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WOUND HEALING ACTIVITY OF METHANOLIC EXTRACT OF THE PEEL OF *ABELMOSCHUS ESCULENTS*

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ABSTRACT

The history of medicine is as that old as human civilization. Nature is provided a complete storehouse of remedies to cure all ailments of mankind. Among the biotic and abiotic elements of nature, they plants are indispensable to man as they provide food, clothing and shelter the three important necessities of life along with other useful product us medicines to alleviate his suffering from injury and disease. The preliminary phytochemical analysis was carried out in the methanol extracts. It was found that glycosides, Carbohydrate, amino acids and tannins. The methanol extract was screened for wound healing activity by excision and incision wound model, in the form of an ointment having 2 concentrations (10%and 20 % w/w) of peel extract in simple ointment base. Both the concentrations of the methanol extract showed significant response in both the wound types tested when compared with the control group. Povidine ointment (0.2%w/w) was used as an standard drug. The extract having significant ($p>0.05$ and $p<0.01$) wound healing activity compared to control. On the basis of the results obtained suggest marked that extracts have significant wound healing activity of *Abelmoschus esculents.* The results supported the traditional use of this plant in some painful and wound healing conditions.

KEYWORDS: *Abelmoschus esculents*, Phytochemical screening, wound healing.

INTRODUCTION

The history of medicine is as that old as human civilization. Nature is provided a complete storehouse of remedies to cure all ailments of mankind. (Adem Yesuf, *et al.*, 2013) Among the biotic and abiotic elements of nature, they plants are indispensable to man as they provide food, clothing and shelter the three important necessities of life along with other useful product us medicines to alleviate his suffering from injury and disease. (C.Aparna, *et al.*, 2013) In the fast, almost all the medicines used wear from the plants, the plant being man's only chemist for ages. (Aijaz, *et al.*,2011) Wound healing is the process of repair that follows injury to the skin and proper healing of wounds is essential for the restoration of disrupted anatomical continuity and disturbed functional status of the skin (Kotade kiran and Mohammed Asad., 2009).

Health and immunity status, severity and types of wounds, patients are medication status, disastrous nature of the assault-environment around the site of the wounds and potentials of serious microbial infection. (D Kumarasamyraja,2012).

The organization of new vascular networks in the angiogenesis pathway stimulated by macrophage activity, tissue hypoxia and vascular endothelium growth factor (VEGF), provides necessary oxygen and nutrient supplements required for wound repair .(Rajesh S, *et al.,2015).*

The wound area is then epithelialized by keratinocytes. The healing process completes in the remodelling phase, during which the skin regains 80% of its original strength (Robab valizadeh *et al*, 2015).

FACTORS AFFECTING WOUND HEALING

Desiccation A moist environment allows wounds to heal faster and less painfully than a dry environment, in which cells typically dehydrate and die. This causes a

scab or crust to form over the wound site, which impedes healing. If the wound is kept hydrated with a moisture-retentive dressing, epidermal cell migration is enhanced, encouraging epithelialization.

Infection or abnormal bacterial presence If an infection is present, as evidenced by purulent drainage or exudates, indurations, erythema, or fever, a wound culture should be obtained to identify the offending bacteria and guide antibiotic therapy. When a pressure ulcer or full-thickness wound extending to the bone fails to heal, the patient should be assessed for signs of osteomyelitis. Any abnormal culture or other test results should be reported to the physician so that appropriate antibiotics are prescribed to treat the infection. (Yogesh Sharma, *et al.,* 2013).

Maceration Urinary and fecal incontinence can alter the skin's integrity. Educating caregivers about proper skin care is essential for successful skin and wound management.

Necrosis Dead, devitalized (necrotic) tissue can delay healing. Slough and eschar are the 2 types of necrotic tissue that may appear in a wound. Slough is moist, loose, stringy necrotic tissue that is typically yellow. Eschar, which appears as dry, thick, leathery tissue, may be black. In most cases, necrotic tissue must be removed before repair and healing can occur.

Pressure When pressure at the wound site is excessive or sustained, the blood supply to the capillary network may be disrupted. This impedes blood flow to the surrounding tissue and delays healing. (Boyapati L *et al., 2007*)

Trauma and edema Wounds heal slowly-and may not heal at all-in an environment in which they are repeatedly traumatized or deprived of local blood supply by edema.

Age Wounds in older patients may heal more slowly than those in younger patients, mainly because of co morbidities that occur as a person ages. Older patients may have inadequate nutritional intake, altered hormonal responses, poor hydration, and compromised immune, circulatory, and respiratory systems, any of which can increase the risk of skin breakdown and delay wound healing.(Emery CF *et al.,* 2005).

