–112. https://doi.org/10.37275/ehi.v2i2.30

Purba, R. A. P., & Paengkoum, P. (2022). Exploring the Phytochemical Profiles and Antioxidant, Antidiabetic, and Antihemolytic Properties of Sauropus androgynus Dried Leaf Extracts for Ruminant Health and Production. *Molecules*, *27*(23), 8580. https://doi.org/10.3390/molecules27238580

Purkiewicz, A., Regin, K. J., Mumtaz, W., & Pietrzak-Fiećko, R. (2025). Breastfeeding: The Multifaceted Impact on Child Development and Maternal Well-Being. *Nutrients*, *17*(8), 1326. https://doi.org/10.3390/nu17081326

Qiao, J., Dai, L.-J., Zhang, Q., & Ouyang, Y.-Q. (2020). A Meta-Analysis of the Association Between Breastfeeding and Early Childhood Obesity. *Journal of Pediatric Nursing*, *53*, 57–66. https://doi.org/10.1016/j.pedn.2020.04.024

Raguindin, P. F. N., Dans, L. F., & King, J. F. (2014). Moringa oleifera as a Galactagogue. *Breastfeeding Medicine*, *9*(6), 323–324. https://doi.org/10.1089/bfm.2014.0002

Rahmat, E., Lee, J., & Kang, Y. (2021). Javanese Turmeric (Curcuma xanthorrhiza Roxb.): Ethnobotany, Phytochemistry, Biotechnology, and Pharmacological Activities. *Evidence-Based Complementary and Alternative Medicine*, *2021*, 1–15. https://doi.org/10.1155/2021/9960813

Ramadhanti, I. P., Yusra, M., & Fontanella, F. (2022). Sari Temulawak (curcuma Xanthorhizzaroxb) Pada Volume Asi Ibu Postpartum). *Al-Insyirah Midwifery: Jurnal Ilmu Kebidanan (Journal of Midwifery Sciences)*, *11*(2), 95–101. https://doi.org/10.35328/kebidanan.v11i2.2155

Rehan, M., Beg, M. A., Parveen, S., Damanhouri, G. A., & Zaher, G. F. (2014). Computational insights into the inhibitory mechanism of human AKT1 by an orally active inhibitor, MK-2206. *PloS One*, *9*(10), e109705. https://doi.org/10.1371/journal.pone.0109705

Rotella, R., Soriano, J. M., Llopis-González, A., & Morales-Suarez-Varela, M. (2023). The Impact of Moringa oleifera Supplementation on Anemia and other Variables during Pregnancy and Breastfeeding: A Narrative Review. *Nutrients*, *15*(12), 2674. https://doi.org/10.3390/nu15122674

Ryan, R. A., Hepworth, A. D., Lyndon, A., & Bihuniak, J. D. (2023). Use of Galactagogues to Increase Milk Production Among Breastfeeding Mothers in the United States: A Descriptive Study. *Journal of the Academy of Nutrition and Dietetics*, *123*(9), 1329–1339. https://doi.org/10.1016/j.jand.2023.05.019

UNIVERSITAS
GADJAH MADA
Kajian In Silico Mekanisme Aktivitas Galaktagog Kombinasi Katuk (Sauropus androgynus), Kelor (Moringa oleifera), Dan Temulawak (Curcuma xanthorrhiza): Studi Network Pharmacology, Prediksi Farmakokinetik, Molecular Docking, dan Molecular Dynamics.
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Sahu, U., Shah, K., & Chauhan, N. S. (2022). Potential Galactogogues: A Review. *International Journal of Pharmaceutical Sciences and Nanotechnology*, *15*(1), 5726–5740. https://doi.org/10.37285/ijpsn.2022.15.1.2

Salek, R. M., Steinbeck, C., Viant, M. R., Goodacre, R., & Dunn, W. B. (2013). The role of reporting standards for metabolite annotation and identification in metabolomic studies. *GigaScience*, *2*(1), 13. https://doi.org/10.1186/2047-217X-2-13

Salmaso, V., & Moro, S. (2018). Bridging Molecular Docking to Molecular Dynamics in Exploring Ligand-Protein Recognition Process: An Overview. *Frontiers in Pharmacology*, *9*, 923. https://doi.org/10.3389/fphar.2018.00923

