



## Wound Healing Properties of Aloe Barbadensis Miller-In Vitro Assay

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### ABSTRACT

A succulent plant found across the world, aloe vera has long been heralded for its medicinal uses, especially when it comes to wound care. The plant has been used to treat any number of small cuts, abrasions, skin irritations, and mild burns. Aloe vera extract used in this study was obtained from Green chem ,Bengaluru,India. FBS was obtained from Sigma Aldrich.co.india. The normal mouse skin fibroblast line (c147) employed in this study were obtained from a NCCS, Pune. The in vitro scratch assay was carried out to detect the effect of Aloe vera extract on the migration of mouse skin fibroblast cells. Wound closure was examined by the quantity of transferred fibroblasts from the edge of the nick in extract treated wells in comparison to the control wells for 48h in four separate fields.The Aloe vera extract at 50µg/ml, 100µg/ml as well as epidermal growth factor 4ng/ml exhibited progressive wound closure compared to control and DMSO group.Aloe vera extract possesses wound healing properties by exhibiting progressive wound closure compared to control and DMSO group.

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## INTRODUCTION

Treatment of wounds is an incessant sign recorded in ethnopharmacological studies. Numerous conventional drugs are utilized for cleaning or rewarding injuries, yet just a couple have been tried pharmacologically for their injury mending potentials.[1]The Aloe vera plant has been known and utilized for quite a long time for its well being, magnificence, therapeutic and healthy skin properties. The name Aloe vera gets from the Arabic word "Alloeh" signifying "sparkling severe substance," while "vera" in Latin signifies "valid." 2000 years back, the Greek researchers viewed Aloe vera as the all inclusive panacea. The Egyptians called Aloe "the plant of immortality." [2]Aloe Vera is logically known as *A. barbadensis* Mill. Its mending property is identified with an intensify that is called glucomannan, which is advanced with polysaccharides like mannose. The glucomannan influences fibroblast development factor and invigorates the action and multiplication of these cells and thusly improves collagen creation and discharge. The adhesive of aloe vera not just expands measure of collagen on wound site, yet additionally increments transversal associations among these groups as opposed to production of progress in collagen structure and subsequently quickens wound improvement [3]. Using therapeutic spices has been seen in treatment of sorts of twisted from the earliest starting point. Because of decreased money related burden and its clinical impacts, these plants are seen by the individuals. A few plants are utilized customarily in treatment of many skin wounds and burnings in different purposes of the world . [4]

Wound recuperating property is identified with an aggravate that is called glucomannan, which is advanced by polysaccharides like mannose. The glucomannan impacts fibroblast development factor and animates the action and multiplication of these phones and thusly improves collagen creation and secretion. The adhesive of aloe vera plant builds measure of collagen, yet in addition increments transverse associations among these groups instead of formation of progress in collagen structure and accordingly quicken twisted improvement [3]. Results of in Citroen concentrates on impact of aloe Vera on cell expansion are contradictory. One clarification is that the sap could have cytotoxic movement while the gel may advance cell growth. [5]Aloe Vera is helpful in rewarding injuries and burns, minor skin diseases, pimples, diabetes, and raised blood lipids in people, and gives some guarantee in rewarding genuine and steady conditions, for example, dermatitis, genital herpes, dandruff, psoriasis, infection, skin ulcers and others. Different utilizations incorporate, give rich supplements to

great wellbeing, goes about as cream, treats skin break out, reduces the perceivability of stretch marks, soothes in periodontal sickness, and furthermore helps in assimilation. From the outset the Egyptians utilized aloe vera plants for treatment of wounds, consumes, and contaminations. After them, Greeks, Spanish, and African people groups utilized aloe vera plants by different methods for a few purposes. As per exemplary medication in Iran, aloe vera has hot and dry silliness and its concentrate is utilized for therapeutic purposes. Aloe vera gel contains two hormones namely, Auxin and gibberellins that are liable for giving injury recuperating and calming properties which lessen skin aggravation. A. vera inward concentrate builds Vitamin C and E ingestion after application. A. vera isn't suggested in mix with antidiabetic, diuretic, purgative medications, sevoflurane, and digoxin. [6, 7] Today, the aloe vera plant is utilized for different purposes. In this study, we are doing a scratch assay to assess the wound healing properties of aloe Vera. Previously we have worked on plenty of topics in pharmacology. [8-12] Now we are planning to assess the Wound healing properties of Aloe Vera.

