

DAFTAR PUSTAKA

- Ali, S. dan Yosipovitch, G., 2013. Skin pH: From Basic Science to Basic Skin Care. *Acta dermato-venereologica*, **93**(3): 261-267.
- Amaro-Ortiz, A., Yan, B., dan D'Orazio, J.A., 2014. Ultraviolet Radiation, Aging and the Skin: Prevention of Damage by Topical cAMP Manipulation. *Molecules*, **19**: 6202–6219.
- Amberg, N. dan Fogarassy, C., 2019. Green Consumer Behavior in the Cosmetics Market. *Resources*, **8**: 137.
- An, I.-S., An, S., Kang, S.-M., Choe, T.-B., Lee, S.N., Jang, H.H., dkk., 2012. Titrated extract of *Centella asiatica* provides a UVB protective effect by altering microRNA expression profiles in human dermal fibroblasts. *International Journal of Molecular Medicine*, **30**: 1194–1202.
- Anita, M., 2008. Formulasi dan Uji Klinik Gel Anti Jerawat Benzoi Peroksida-HPMC, Fakultas Farmasi.
- Anonin, 2016. *Strong Oxidizing Agents on Chemical Class Standard Operating Procedure*, http://www.cchem.berkeley.edu/rsgrp/SOPs2017/StrongOxidizingAgents_Sarpong.pdf, diakses pada tanggal 18 Februari 2022.
- Anonim, 2019, *Asiaticoside on Voluntary Safety Information Following the Safety Data Sheet Format According to Regulation (EC) No. 1907/2006 (REACH)*, <https://www.carlroth.com/medias/SDB-3972-MT-EN.pdf?context=bWFzdGVyfHNIY3VyaXR5RGF0YXNoZWV0c3wyMTczOTR8YXBwbGljYXRpb24vcGRmfHNIY3VyaXR5RGF0YXNoZWV0cy9oNGEvaDBhLzg5NjkyMzQ0NDg0MTQucGRmfGEwMzU4YjZkMDU1ZTJhZWE0ZDM4ODk0N2YyMTQxOGNjOWE1YTQ1OGViZTg3OTAxMjQ1MTI3MGI2MDUyMGZINWU>, diakses pada 18 Februari 2022.
- Anonymous, 2018. 'Centellae asiaticae herba', *Text, European Medicines Agency*. URL: <https://www.ema.europa.eu/en/medicines/herbal/centellae-asiaticae-herba>, diakses pada tanggal 15 Agustus 2021.
- Anukunwithaya, T., Tantisira, M.H., Tantisira, B., dan Khemawoot, P., 2017. Pharmacokinetics of a Standardized Extract of *Centella asiatica* ECa 233 in Rats. *Planta Medica*, **83**: 710–717.
- Arisanty, A., Sinala, S., Sukmawaty, M., dan Masna, A., 2021. Formulasi Sediaan Lotion Sari Kering Herba Pegagan (*Centella Asiatica* (L.) Urban) dengan Variasi Konsentrasi Emulgator Span 60 dan Tween 60. *Media Farmasi*, **16**: 1–8.
- Astuti, I.Y., Yupiterawati, A., dan Nurulita, N.A., 2021. Anti-aging activity of tetrahydrocurcumin, *Centella asiatica* extract, and its mixture. *Advances in Traditional Medicine*, **21**: 57–63.