Body type Body type may also affect wound healing. An obese patient, for example, may experience a compromise in wound healing due to poor blood supply to adipose tissue. In addition, some obese patients have protein malnutrition, which further impedes the healing. Conversely, when a patient is emaciated, the lack of oxygen and nutritional stores may interfere with wound healing.(N. S. Jagtap, *etal.,2009)*

Chronic diseases Coronary artery disease, peripheral vascular disease, cancer, and diabetes mellitus are a few of the chronic diseases that can compromise wound healing. Patients with chronic diseases should be followed closely through their course of care to provide the best plan.

Immune suppression and radiation therapy Suppression of the immune system by disease, medication, or age can delay wound healing. Radiation therapy can cause ulceration or change in the skin , either immediately after a treatment or after all treatment has ended.

Laboratory values Nutritional markers are not the only laboratory values that must be considered when evaluating healing. Measuring the haemoglobin level helps assess the oxygen-carrying capacity of the blood; however, it may also be necessary to assess hepatic, renal, and thyroid functions to determine the patient's healing capacity.

Abelmoschus esculents

Scientific classification of *Abelmoschus esculents*

Kingdom	: Plantae
Order	: Malvales
Family	: Malvaceae
Genus	: Abelmoschus
Species	: *A. Esculents*

Distribution

The geographical origin of okra is distributed, with supporters of South Asian, Ethiopian and West African origins. Supporters of a South Asian origin point to the presence of its proposed parents in that region. Supporters of a West African origin point to the greater diversity of okra in that region.

Abelmoschus esculents are cultivated throughout the tropical and warm temperate regions of the world for its fibrous fruits or pods containing round, white seeds. It is among the most heat- and drought-tolerant vegetable species in the world and will tolerate soils with heavy clay and intermittent moisture, but frost can damage the pods.

Parts used: Peels

MATERIALS AND METHODS

Animals

Male Wister rats weighing between 170 and 220 gm were used for this study. The animals were randomly grouped in polypropylene cages with paddy husk as bedding. Animals were housed at a temperature of 24±2˚C and relative humidity of 30-70%. A 12:12 light: day cycle was followed. All the animals were allowed to free access to water and fed with standard commercial pelleted rat chaw (M/s. Hindustan Lever Ltd., Mumbai). All the experimental procedures and protocols used in this study were reviewed by the Institutional animal

ethics committee (688/2/C-CPCSEA) of NCP and were accordance with the guidelines of the IAEC.

Plant material

The plant material consists of dried powdered of *Abelmoschus esculents* .belonging to the family Malvaceae.

Preparation of plant extract

Fresh Peel of *Abelmoschus esculents* was collected from soolai, Erode, Tamil Nadu, India. The Peels were dried and latter powdered. This powder was then macerated with hydro Methanol for 72 h with occasional shaking with the concentration of water and alcohol of 80:20. It was then filtered and the solvent was evaporated under heating mantle. The yield of hydro methanolic extract of Peels of *Abelmoschus esculents* was prepared

PREPARATION OF SIMPLE OINTMENT:

Ingredients:

Wool fat, Hard paraffin, Ceto -sterile alcohol, White soft paraffin

Preparation

Melt hard paraffin and ceto-sterile alcohol on water bath to this incorporate wool fat and white soft paraffin stir until all ingredients are melted. Examine the contents for any foreign particles decant or strain is required stir the mix thoroughly until melt. It is packed in a suitable container 200mg and 400mg (10% and 20%) of ethanol extract is mixed thoroughly with 2gm of simple ointment until the uniform mixture is formed.

SCREENING OF WOUND HEALING ACTIVITY

Model for Wound Healing

Excision wound model is selected for this study

Experimental Protocol

The animal were divided into 4 group each containing 6 rats

Group I - normal control

Group II- Standard - Povidone iodine ointment

Group III - *Abelmoschus esculents* extract 10%

Group IV - *Abelmoschus esculents* extract 20%

SELECTION OF ANIMALS

The mice were maintained under standard laboratory conditions. They were housed in cages bottomed with husk, maintained at room temperature and provided with the standard feed pellets which are commercially available and with water. After randomization into groups, the mice were acclimatized for a period of two weeks in the environment.

INDUCTION OF WOUND

Excision Wound model

An excision wound model has inflected by cutting away approximately 500 nm full thickness of shaved skin of a predetermined area on the anterior - dorsal side of each rat. The wounds were traced by using wax paper on the day of wounding and subsequently on alternate. Group I animal served as normal control, Group II animal treated with povidone iodine and Group III treated with 10% of *Abelmoschus esculents* extract (mixed with simple ointment) and group IV treated with 20% of *Abelmoschus esculents* for 15 days changes in wound area were calculated after 1st, 4th, 8th, 12th day giving an indication of the rate of wound contraction.

Assessment of Wound Healing

Wound contraction was studied by placing the wax paper, on the raw wound area, every alternative day till the wounds were completely covered with epithelium. These wound trace were retraced on a mm scale in graph paper. The wounds are determined and expressed as percentage of original wound size.