Sanchez-Vega, F., Mina, M., Armenia, J., Chatila, W. K., Luna, A., La, K. C., Dimitriadoy, S., Liu, D. L., Kantheti, H. S., Saghafinia, S., Chakravarty, D., Daian, F., Gao, Q., Bailey, M. H., Liang, W.-W., Foltz, S. M., Shmulevich, I., Ding, L., Heins, Z., … Schultz, N. (2018). Oncogenic Signaling Pathways in The Cancer Genome Atlas. *Cell*, *173*(2), 321-337.e10. https://doi.org/10.1016/j.cell.2018.03.035

Schymanski, E. L., Jeon, J., Gulde, R., Fenner, K., Ruff, M., Singer, H. P., & Hollender, J. (2014). Identifying Small Molecules via High Resolution Mass Spectrometry: Communicating Confidence. *Environmental Science & Technology*, *48*(4), 2097–2098. https://doi.org/10.1021/es5002105

Shamsol Azman, A. N. S., Tan, J. J., Abdullah, M. N. H., Bahari, H., Lim, V., & Yong, Y. K. (2023). Network Pharmacology and Molecular Docking Analysis of Active Compounds in Tualang Honey against Atherosclerosis. *Foods*, *12*(9), 1779. https://doi.org/10.3390/foods12091779

Sharma, R. K., Jalalpure, S. S., Chouhan, M. K., Deshpande, S., Acharya, R., & Hegde, S. (2022). Decipher the inhibitory potential of phytocompounds from Leptadenia reticulata on dopamine D2 receptor to enhance prolactin secretion. *Drug Research*, *72*(04), 189–196. https://doi.org/10.1055/a-1735-2887

Sharma, V., & Sarkar, I. N. (2012). Bioinformatics opportunities for identification and study of medicinal plants. *Briefings in Bioinformatics*, *14*(2), 238–250. https://doi.org/10.1093/bib/bbs021

Shaw, A. L., Parson, M. A. H., Truebestein, L., Jenkins, M. L., Leonard, T. A., & Burke, J. E. (2023). ATP-competitive and allosteric inhibitors induce differential conformational changes at the autoinhibitory interface of Akt1. *Structure*, *31*(3), 343-354.e3. https://doi.org/10.1016/j.str.2023.01.007

Shawky, E., Nassra, R. A., El-Alkamy, A. M. T., Sallam, S. M., & El Sohafy, S. M. (2024). Unraveling the mechanisms of Fenugreek seed for managing different gynecological disorders: Steroidal saponins and isoflavones revealed as key bioactive metabolites. *Journal of Pharmaceutical and Biomedical Analysis*, *238*, 115865. https://doi.org/10.1016/j.jpba.2023.115865

Shen, Q., Huang, C.-R., Du, W.-W., Li, J.-Y., Redding, S. R., & Ouyang, Y.-Q. (2023). Galactagogue Food Consumption, Perception of Insufficient Milk Supply, and Exclusive Breastfeeding in Chinese Postpartum Women: An Analysis of Repeated Measures. *Journal of Transcultural Nursing*, *34*(5), 365–374. https://doi.org/10.1177/10436596231184650

Shen, Q., Khan, K. S., Du, M.-C., Du, W.-W., & Ouyang, Y.-Q. (2021). Efficacy and Safety of Domperidone and Metoclopramide in Breastfeeding: A Systematic Review and Meta-Analysis. *Breastfeeding Medicine*, *16*(7), 516–529. https://doi.org/10.1089/bfm.2020.0360

Shen, Q., Zhang, Y., Uray, I. P., Hill, J. L., Kim, H.-T., Lu, C., Young, M. R., Gunther, E. J., Hilsenbeck, S. G., Chodosh, L. A., Colburn, N. H., & Brown, P. H. (2006). The AP-1 transcription factor regulates postnatal mammary gland development. *Developmental Biology*, *295*(2), 589–603. https://doi.org/10.1016/j.ydbio.2006.03.042

Si, S., Zhao, G., Song, G., & Liu, J. (2024). Efficacy and safety of domperidone and metoclopramide on human milk production in postpartum mothers: A bayesian network meta-analysis of randomized controlled trials. *BMC Pregnancy and Childbirth*, *24*(1), 819. https://doi.org/10.1186/s12884-024-07027-4

UNIVERSITAS
GADJAH MADA
Kajian In Silico Mekanisme Aktivitas Galaktagog Kombinasi Katuk (Sauropus androgynus), Kelor (Moringa oleifera), Dan Temulawak (Curcuma xanthorrhiza): Studi Network Pharmacology, Prediksi Farmakokinetik, Molecular Docking, dan Molecular Dynamics.
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Slepicka, P. F., Somasundara, A. V. H., & Dos Santos, C. O. (2021). The molecular basis of mammary gland development and epithelial differentiation. *Seminars in Cell & Developmental Biology*, *114*, 93–112. https://doi.org/10.1016/j.semcdb.2020.09.014