- Azerad, R., 2016. Chemical structures, production and enzymatic transformations of saponins and saponins from *Centella asiatica* (L.) Urban. *Fitoterapia*, **114**: 168–187.
- Azis, H.A., Taher, M., Ahmed, A.S., Sulaiman, W.M.A.W., Susanti, D., Chowdhury, S.R., dkk., 2017. In vitro and In vivo wound healing studies of methanolic fraction of *Centella asiatica* extract. *South African Journal of Botany*, **108**: 163–174.
- Budi, S. dan Rahmawati, M., 2020. Pengembangan Formula Gel Ekstrak Pegagan (*Centella asiatica* (L.) Urb) sebagai Antijerawat. *Jurnal Farmasi dan Ilmu Kefarmasian Indonesia*, **6**: 51–55.
- Buranasudja, V., Rani, D., Malla, A., Kobtrakul, K., dan Vimolmangkang, S., 2021. Insights into antioxidant activities and anti-skin-aging potential of callus extract from *Centella asiatica* (L.). *Scientific Reports*, **11**: 13459.
- Badan POM RI, 2019, Peraturan Badan Pengawas Obat dan Makanan Nomor 23 Tahun 2019 Tentang Persyaratan Teknis Kosmetika, Badan POM RI, Jakarta.
- Bylka, Wiesława, Znajdek-Awizeń, P., Studzińska-Sroka, E., dan Brzezińska, M., 2013. *Centella asiatica* in cosmetology. *Advances in Dermatology and Allergology/Postępy Dermatologii I Alergologii*, **30**: 46–49.
- Bylka, W., Znajdek-Awizeń, P., Studzińska-Sroka, E., dan Brzezińska, M., 2013. *Centella asiatica* in cosmetology. *Postępy Dermatologii i Alergologii*, **30**: 46–49.
- Bylka, W., Znajdek-Awizeń, P., Studzińska-Sroka, E., Dańczak-Pazdrowska, A., dan Brzezińska, M., 2014. *Centella asiatica* in dermatology: an overview. *Phytotherapy research: PTR*, **28**: 1117–1124.
- Camacho-Alonso, F., Torralba-Ruiz, M.R., García-Carrillo, N., Lacal-Luján, J., Martínez-Díaz, F., dan Sánchez-Siles, M., 2019. Effects of topical applications of porcine acellular urinary bladder matrix and *Centella asiatica* extract on oral wound healing in a rat model. *Clinical Oral Investigations*, **23**: 2083–2095.
- Choi, M.-J., Zheng, H.-M., Kim, J.M., Lee, K.W., Park, Y.H., dan Lee, D.H., 2016. Protective effects of *Centella asiatica* leaf extract on dimethylnitrosamine-induced liver injury in rats. *Molecular Medicine Reports*, **14**: 4521–4528.
- Damayanti A. T. R., 2016, *Pengaruh Konsentrasi HPMC dan Propilen Glikol terhadap Sifat dan Stabilitas Fisik Sediaan Gel Ekstrak Pegagan (Centella asiatica (L.) Urban)*, Skripsi, Universitas Sanata Dharma: Yogyakarta.
- da Rocha, P.B.R., Souza, B. dos S., Andrade, L.M., dos Anjos, J.L.V., Mendanha, S.A., Alonso, A., dkk., 2019. Enhanced asiaticoside skin permeation by

Centella asiatica-loaded lipid nanoparticles: Effects of extract type and study of stratum corneum lipid dynamics. *Journal of Drug Delivery Science and Technology*, **50**: 305–312.