## MATERIALS AND METHODS

### Plant materials

Aloe vera extract used in this study was obtained from Green chem Herbal Extracts & Formulations ,Bengaluru, India.

### Chemicals used

FBS was obtained from Sigma Aldrich.co.india. All the other chemicals used in the study were up to analytical grade

### Cell culture

The normal mouse skin fibroblast line (c147) employed in this study were obtained from a NCCS, Pune and were cultured in Roswell Park Memorial Institute (RPMI) 1640 (Biosera, France) + fetal bovine serum (FBS) 10% (Invitrogen, USA) medium, 100 U/mL penicillin and 100 µg/mL streptomycin (Invitrogen, USA). Cells were kept under standard culture conditions at 37°C and 5% CO<sub>2</sub>. All cells were used between passages 5 and 6. Trypsin 0.025%-ethylene diamine tetra acetic acid 0.02% (Sigma-Aldrich, USA) in phosphate-buffered saline was used to separate fibroblast cells from the flasks.

### Cell migration assay

The in vitro scratch assay was carried out to detect the effect of Aloe vera extract on the migration of mouse skin fibroblast cells. Fibroblasts were seeded at high density on a 24-well plate in RPMI 1640 medium containing 100 U/mL penicillin and 100 µg/mL streptomycin and 10% FBS. After 24 h,

fibroblasts were attached and spread to form a confluent monolayer. Cell monolayer was scraped with a tip. Parted cells were removed and the attached cells were incubated with 500 µL of RPMI medium containing 5% FBS, 50µg/mL and 100µg/mL of Aloe vera, epidermal growth factor (4ng/ml) and incubated at 37°C, 5% CO<sub>2</sub> and 90% humidity. Wound closure was examined by the quantity of transferred fibroblasts from the edge of the nick in extract treated wells in comparison to the control wells for 48h in four separate fields.

## RESULTS AND DISCUSSION

The figure shows the pictures of scratch assay on mouse fibroblast cell lines after 48h injury with and without medicines [Figure:1]. The Aloe vera remove at 50µg/ml, 100µg/ml just as epidermal development factor 4ng/ml displayed dynamic injury conclusion contrasted with control and DMSO gathering. The improved movement and wound conclusion displayed by aloe vera remove shows the injury recuperating property of aloe vera extricate, contrasted and that of development factor. The pictures were micrographed at amplification of 10X.

From the consequences of the current investigation it is obvious that The Aloe vera separate at 50µg/ml, 100µg/ml just as epidermal development factor 4ng/ml showed dynamic injury conclusion contrasted with control and DMSO gathering. The improved relocation and wound conclusion shown by aloe vera separately demonstrates the injury mending property of aloe vera extricate, contrasted and that of development factor.

