



In Vitro Wound Healing Activity of Marine Brown Algae Extract Using Scratch Assay

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ABSTRACT

The present investigation was carried out to evaluate the invitro wound healing efficacy of a marine brown algae *Sargassum swartzii* extract using L929 mouse fibroblast cell line. In this study, L929 fibroblast cells were cultured and the cells were treated with different concentrations of 25, 50, and 100 µg/m L. Photomicrographs were taken at 0,12,24, and 36 hours. The wound area was quantified using ImageJ software, and wound closure and cell migration rate were calculated. The results show a concentration and time dependent enhancement in wound closure in treated groups. The maximum wound healing effect was observed at 100 µg/m L after 36 hours. These findings suggest that the marine brown algae extract promotes fibroblast migration and wound closure under invitro conditions. The wound healing activity may be done in the presence of glycosides. These findings confirm that the marine brown algal extract possesses the significant invitro wound healing efficacy.

Keywords : Wound healing, Marine brown algae, scratch assay, fibroblast cells, Cell migration

1.INTRODUCTION

Wound healing is a complex biological process involving cell, migration, proliferation, and cell repair. The fibroblasts play an important role in wound contraction [1]. Impaired wound healing can cause infection, chronic wounds [2]. Therefore, the exploration of new agents can improve wound healing properties.

Natural agents are used for long valuable source of bioactive compounds [3]. Marine brown algae are rich content of functional metabolites. Several studies reported that these constituents possess anti-inflammatory, tissue regenerative properties, which are important for wound healing process [4,5]. Due to these pharmacological properties, the marine brown algae are considered as potential wound healing agents.

Aim & Objective

To evaluate the invitro wound healing activity of the marine brown algal extract using wound healing scratch assay in L929 mouse fibroblast cell line.

To determine the effect of different concentrations of marine brown algal extract.

To determine the rate of wound closure at different time intervals.

To compare the wound healing efficacy of treated group with the control group.

2. Materials and Method

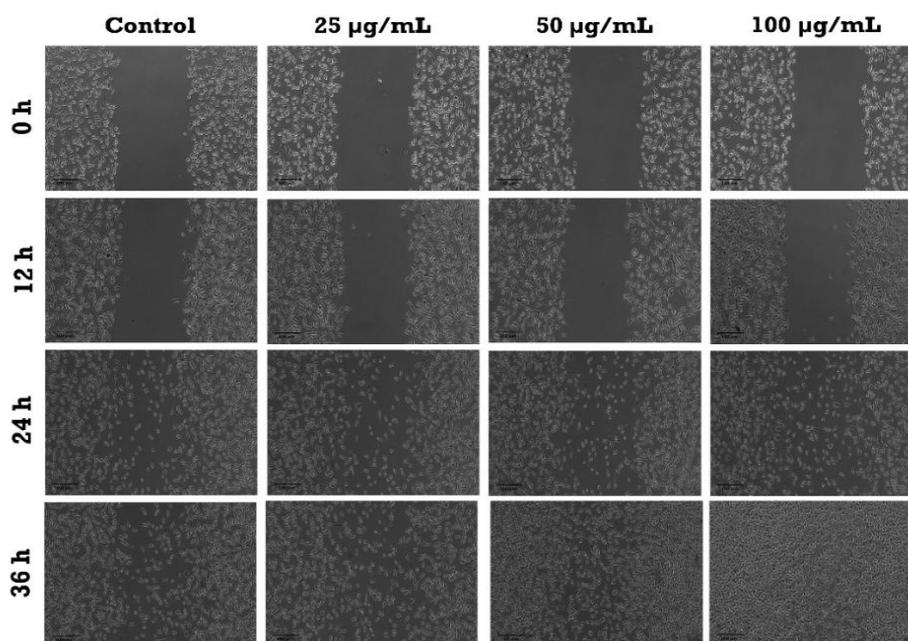
The marine brown algae sample was processed and extracted using ethanol. The extract was subjected to distillation and drug extract prepared for invitro evaluation.

Cell Line and Culture Conditions

The cells (0.3×10^6 cells/well) were seeded on 6 well plates and allowed to acclimatize to the culture conditions such as 37 °C and 5% CO₂ environment in the incubator for 24 h. The test samples were filter sterilized using 0.2 µm Millipore syringe filter. The sample was added to the wells containing cultured cells of at least 80% confluency in different concentrations (25, 50, and 100 µg/mL). Untreated wells were kept as control.

The images of the wounded area at 0, 12, 24, and 36 hours using a phase contrast microscope. In order to evaluate the migration rate, the images were analysed using “ImageJ” software and compared with the value obtained at 0 h. An increase in the percentage of the closed area indicated the migration of cells. This in turn indicates the efficacy of wound healing.