- de Villiers M., 2017, *Ointment Bases*, University of Wisconsin-Madison, 277-290.
- Dewi, A.D.S.P., Jufri, M., dan Iskandarsyah, 2018. Development and In Vitro penetration test of ethosomal cream-containing pegagan (*Centella asiatica*) herbal extract. *International Journal of Applied Pharmaceutics*, **10**: 120–125.
- Erdogan Orhan, I., 2012. *Centella asiatica* (L.) Urban: From Traditional Medicine to Modern Medicine with Neuroprotective Potential. *Evidence-based complementary and alternative medicine: eCAM*, **2012**: 946259.
- Ermawati, D.E. dan Ramadhani, C.I., 2020. Formulation of Anti-Acne Gel of *Moringa oleifera*, L. Ethanolic Extract and Antibacterial Test on *Staphylococcus epidermidis*. *Majalah Farmaseutik*, **16**: 154–162.
- Febriani, A., Maruya, I., dan Sulistyaningsih, F., 2020. Formulasi dan Uji Iritasi Sediaan Gel Kombinasi Ekstrak Etanol Rimpang Kencur (*Kaempferia galanga* L.) dan Ekstrak Etanol Herba Pegagan (*Centella asiatica* (L.) Urban). *SAINSTECH FARMA*, **13**: 45–54.
- Fujiastuti, T. dan Sugihartini, N., 2015. Sifat Fisik Dan Daya Iritasi Gel Ekstrak Etanol Herba Pegagan (*Centella asiatica* L.) dengan Variasi Jenis Gelling Agent. *PHARMACY: Jurnal Farmasi Indonesia (Pharmaceutical Journal of Indonesia)*, **12**: 11–20.
- Ganceviciene, R., Liakou, A.I., Theodoridis, A., Makrantonaki, E., dan Zouboulis, C.C., 2012. Skin anti-aging strategies. *Dermato-endocrinology*, **4**: 308–319.
- Gray, N.E., Alcazar Magana, A., Lak, P., Wright, K.M., Quinn, J., Stevens, J.F., dkk., 2018. *Centella asiatica*: phytochemistry and mechanisms of neuroprotection and cognitive enhancement. *Phytochemistry Reviews*, **17**: 161–194.
- Hanifah, M. dan Jufri, M., 2018a. Formulation and Stability Testing of Nanoemulsion Lotion Containing *Centella asiatica* Extract. *Journal of Young Pharmacists*, **10**: 404–408.
- Hanifah, M. dan Jufri, M., 2018b. Formulation and Stability Testing of Nanoemulsion Lotion Containing *Centella asiatica* Extract. *Journal of Young Pharmacists*, **10**: 404–408.
- Hashim, P., Sidek, H., Helan, M.H.M., Sabery, A., Palanisamy, U.D., dan Ilham, M., 2011. Triterpene composition and bioactivities of *Centella asiatica*. *Molecules (Basel, Switzerland)*, **16**: 1310–1322.
- Hasriyani, H., Krisgiantara, N., Djamal, J.M., Murharyanti, R., dan Etikasari, R., 2021. Uji Sifat Fisik Gel Ekstrak Herba Pegagan (*Centella asiatica* (L.)

Urban) dengan Variasi Konsentrasi Carbopol sebagai *Gelling Agent*. *Proceeding of the URECOL*, 329–335.

- Hendriana P. V., 2016, *Pengaruh Konsentrasi CMC-Na Sebagai Gelling Agent dan Propilen Glikol sebagai Humektan terhadap Sifat Fisik dan Stabilitas Fisik Gel Ekstrak Pegagan (Centella asiatica (L.) Urban)*, Skripsi, Universitas Sanata Dharma: Yogyakarta.
- Hidayah, U.N.W., Dr. TN Saifullah Sulaiman, M.S., dan Tanti Azizah Sujono, M.S., 2013. 'Formulasi Sediaan Gel Ekstrak Herba Pegagan (*Centella Asiatica* L. Urban) Dengan HPMC SH 60 Sebagai Gelling Agent Dan Uji Penyembuhan Luka Bakar Pada Kulit Punggung Kelinci Jantan', Universitas Muhammadiyah Surakarta.
- International Council for Harmonisation. 2003. 'Stability Testing of new Drug Substances and Products Q1A (R2)'. London: European Medicines Agency.
- James, J. dan Dubery, I., 2011. Identification and Quantification of Triterpenoid Centelloids in *Centella asiatica* (L.) Urban by Densitometric TLC. *JPC – Journal of Planar Chromatography – Modern TLC*, **24**: 82–87.
- Jung, E., Lee, J.-A., Shin, S., Roh, K.-B., Kim, J.-H., dan Park, D., 2013. Madecassoside Inhibits Melanin Synthesis by Blocking Ultraviolet-Induced Inflammation. *Molecules*, **18**: 15724–15736.
- Kim, S.H., Seo, H.-S., Jang, B.-H., Shin, Y.-C., dan Ko, S.-G., 2014. The effect of *Rhus verniciflua* Stokes (RVS) for anti-aging and whitening of skin. *Oriental Pharmacy and Experimental Medicine*, **14**: 213–222.
- Kwon, M.C., Choi, W.Y., Seo, Y.C., Kim, J.S., Yoon, C.S., Lim, H.W., dkk., 2012. Enhancement of the skin-protective activities of *Centella asiatica* L. Urban by a nano-encapsulation process. *Journal of Biotechnology*, **157**: 100–106.
- Lai-Cheong, J.E. dan McGrath, J.A., 2021. Structure and function of skin, hair and nails. *Medicine*, **49**: 337–342.
- Lee, J.-H., Kim, H.-L., Lee, M.H., You, K.E., Kwon, B.-J., Seo, H.J., dkk., 2012. Asiaticoside enhances normal human skin cell migration, attachment and growth in vitro wound healing model. *Phytomedicine*, **19**: 1223–1227.
- Li, H., Peng, Q., Guo, Y., Wang, X., dan Zhang, L., 2020. Preparation and in vitro and in vivo Study of Asiaticoside-Loaded Nanoemulsions and Nanoemulsions-Based Gels for Transdermal Delivery. *International Journal of Nanomedicine*, **15**: 3123–3136.
- Liu, M., Li, Z., Wang, H., dan Du, S., 2016. Increased cutaneous wound healing effect of biodegradable liposomes containing madecassoside: preparation optimization, in vitro dermal permeation, and in vivo bioevaluation. *International Journal of Nanomedicine*, **Volume 11**: 2995–3007.