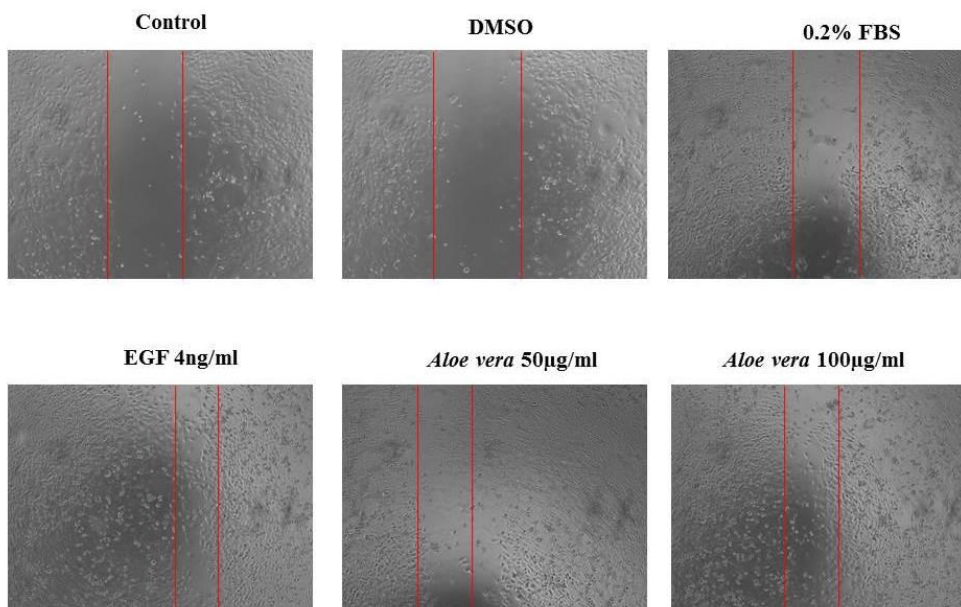
Aloe vera gel is viewed as sheltered whenever applied skin with just a couple of unfavorably susceptible responses being reported.[13] The adequacy of aloe vera gel to treat consume wounds, genital herpes, and seborrheic dermatitis have been appeared in clinical preliminaries, yet different signs, for example, psoriasis or interior application for the treatment of type 2 diabetes stay uncertain. The significant use of aloe vera gel stays as a skin lotion in beautifiers and as an après

treatment for burns from the sun, for which it has demonstrated its effectiveness.[14, 15]

In a comparative report "Viability of Aloe Vera Gel contrasted and 1% silver sulphadiazine cream as consume twisted dressing in second degree burns", conducted by Muhammad Naveed Shahzad and Naheed Ahmed they expressed that "aloe vera gel advanced injury recuperating in severely charred area patients better than SSD cream. The component of the momentous adequacy of aloe cream in the recuperating of consumed wounds might be clarified by its cell expansion, and mitigating impacts. It likewise soothes torment better than SSD and is cost effective." [16]

The gel of the aloe vera plant has a long history in the treatment of skin conditions. There is some proof from human and creature contemplates that aloe may be useful for wound healing,[17, 18] yet one examination found that aloe gel really eased back the recuperating of careful wounds.[19] Also, an audit of 7 preliminaries including 347 individuals didn't discover proof that aloe can improve wound healing.[20]

Be that as it may, In another examination there were twenty-seven patients with fractional thickness consumed wounds, they were treated with aloe vera gel contrasted and vaseline bandage. It uncovered the aloe vera gel rewarded sore mended quicker than the vaseline dressing territory. The normal time of recuperating in the aloe gel region was 11.89 days and 18.19 days for the vaseline cloth rewarded wound. Factual examination by utilizing t-test and the estimation of  $P < 0.002$  was measurably huge. In histologic investigation, it demonstrated early epithelialization in the rewarded aloe vera gel zone. Just some minor unfriendly impacts, for example, inconvenience and torment were experienced in the 27 cases. This investigation indicated the viability of aloe vera gel on a halfway thickness consume wound, and it may be gainful to do encourage preliminaries on consume wounds.[21, 22]



**Figure 1: Scratch assay on mouse fibroblast cell lines**

## CONCLUSION

Aloe vera extract possesses wound healing properties by exhibiting progressive wound closure compared to control and DMSO group. In recent times, there has been an increase in demand for alternative medicine. Medicinal plants, such as Aloe vera, have natural phytochemicals and have proven to be better than synthetic drugs. In conclusion, the use of aloe vera extract and its components for the treatment of a wounds needs further clinical evidence through well-designed studies with defined aloe extracts. This indicates the scientific significance of aloe vera and the need to establish it as a valid treatment option for wounds. However, the use of aloe vera in topical applications has widely been confirmed in the clinical studies as safe.

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## CONFLICTS OF INTEREST

There were no conflicts of interest regarding the publication of this article.

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