Image analysis



3.Results

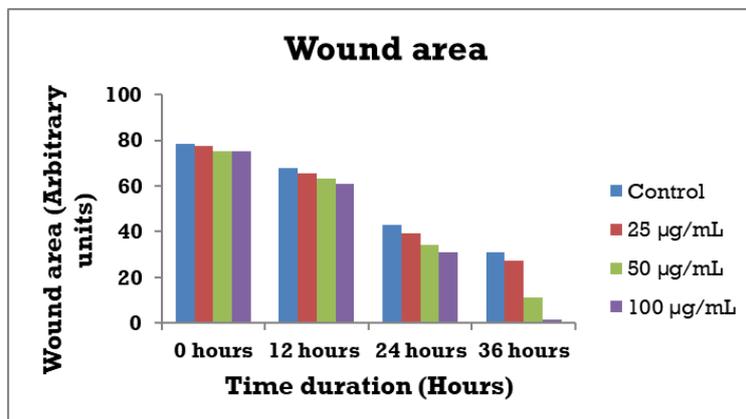
Effect on Average Wound Area

The marine brown algae extract significantly reduced the wound area in a concentration- and time-dependent manner. The control group showed gradual wound closure over time; however, treated groups exhibited enhanced wound contraction.

Sample Concentration	Average Wound area (Arbitrary units)			
	0 hours	12 hours	24 hours	36 hours
Control	78.3	67.9	42.7	30.8
25 µg/mL	77.4	65.3	39.3	27.1
50 µg/mL	75.2	63.0	34.0	11.0
100 µg/mL	75.3	61.0	30.7	1.4



Graphical Representation

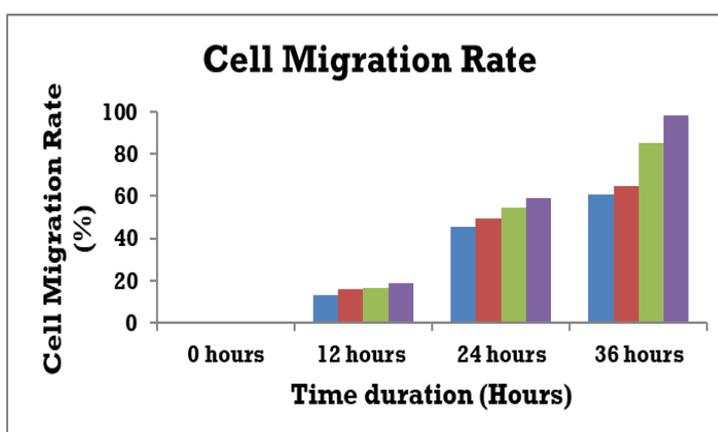


The maximum reduction in wound area was observed at 100 µg/mL, indicating strong wound healing activity.

Effect on Cell Migration Rate

Sample Concentration	Cell Migration Rate (%)			
	0 hours	12 hours	24 hours	36 hours
Control	0.0	13.3	45.5	60.7
25 µg/mL	0.0	15.7	49.2	65.0
50 µg/mL	0.0	16.2	54.8	85.4
100 µg/mL	0.0	19.0	59.2	98.1

Graphical Representation



Enhanced cell migration rate, the indicator of enhanced wound healing, was observed in a concentration and time dependent manner. The maximum efficacy was displayed by 100 µg/mL of the sample.

4. Discussion

In this study *Sargassum swartzii* extract enhanced cell migration and wound closure using L929 fibroblast cells. Fibroblast migration is an important process, and the observed increase in wound closure indicates the wound healing potential of extract.



The wound healing efficiency was found to be in a concentration and time dependent manner. The maximum wound healing efficacy was elicited by the concentration at 100 $\mu\text{g/mL}$ at the time duration of 36 hours. This indication gives the sample have wound healing efficacy.

5. Conclusion

In this study according to the results the Marine brown algae *Sargassum swartzii* exhibits significant wound healing activity in vitro by promoting fibroblast migration and wound closure. These findings gave a potential natural source of wound management applications.

Further studies are requiring to identify these effects through detailed pharmacological investigations.

6. References

1. Liang CC, Park AY, Guan JL. In vitro scratch assay: a convenient and inexpensive method for analysis of cell migration in vitro. *Nat Protoc.* 2007;2(2):329–333.
2. Boateng JS, Matthews KH, Stevens HN, Eccleston GM. Wound healing dressings and drug delivery systems: a review. *J Pharm Sci.* 2008;97(8):2892–2923.
3. Newman DJ, Cragg GM. Natural products as sources of new drugs over the last 25 years. *J Nat Prod.* 2007;70(3):461–477.
4. Pal A, Kamthania MC, Kumar A. Bioactive compounds and properties of seaweeds: a review. *Open Access Libr J.* 2014;1: e752.
5. Premarathna AD, et al. In vitro and in vivo evaluation of the wound healing properties of seaweeds. *Biochem Biophys Rep.* 2021; 26:10098

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Conflict of Interest Statement: All authors have nothing else to disclose.

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