- Maphosa, Y. dan Jideani, V.A., 2018. *Factors Affecting the Stability of Emulsions Stabilised by Biopolymers*, Science and Technology Behind Nanoemulsions. IntechOpen.
- Mayba, J.N. dan Gooderham, M.J., 2018. A Guide to Topical Vehicle Formulations. *Journal of Cutaneous Medicine and Surgery*, **22**: 207–212.
- McGrath, J.A. dan Uitto, J., 2016. Structure and Function of the Skin, dalam: *Rook's Textbook of Dermatology, Ninth Edition*. American Cancer Society, hal. 1–52.
- Meliana, Y. dan Septiyanti, M., 2018. Karakterisasi Sediaan Topikal Anti Aging Dari Kombinasi Ekstrak Pegagan dan Kulit Buah Manggis. *Jurnal Sains Materi Indonesia*, **17**: 178–183.
- Monton, C., Settharaksa, S., Luprasong, C., dan Songsak, T., 2019. An optimization approach of dynamic maceration of *Centella asiatica* to obtain the highest content of four centelloids by response surface methodology. *Revista Brasileira de Farmacognosia*, **29**: 254–261.
- National Center for Biotechnology Information, 2022. *PubChem Compound Summary for CID 108062, Asiaticoside*. Diakses pada 11 Februari 2022 dari <https://pubchem.ncbi.nlm.nih.gov/compound/Asiaticoside>.
- Ncube, E.N., Steenkamp, P.A., Madala, N.E., dan Dubery, I.A., 2016. Chlorogenic Acids Biosynthesis in *Centella asiatica* Cells Is not Stimulated by Salicylic Acid Manipulation. *Applied Biochemistry and Biotechnology*, **179**: 685–696.
- Nur, W., 2015. 'Formulasi Sediaan Masker Gel dari Ekstrak Etanol Herba Pegagan (*Centella asiatica*(L) Urb) dengan Berbagai Variasi Basis', Universitas Islam Negeri Alauddin Makassar.
- Pai, V., Shukla, P., dan Kikkeri, N., 2014. Antioxidants in dermatology. *Indian dermatology online journal*, **5**: 210–4.
- Pamornpathomkul, B., Rangsimawong, W., Rojanarata, T., Opanasopit, P., Chaiyodsilp, C., dan Ngawhirunpat, T., 2018. Lipid-based nanocarriers to enhance skin permeation and antioxidant activity of *Centella asiatica* extract. *MATEC Web of Conferences*, **192**: 01016.
- Paocharoen, V., 2010. The Efficacy and Side Effects of Oral *Centella asiatica* extract for Wound Healing Promotion in Diabetic Wound Patients **93**: 5.
- Patil, P.B., Datir, S.K., dan Saudagar, R.B., 2019. A Review on Topical Gels as Drug Delivery System. *Journal of Drug Delivery and Therapeutics*, **9**: 989–994.
- Poljšak, B. dan Dahmane, R., 2012. Free Radicals and Extrinsic Skin Aging. *Dermatology Research and Practice*, **2012**: 135206.

