

## Documents

Warsi, W.<sup>a c</sup>, Jaswir, I.<sup>b c</sup>, Khatib, A.<sup>a</sup>, Ahmed, Q.U.<sup>a</sup>, Nawi, M.S.B.M.<sup>a</sup>, Ahda, M.<sup>a c</sup>, Rohman, A.<sup>d</sup>, Ardini, Y.D.<sup>e</sup>

**PHYTOCONSTITUENTS ASSESSMENT AND TOXICITY STUDY OF *Gelidium spinosum* WATER EXTRACT IN ZEBRAFISH (*Danio rerio*) EMBRYOS**

(2023) *Rasayan Journal of Chemistry*, 16 (3), pp. 1883-1891.

DOI: 10.31788/RJC.2023.1638375

<sup>a</sup> Department of Pharmaceutical Chemistry, Kulliyah of Pharmacy, International Islamic University Malaysia, Pahang Darul Makmur, Kuantan, 25200, Malaysia

<sup>b</sup> International Institute for Halal Research and Training, International Islamic University Malaysia, Gombak, Kuala Lumpur, 53100, Malaysia

<sup>c</sup> Faculty of Pharmacy, Universitas Ahmad Dahlan, Yogyakarta, 55164, Indonesia

<sup>d</sup> Center of Excellence, Institute of Halal Industry and Systems (PUI-PT IHIS), Universitas Gadjah Mada, Yogyakarta, 55281, Indonesia

<sup>e</sup> Paediatric Dentistry and Dental Public Health Department, Kulliyah of Dentistry, International Islamic University Malaysia, Pahang Darul Makmur, Kuantan, 25200, Malaysia

#### Abstract

*Gelidium spinosum* belongs to red seaweed that is used as a food ingredient to heal a variety of diseases. Awareness about the potential medicinal value and actual research data on this plant's toxic effect is currently insufficient. Hence, the current study aimed to determine phytoconstituents using Gas Chromatography-Mass Spectrometry (GC-MS), and investigated the toxic effect of *Gelidium spinosum* Water Extract (GsWE) using zebrafish (*Danio rerio*) embryos model. Results of the identification confirmed some known phytoconstituents including alkaloid, cinnamic acid ester, heterocyclic aromatic, organic fatty acids, fatty alcohol, and sugars. Results of a toxicity study of GsWE showed a concentration-dependent increase in mortality and yolk size, meanwhile a decrease in eye size, body length, and heartbeat rate on zebrafish embryos. The median lethal concentration (LC50) of GsWE was obtained at 707.38 mg/L. It was considered in the safe category. GsWE did not affect to zebrafish embryo development at low concentrations. In high concentrations, zebrafish embryos showed abnormalities, such as loss of pigmentation, pericardial oedema, and yolk oedema. The results of this investigation will contribute to reinforcing the safety of *G. spinosum*-related food supplement manufacturing. © 2023, Rasayan Journal of Chemistry, c/o Dr. Pratima Sharma. All rights reserved.

#### Author Keywords

*Danio rerio*; *Gelidium spinosum*; Seaweed; Toxicity; Water Extract; Zebrafish

#### Funding details

Universitas Ahmad DahlanUADPDD-098/SP3/LPPM-UAD/VI/2021

The project was funded by The Unit of Research and Community Service, Universitas Ahmad Dahlan, Yogyakarta, Indonesia, through a doctoral dissertation grant (number: PDD-098/SP3/LPPM-UAD/VI/2021).

#### References

- Moubayed, N.M.S., Al Hourri, H.J., Al Khulaifi, M.M., Al Farraj, D.A. (2017) *Saudi Journal of Biological Sciences*, 24 (1), p. 162.
- Gullón, B., Gagaoua, M., Barba, F.J., Gullón, P., Zhang, W., Lorenzo, J.M. (2020) *Trends Food Science Technology*, 100, p. 1.
- Hossain, Md.S., Sifat, S.A., Hossain, M.A., Salleh, S., Hossain, M., Akter, S., Hossain, M.B. (2021) *Regional Studies in Marine Science*, 46, p. 101878.
- Pandey, A., Pandey, S., Rajneesh, J. Pathak, Ahmed, H., Singh, V., Singh, S.P., Sinha, R.P. (2017) *International Journal of Applied Sciences and Biotechnology*, 5 (1), p. 12.
- Mittal, R., Raghavarao, K.S.M.S. (2018) *Algal Research*, 34, p. 1.