Sliwoski, G., Kothiwale, S., Meiler, J., & Lowe, E. W. (2014). Computational methods in drug discovery. *Pharmacological Reviews*, *66*(1), 334–395. https://doi.org/10.1124/pr.112.007336

Soka, S., Alam, H., Boenjamin, N., Agustina, T. W., & Suhartono, M. T. (2010). Effect of Sauropus androgynus Leaf Extracts on the Expression of Prolactin and Oxytocin Genes in Lactating BALB/C Mice. *Lifestyle Genomics*, *3*(1), 31–36. https://doi.org/10.1159/000319710

Spatz, D. L., Rodríguez, S. Á., Benjilany, S., Finderle, B., Von Gartzen, A., Yates, A., & Brumley, J. (2024). Having Enough Milk to Sustain a Lactation Journey: A Call to Action. *Nursing for Women's Health*, *28*(4), 256–263. https://doi.org/10.1016/j.nwh.2024.02.007

Stea, D. M., & D'Alessio, A. (2025). Caveolae: Metabolic Platforms at the Crossroads of Health and Disease. *International Journal of Molecular Sciences*, *26*(7), 2918. https://doi.org/10.3390/ijms26072918

Stefan, S. M., & Rafehi, M. (2024). Medicinal polypharmacology—A scientific glossary of terminology and concepts. *Frontiers in Pharmacology*, *15*, 1419110. https://doi.org/10.3389/fphar.2024.1419110

Sternlicht, M. D., & Sunnarborg, S. W. (2008). The ADAM17-amphiregulin-EGFR axis in mammary development and cancer. *Journal of Mammary Gland Biology and Neoplasia*, *13*(2), 181–194. https://doi.org/10.1007/s10911-008-9084-6

Sudhesh Dev, S., Zainal Abidin, S. A., Farghadani, R., Othman, I., & Naidu, R. (2021). Receptor Tyrosine Kinases and Their Signaling Pathways as Therapeutic Targets of Curcumin in Cancer. *Frontiers in Pharmacology*, *12*, 772510. https://doi.org/10.3389/fphar.2021.772510

Suganya, J., Kumar, G. R., Radha, M., & Mandaly Devi, S. (2022). A Computational approach in identifying the herbal compounds as Lactation inducer. *Research Journal of Pharmacy and Technology*, *15*(8), 3345–3350. https://doi.org/10.52711/0974-360X.2022.00559

Sumner, L. W., Amberg, A., Barrett, D., Beale, M. H., Beger, R., Daykin, C. A., Fan, T. W.-M., Fiehn, O., Goodacre, R., Griffin, J. L., Hankemeier, T., Hardy, N., Harnly, J., Higashi, R., Kopka, J., Lane, A. N., Lindon, J. C., Marriott, P., Nicholls, A. W., … Viant, M. R. (2007). Proposed minimum reporting standards for chemical analysis: Chemical Analysis Working Group (CAWG) Metabolomics Standards Initiative (MSI). *Metabolomics*, *3*(3), 211–221. https://doi.org/10.1007/s11306-007-0082-2

Sun, C., Mezzadra, R., & Schumacher, T. N. (2018). Regulation and Function of the PD-L1 Checkpoint. *Immunity*, *48*(3), 434–452. https://doi.org/10.1016/j.immuni.2018.03.014

Suryawan, A. Z., & Lazarosony, N. R. (2021). The effect of Katuk leaf to breastfeeding mother: A literature review. *Indonesian Journal of Perinatology*, *2*(2), 25–28. https://doi.org/10.51559/inajperinatol.v2i2.12

Syamsudin, R. A. M. R., Perdana, F., Mutiaz, F. S., Galuh, V., Rina, A. P. A., Cahyani, N. D., Aprilya, S., Yanti, R., & Khendri, F. (2019). Temulawak Plant (curcuma Xanthorrhizaroxb) as Atraditional Medicine. *Jurnal Ilmiah Farmako Bahari*, *10*(1), 51–65.