- Pratimasari, D., Sugihartini, N., dan Yuwono, T., 2015. Evaluasi Sifat Fisik dan Uji Iritasi Sediaan Salep Minyak Atsiri Bunga Cengkeh dalam Basis Larut Air. *Jurnal Ilmiah Farmasi*, **11**: 9–15.
- Proksch, E., 2018. pH in nature, humans and skin. *The Journal of Dermatology*, **45**: 1044–1052.
- Putri, E., Angkasa, C., Ginting, C.N., Chiuman, L., dan Lister, I.N.E., 2019. Comparison of Anti-Aging Effectiveness from Gotu Kola Extract Cream (*Centella asiatica*) and Robusta Coffee Cream (*Coffea canephora*) Toward Hydration Levels in Male Mus Musculus Skin. *American Academic Scientific Research Journal for Engineering, Technology, and Sciences*, **61**: 192–201.
- PubChem, 2022, *Compound Summary for CID 108062, Asiaticoside*, <https://pubchem.ncbi.nlm.nih.gov/compound/Asiaticoside>, diakses pada 18 Februari 2022.
- Puttarak, P. dan Brantner, A., 2016a. Biological Activities and Stability of a Standardized Pentacyclic Triterpene Enriched *Centella asiatica* Extract. *Natural Product Sciences*, **22**: 20.
- Puttarak, P. dan Brantner, A., 2016b. Biological Activities and Stability of a Standardized Pentacyclic Triterpene Enriched *Centella asiatica* Extract. *Natural Product Sciences*, **22**: 20.
- Ratz-Lyko, A., Arct, J., dan Pytkowska, K., 2016. Moisturizing and Antiinflammatory Properties of Cosmetic Formulations Containing *Centella asiatica* Extract. *Indian Journal of Pharmaceutical Sciences*, **78**: 27–33.
- Rowe R.C, P.J, Sheskey, & M.E, Q, 2009, *Handbook of Pharmaceutical Excipients*, Sixth Edition. USA: Pharmaceutical Press.
- Sabaragamuwa, R., Perera, C.O., dan Fedrizzi, B., 2018. *Centella asiatica* (Gotu kola) as a neuroprotectant and its potential role in healthy ageing. *Trends in Food Science & Technology*, **79**: 88–97.
- Saha, S., 2017. Log P in Encyclopedia of Physical Organic Chemistry. hal. 629–650.
- Saraf, S., 2012. Formulating Moisturizers Using Natural Raw Materials. *Treatment of Dry Skin Syndrome*, 379–397.
- Sari, R.K., Wistara, N.J., Nawawi, D.S., Meisaroh, N., Wientarsih, I., Agungpriyono, D.R., dkk., 2017. Stabilitas Fisikokimia dan Sifat Antipenuaan Kulit Formula Krim Berbahan Aktif Alami (Physicochemical stabilities and Skin Antiaging Properties of Bioactive-based Cream Formulas). *Jurnal Ilmu dan Teknologi Kayu Tropis*, **15**: 29–37.
- Sawatdee S., Atiparin A., 2020. Formulation and Stability Evaluation of Cream Containing *Chromolaena odorata* and *Centella asiatica* Leaf Extracts.

International Journal of Pharmaceutical Sciences and Research, **11(1)**: 282-287.