Statistical Analysis

The values are expressed as mean SEM. The data were analyzed by ANOVA followed by Dunnet's test. P values <0.05 consider as sign.

RESULT AND DISCUSSION

Table1: Wound healing activity of hydro methanolic leaves extract of *Abelmoschus esculents* in rats by Excision model

Group	Wound contraction (%)				Epithelialization period (day)
	1 day	4day	8 day	12 day	
Group I Simple ointment (control)	12.9±0.2	26.8±2.3	43.2±1.4	65.8±1.6	18.7±1.8
Group II Povidine iodine	18.3±0.7**	42.6±0.8**	69.6±1.6**	89.0±0.94**	13.9±1.2**
Group III AE (10%)	14.1±0.8	32.3±0.9**	58.4±0.8**	79.5±0.8**	16.8±0.5
Group IV AE (20%)	14.8±0.6	34.7±1.1**	63.2±0.4**	80.2±0.4**	15.9±0.7*

Values were mean ± SEM, n=6, *P<0.05, **P<0.01 Vs control (one way ANOVA followed by Dunnet's test).

In excision model AE 20% treated groups showed a significant (P<0.05) increase in wound healing activity when compared to control. But the low dose 10% AE does not showed the significant (P>0.05) reduction in period of epithelialization. For AE 10% & 20% extract wound contraction were 79.5% & 80.2% by 12th day as well as period of epithelialization were obtained by 16.8 & 15.9 days. The standard povidine iodine treated animals showed a significant (P<0.01) increase in wound contraction (89.0%) and decrease in period of epithelialization (13.9 days) when compared to control.

The order of wound healing activity was povidine iodine > AE 20% >AE 10%.

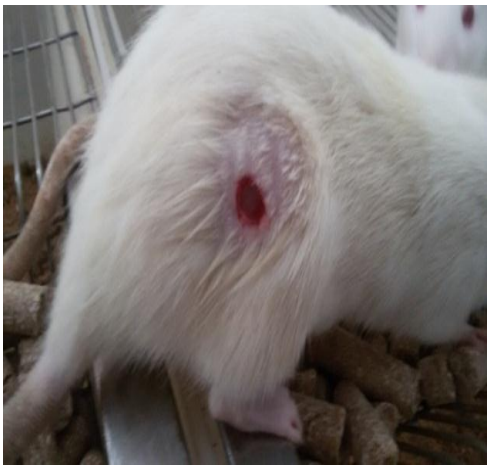


Fig 1: Creation of wounds in Animal

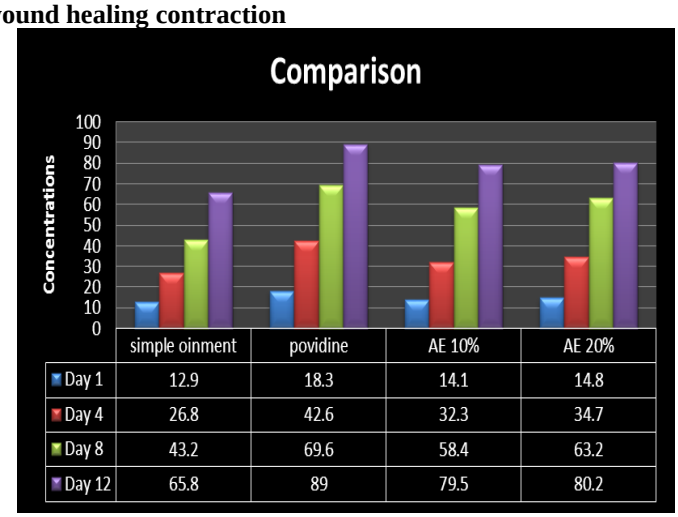
Fig: 2 After AE apply

Fig: 3 4st day of rat

Fig: 4 8th day of rat

Fig: 5 12th day of rat

Table 3: Comparison of wound healing contraction



	simple oinment	povidine	AE 10%	AE 20%
Day 1	12.9	18.3	14.1	14.8
Day 4	26.8	42.6	32.3	34.7
Day 8	43.2	69.6	58.4	63.2
Day 12	65.8	89	79.5	80.2

SUMMARY AND CONCLUSION

This study describes the clinical importance of *Abelmoschus esculents* in wound healing. Tissue repair and wound healing are complex process that involves inflammation, fibroblast proliferation, neovascularisation, wound contraction and resurfacing of the wound defect with epithelium. The process of wound healing is essential to prevent the invasion of damaged tissue by pathogen and to partially or completely reform the damage tissue.

The results in this study are in support that the wound healing and repair is accelerated by applying which was high-lighted by the full thickness coverage of the wound area by an organised epidermis in the presence of mature scar tissue in the dermis.

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