

Telaah sistematis potensi ulva lactuca pada lini sel kanker manusia sebagai radiosensitizer = The potential of ulva lactuca on human cancer cell line as a radiosensitizer: a systematic review

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Abstrak

Latar Belakang: Radioterapi adalah salah satu terapi kanker yang telah banyak digunakan untuk mengendalikan tumor secara lokal dan regional. Namun, tumor yang resisten terhadap radiasi dapat mengurangi efektivitas terapi. Radiosensitizer adalah agen penting untuk meningkatkan sensitivitas radiasi. Ulva lactuca (*U. lactuca*) adalah sejenis ganggang dan sudah terbukti memiliki efek antitumor. Diketuinya jalur kerja *U. lactuca* mungkin memberikan pemahaman dasar terkait perannya sebagai radiosensitizer.

Metode: Telaah sistematis dilakukan melalui pencarian literatur pada beberapa database. Pedoman PRISMA digunakan untuk melaporkan hasil pencarian. Studi in vivo atau in vitro yang menganalisis efek *U. lactuca* pada kanker dimasukkan dalam penelitian ini. Telaah kritis dinilai menggunakan Systemic Review Centre for Laboratory animal Experimentation Risk of Bias (SYRCLE RoB) tool pada studi in vivo dan Science in Risk Assessment and Policy (SciRAP) pada studi in vitro.

Hasil: Tujuh artikel dimasukkan dalam telaah sistematis ini. Semua studi in vivo memiliki bias risiko rendah. Dua penelitian melaporkan bahwa *U. lactuca* memiliki efek antitumor (CEA, AFP, kadar bcl-2 menurun dan kadar p53 meningkat). Enam studi menunjukkan bahwa *U. lactuca* juga memiliki efek antioksidan (MDA, TNF alpha, kadar NO menurun, sementara TAC, MPO, SOD, CAT dan GR, GST, kadar GSH meningkat, dengan aktivitas pembersihan radikal). Lima penelitian menunjukkan bahwa *U. lactuca* memiliki aktivitas antikanker terhadap Caco-2 dan HT-29 CRC, MCF-7, Fem-x, HepG2, dan lini sel Hela.

Kesimpulan: Aktivitas radikal bebas, p53, dan caspase-8, 9 adalah jalur utama efek antitumor *U. lactuca*. Jalur ini mungkin mengungkap potensinya sebagai radiosensitizer, yang memerlukan penelitian lebih lanjut.

.....Introduction: Radiotherapy is one of the main treatments for cancer. It had been widely used to control tumor locally and regionally. However, a radioresistant tumor might compromise efficacy of the therapy. Radiosensitizer is an important agent to improve radiation sensitivity. Ulva lactuca (*U. lactuca*) is a type of algae with known antitumor effects. Analysis of its molecular pathway might provide basic understanding of its role as radiosensitizer.

Method: A systematic review was conducted through literature searching on several databases. PRISMA guideline was used to present the results. In vivo or in vitro study which analyzed *U. lactuca* effects on cancer were included in this study. In vivo studies were critically appraised using Systemic Review Centre for Laboratory animal Experimentation Risk of Bias (SYRCLE RoB) tool and in vitro studies were critically appraised using Science in Risk Assessment and Policy (SciRAP).

Result: Seven articles were included in this systematic review. All in vivo studies had low risk bias. Two studies reported that *U. lactuca* had antitumor effect (CEA, AFP, decreased bcl-2 levels and increased p53 level). Six studies showed that *U. lactuca* also had antioxidant effect (MDA, TNF alpha, decreased NO levels, while TAC, MPO, SOD, CAT and GR, GST, increased GSH levels, with radical scavenging activity). Five studies showed that *U. lactuca* had anticancer activities against Caco-2 and HT-29 CRC, MCF-7, Fem-x, HepG2, and Hela cell lines.

Conclusion: Free radicals scavenging activity, p53, and caspase-8, 9 were the primary pathways of U. lactuca antitumor effects. These pathways might unravel its potential as radiosensitizer, which needs further analysis in future studies.