- Olasehinde, T.A., Olaniran, A.O., Okoh, A.I.  
(2019) *Pharmaceutical Biology*, 57 (1), p. 460.
- Martínez-Sanz, M., Gómez-Mascaraque, L.G., Ballester, A.R., Martínez-Abad, A., Brodkorb, A., López-Rubio, A.  
(2019) *Algal Research*, 38, p. 101420.  
1
- Cui, M., Wu, J., Wang, S., Shu, H., Zhang, M., Liu, K., Liu, K.  
(2019) *International Journal Biology Macromolecules*, 129, p. 377.
- Poulouse, N., Sajayan, A., Ravindran, A., Chandran, A., Priyadharshini, G.B., Selvin, J., Kiran, G.S.  
(2021) *Frontiers in Nutrition*, 8, p. 694362.
- Miranda, J.M., Trigo, M., Barros-Velázquez, J., Aubourg, S.P.  
(2022) *Foods*, 11 (7), p. 904.  
1
- El-Din, S.M.M., Alagawany, N.I.  
(2019) *Thalassas An International Journal of Marine Sciences*, 35 (2), p. 381.
- Choi, J., Kim, K.J., Koh, E.J., Lee, B.Y.  
(2018) *Nutrients*, 10 (1), p. 51.  
1
- Pei, Y., Yang, S., Xiao, Z., Zhou, C., Hong, P., Qian, Z.J.  
(2021) *Frontiers Bioengineering and Biotechnology*, 9, p. 794818.
- Prasedya, E.S., Ardiana, N., Padmi, H., Ilhami, B.T.K., Martyasari, N.W.R., Sunarwidhi, A.L., Nikmatullah, A., Frediansyah, A.  
(2021) *Molecules*, 26 (21), p. 6568.  
1
- Schneider, G., Figueroa, F.L., Vega, J., Chaves, P., Álvarez-gómez, F., Korbee, N., Bonomi-Barufi, J.  
(1890) *Algal Research*, 49, p. 101956.  
(2020)
- Situmorang, P.C., Ilyas, S., Hutahaean, S., Rosidah, Manurung, R.D.  
(2020) *Rasayan Journal of Chemistry*, 13 (2), p. 780.
- Lucida, H., Primadini, Y., Suhatri  
(2019) *Rasayan Journal of Chemistry*, 12 (2), p. 727.
- Prakash, V., Jain, V., Chauhan, S.S., Parthasarathi, R., Roy, S.K., Anbumani, S.  
(2022) *Science of Total Environmental*, 804, p. 149920.
- Ng, C.Y.P., Cheng, S.H., Yu, K.N.  
(2017) *Internationa Journal of Molecular Sciences*, 18 (385), p. 1.
- Yuniarto, A., Sukandar, E.Y., Fidrianny, I., Nasrullah, H., Adnyana, I.K.  
(2019) *Rasayan Journal of Chemistry*, 12 (3), p. 1496.
- Nurjanah, M. Nurilmala, E., E., Luthfiyana, N., Hidayat, T.  
(2017) *Proceedings of The Pakistan Academi of Sciences, Part B*, 54 (4), p. 311.
- Nipun, T.S., Khatib, A., Ahmed, Q.U., Nasir, M.H.M., Supandi, F., Taher, M., Saiman, M.Z.  
(2021) *Plants*, 10, p. 2688.
- Paatero, I., Alve, S., Gramolelli, S., Ivaska, J., Ojala, P.  
(2018) *Bio-Protocol*, 8, p. 18.

- Busquet, F., Halder, T. Braunbeck, Lillicrap, A., Kleensang, A., Belanger, S., Carr, G., Wlter, R.  
**OECD guidelines for testing of chemicals 236-Fish embryo acute toxicity (FET) test**  
(2013) *Organanisation for Economic Co-operation and Development*, 236.
- Choe, H., Kim, M.J., Jeon, H.J., im, K., Kim, C., Park, J., Shin, J., Lee, S-E.  
(2021) *Ecotoxicology and Environmental Safety*, 222, p. 112544.
- Abidin, I.Z.Z., Fazry, S., Jamar, N.H., Dyari, H.R.E., Ariffin, Z.Z., Johari, A.N., Ashaari, N.S., Ariffin, S.H.Z.  
(2020) *Scientific Reports*, 10, p. 14165.
- Nguyen, T.H., Nguyen, P-D., Quetin-Leclercq, J., Muller, M., Ly Huong, D.T., Pham, H.T., Kestemont, P.  
(2021) *Journal of Ethnopharmacology*, 267, p. 113538.
- Khan, A.Y.F., Ahmed, Q.U., Nippun, T.S., Hilles, A., Jalal, T.K., Teh, L.K., Salleh, M.Z., Wahab, R.A  
(2020) *Journal Ethnopharmacol*, 262, p. 113138.
- Cornet, C., Calzolari, S., Miñana-Prieto, R., Dyballa, S., van Doornmalen, E., Rutjes, H., Safy, T., Terriente, J.  
(2017) *International Journal of Molecular Sciences*, 18, p. 4.
- Murugesu, S., Khatib, A., Ahmed, Q.U., Ibrahim, Z., Uzir, B.F., Benchoula, K., Yusoff, N.I.N., El-Seedi, H.R.  
(2019) *Toxicology Reports*, 6, p. 1148.
- Zhang, C., Zhang, J., Zhu, L., Du, Z., Wang, J., Wang, J., Li, B., Yang, Y.  
(2020) *Science of The Total Environment*, 715, p. 137069.  
31
- Ganzen, L., Venkatraman, P., Pang, C.P., Leung, Y.F., Zhang, M.  
(2017) *International Journal of Molecular Sciences*, 18, p. 6.
- He, J.H., Guo, S.Y., Zhu, F., Zhu, J.J., Chen, Y.X., Huang, C.J., Gao, J.M., Li, C.Q.  
(2013) *Journal of Pharmacological and Toxicological Methods*, 67, p. 1.
- Abd Rashid, N.A., Lau, B.F., Kue, C.S.  
(2022) *Journal of Ethnopharmacology*, 285, p. 114787.
- Vega, M.R.O., Baldin, E.K., Pereira, D.P., Martins, M.C.S., Pranke, P., Horn, F., Pinheiro, I., Malfatti, F.  
(2022) *Journal of Hazardous Matererials*, 422, p. 126896.
- Iida, T., Yamada, T., Hayashi, N., Okuma, K., Izumori, K., Ishii, R., Matsuo, T.  
(2013) *Food Chemistry*, 138 (2–3), p. 781.  
[RJC-8375/2023]

**Correspondence Address**

Warsi W.; Department of Pharmaceutical Chemistry, Pahang Darul Makmur, Malaysia; email: warsi@pharm.uad.ac.id

**Publisher:** Rasayan Journal of Chemistry, c/o Dr. Pratima Sharma

**ISSN:** 09741496

**Language of Original Document:** English

**Abbreviated Source Title:** Rasayan J. Chem.

2-s2.0-85182461479

**Document Type:** Article

**Publication Stage:** Final

**Source:** Scopus