Tabares, F. P., Bedoya Jaramillo, J. V., & Ruiz-Cortés, Z. T. (2014). Pharmacological Overview of Galactogogues. *Veterinary Medicine International*, *2014*, 1–20. https://doi.org/10.1155/2014/602894

Tan, M. L., Foong, S. C., Foong, W. C., & Ho, J. J. (2022). Use of Galactagogues in a Multi-Ethnic Community in Southeast Asia: A Descriptive Study. *International Journal of Women's Health*, *Volume 14*, 1395–1404. https://doi.org/10.2147/IJWH.S366288

Tschiderer, L., Willeit, P., & Peters, S. A. E. (2022). The cardiovascular benefits of breastfeeding to mothers. *Expert Review of Cardiovascular Therapy*, *20*(8), 589–592. https://doi.org/10.1080/14779072.2022.2100761

Wang, B., Shi, L., Men, J., Li, Q., Hou, X., Wang, C., & Zhao, F. (2020). Controlled synchronization of prolactin/STAT5 and AKT1/mTOR in bovine mammary epithelial cells. *In Vitro Cellular & Developmental Biology - Animal*, *56*(3), 243–252. https://doi.org/10.1007/s11626-020-00432-x

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Wang, E., Sun, H., Wang, J., Wang, Z., Liu, H., Zhang, J. Z. H., & Hou, T. (2019). End-Point Binding Free Energy Calculation with MM/PBSA and MM/GBSA: Strategies and Applications in Drug Design. *Chemical Reviews*, *119*(16), 9478–9508. https://doi.org/10.1021/acs.chemrev.9b00055

Wang, S., Sun, X., Cui, W., & Yuan, S. (2022). MM/PB(GB)SA benchmarks on soluble proteins and membrane proteins. *Frontiers in Pharmacology*, *13*, 1018351. https://doi.org/10.3389/fphar.2022.1018351

WHO, & UNICEF. (2023). Global Breastfeeding Scorecard 2023: Rates of Breastfeeding Increase Around the World Through Improved Protection and Support. *Who.Int*. https://www.unicef.org/media/150586/file

Widhiastuti, E., Yunianto, B., & Sugiyartiningsih, S. (2018). The Effect of Temulawak (curcuma Xanthorrhiza or Javanese Ginger) on the Breast Milk Production of Post Partum Mothers at Ningsih Independent Midwife Tawangmangu. *Malaysian Journal of Medical Research*, *2*(2), 30–34. https://doi.org/10.31674/mjmr.2018.v02i02.005

Williams, M. M., Vaught, D. B., Joly, M. M., Hicks, D. J., Sanchez, V., Owens, P., Rahman, B., Elion, D. L., Balko, J. M., & Cook, R. S. (2017). ErbB3 drives mammary epithelial survival and differentiation during pregnancy and lactation. *Breast Cancer Research*, *19*(1), 105. https://doi.org/10.1186/s13058-017-0893-7

Wu, W.-I., Voegtli, W. C., Sturgis, H. L., Dizon, F. P., Vigers, G. P. A., & Brandhuber, B. J. (2010). Crystal Structure of Human AKT1 with an Allosteric Inhibitor Reveals a New Mode of Kinase Inhibition. *PLoS ONE*, *5*(9), e12913. https://doi.org/10.1371/journal.pone.0012913

Xia, M., Luo, J., Wang, J., & Liang, Y. (2022). Association between breastfeeding and postpartum depression: A meta-analysis. *Journal of Affective Disorders*, *308*, 512–519. https://doi.org/10.1016/j.jad.2022.04.091

Xiong, G., Wu, Z., Yi, J., Fu, L., Yang, Z., Hsieh, C., Yin, M., Zeng, X., Wu, C., Lu, A., Chen, X., Hou, T., & Cao, D. (2021). ADMETlab 2.0: An integrated online platform for accurate and comprehensive predictions of ADMET properties. *Nucleic Acids Research*, *49*(W1), W5–W14. https://doi.org/10.1093/nar/gkab255

Xu, R., Nelson, C. M., Muschler, J. L., Veiseh, M., Vonderhaar, B. K., & Bissell, M. J. (2009). Sustained activation of STAT5 is essential for chromatin remodeling and maintenance of mammary-specific function. *The Journal of Cell Biology*, *184*(1), 57–66. https://doi.org/10.1083/jcb.200807021

Yamamoto, M., Abe, C., Wakinaga, S., Sakane, K., Yumiketa, Y., Taguchi, Y., Matsumura, T., Ishikawa, K., Fujimoto, J., Semba, K., Miyauchi, M., Akiyama, T., & Inoue, J. (2019). TRAF6 maintains mammary stem cells and promotes pregnancy-induced mammary epithelial cell expansion. *Communications Biology*, *2*(1), 292. https://doi.org/10.1038/s42003-019-0547-7