- Sayuti, N.A., 2015. Formulasi dan Uji Stabilitas Fisik Sediaan Gel Ekstrak Daun Ketepeng Cina (*Cassia alata* L.). *Jurnal Kefarmasian Indonesia*, **5**: 74–82.
- Setyawaty, R., Widayat, W., dan Dewanto, D., 2020. Formulation and Evaluation of Physical Characteristics of Red Rice Extract (*Oryza Glaberrima* Steud) Lotion. *Majalah Farmaseutik*, **16**: 20–26.
- Sh. Ahmed, A., Taher, M., Mandal, U.K., Jaffri, J.M., Susanti, D., Mahmood, S., dkk., 2019. Pharmacological properties of *Centella asiatica* hydrogel in accelerating wound healing in rabbits. *BMC Complementary and Alternative Medicine*, **19**: 213.
- Simões, A., Miranda, M., Cardoso, C., dan Vitorino, F.V., 2020. Rheology by Design: A Regulatory Tutorial for Analytical Method Validation. *Pharmaceutics*, **12**: E820.
- Sondari, D., Irawadi, T.T., Setyaningsih, D., dan Tursiloadi, S., 2018. Studi Awal Pengaruh Metode Ekstraksi terhadap Rendemen dan Kadar *Asiaticoside* dari *Centella Asiatica* (L) Urb. *Jurnal Sains Materi Indonesia*, **17**: 124–130.
- Sujono, T.A., Hidayah, U.N.W., dan Sulaiman, T.N.S., 2014. Efek Gel Ekstrak Herba Pegagan (*Centella Asiatica* L. Urban) dengan *Gelling Agent Hidroksipropil Methylcellulose* terhadap Penyembuhan Luka Bakar pada Kulit Punggung Kelinci. *Biomedika*, **6 (2)**: 9-17.
- Sumiati, T., Effendy, F., dan Riani, E., 2019. Formulasi Losion Ekstrak Herba Pegagan (*Centella Asiatica* (L.) Urban) dan Uji Mutu serta Stabilitasnya. *Jurnal Farmamedika (Pharmamedika Journal)*, **4**: 62–69.
- SNI, 1996, *SNI. 16-4399-1996 Sediaan Tabir Surya*, Dewan Standardisasi Nasional, Jakarta.
- Sun, B., Wu, L., Wu, Y., Zhang, C., Qin, L., Hayashi, M., dkk., 2020. Therapeutic Potential of *Centella asiatica* and Its Triterpenes: A Review. *Frontiers in Pharmacology*, **11**: 568032.
- Talianu, M.-T., Dinu-Pîrvu, C., Ghica, M., Anuța, V., Jînga, V., dan Popa, L., 2020. Foray into Concepts of Design and Evaluation of Microemulsions as a Modern Approach for Topical Applications in Acne Pathology. *Nanomaterials*,
- Verma, N., Kumari, U., Mittal, S., dan Mittal, A.K., 2017. Effect of asiaticoside on the healing of skin wounds in the carp *Cirrhinus mrigala*: An immunohistochemical investigation. *Tissue and Cell*, **49**: 734–745.
- Wijayadi, L.Y. dan Darmawan, H., 2017. Asiaticoside increases aquaporin-3 protein expression in the cytoplasm of normal human epidermal keratinocytes. *Universa Medicina*, **36**: 25–33.

- Wulandari P., 2015, *Formulasi dan Evaluasi Sifat Fisik Sediaan Gel Ekstrak Pegagan (*Centella asiatica* (L.) Urban) dengan Gelling Agent Karbopol 940 dan Humektan Propilen Glikol*, Skripsi, Universitas Sanata Dharma: Yogyakarta.
- Yao, C.-H., Yeh, J.-Y., Chen, Y.-S., Li, M.-H., dan Huang, C.-H., 2017. Wound-healing effect of electrospun gelatin nanofibres containing *Centella asiatica* extract in a rat model. *Journal of Tissue Engineering and Regenerative Medicine*, **11**: 905–915.
- Yuliani, S. H., 2010. Optimasi Kombinasi Campuran Sorbitol, Gliserol, dan Propilen glikol dalam Gel *Sunscreen* Ekstrak Etanol *Curcuma mangga*. *Majalah Farmasi Indonesia*, 2(2): 83-89.
- Yuliati, L., Mardiyati, E., Bramono, K., dan Freisleben, H.J., 2015. Asiaticoside induces cell proliferation and collagen synthesis in human dermal fibroblasts. *Universa Medicina*, **34**: 96–103.
- Zahara, K., Bibi, Y., dan Tabassum, S., 2014. Clinical and therapeutic benefits of *Centella asiatica*. *Pure and applied biology*, **3**: 152–159.
- Zhang, S. dan Duan, E., 2018. Fighting against Skin Aging. *Cell Transplantation*, **27**: 729–738.
- Zothanpuui, F., Ravindran, R., dan Kanthiah, S., 2020. A Review on Stability Testing Guidelines of Pharmaceutical Products. *Asian Journal of Pharmaceutical and Clinical Research*, **13**: 2020.
- Zulkarnain, A.K., Susanti, M., dan Lathifa, A.N., 2015. The Physical Stability of Lotion O/W And W/O From *Phaleria Macrocarpa* Fruit Extract as Sunscreen and Primary Irritation Test on Rabbit. *Majalah Obat Tradisional*, **18**: 141–150.