Yamamoto, M., Gohda, J., Akiyama, T., & Inoue, J. (2021). TNF receptor-associated factor 6 (TRAF6) plays crucial roles in multiple biological systems through polyubiquitination-mediated NF-κB activation. *Proceedings of the Japan Academy, Series B*, *97*(4), 145–160. https://doi.org/10.2183/pjab.97.009

Yang, Y., Tai, Y., & Fu, Y. (2023). Postpartum Hypogalactia Modern Treatment of Traditional Chinese Medicine. *Current Research in Medical Sciences*, *2*(2), 95–102. https://doi.org/10.56397/CRMS.2023.06.13

Yasin, Z., Nawawi, A., Wibowo, A., Nadhiroh, S. R., & Devy, S. R. (2024). Effects of Moringa oleifera on increasing breast milk in breastfeeding mothers with stunting toddlers in rural Batang-Batang District, Indonesia. *African Journal of Reproductive Health*, *28*(10s), 34–40. https://doi.org/10.29063/ajrh2024/v28i10s.4

Yi, F., Li, L., Xu, L., Meng, H., Dong, Y., Liu, H., & Xiao, P. (2018). In silico approach in reveal traditional medicine plants pharmacological material basis. *Chinese Medicine*, *13*(1), 33. https://doi.org/10.1186/s13020-018-0190-0

Yukinaga, H., & Miyamichi, K. (2025). Oxytocin and neuroscience of lactation: Insights from the molecular genetic approach. *Neuroscience Research*, S0168010225000124. https://doi.org/10.1016/j.neures.2025.01.002

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Yuliani, F. S., Purwono, S., Sadewa, A. H., Heriyanto, D. S., Mara Sabirin, R., & Mustofa, . (2019). Polyherbal formulation containing Saoropus androgynous, Trigonella foenum-graceum, and Moringa oleifera increased the expression of mRNA smooth muscle α-actin (ACTA2) and cytokeratin 14 (CK14) in lactating rats. *Journal of Thee Medical Sciences (Berkala Ilmu Kedokteran)*. https://doi.org/10.19106/JMedSci005102201902

Yun, C.-H., Boggon, T. J., Li, Y., Woo, M. S., Greulich, H., Meyerson, M., & Eck, M. J. (2007). Structures of lung cancer-derived EGFR mutants and inhibitor complexes: Mechanism of activation and insights into differential inhibitor sensitivity. *Cancer Cell*, *11*(3), 217–227. https://doi.org/10.1016/j.ccr.2006.12.017

Zerdes, I., Matikas, A., Bergh, J., Rassidakis, G. Z., & Foukakis, T. (2018). Genetic, transcriptional and post-translational regulation of the programmed death protein ligand 1 in cancer: Biology and clinical correlations. *Oncogene*, *37*(34), 4639–4661. https://doi.org/10.1038/s41388-018-0303-3

Zhang, B., Cheng, J., Zhang, C., Bai, Y., Liu, W., Li, W., Koike, K., Akihisa, T., Feng, F., & Zhang, J. (2020a). Sauropus androgynus L. Merr.-A phytochemical, pharmacological and toxicological review. *Journal of Ethnopharmacology*, *257*, 112778. https://doi.org/10.1016/j.jep.2020.112778

Zhang, B., Cheng, J., Zhang, C., Bai, Y., Liu, W., Li, W., Koike, K., Akihisa, T., Feng, F., & Zhang, J. (2020b). Sauropus androgynus L. Merr.-A phytochemical, pharmacological and toxicological review. *Journal of Ethnopharmacology*, *257*, 112778. https://doi.org/10.1016/j.jep.2020.112778

Zhang, T., Huang, J., Yi, Y., Zhang, X., Loor, J. J., Cao, Y., Shi, H., & Luo, J. (2018). Akt Serine/Threonine Kinase 1 Regulates *de Novo* Fatty Acid Synthesis through the Mammalian Target of Rapamycin/Sterol Regulatory Element Binding Protein 1 Axis in Dairy Goat Mammary Epithelial Cells. *Journal of Agricultural and Food Chemistry*, *66*(5), 1197–1205. https://doi.org/10.1021/acs.jafc.7b05305

Zhao, J., Xu, L., Lv, L., Wang, L., Wang, X., Liang, C., Wang, C., Qiu, Y., & Pei, X. (2023). Network pharmacology and in vivo and in vitro experiments to determine the mechanism behind the effects of Jiawei Yanghe decoction via TLR4/Myd88/NF-κB against mastitis. *Heliyon*, *9*(11), e21219. https://doi.org/10.1016/j.heliyon.2023.e21219