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FORMULATION AND EVALUATION OF POLYHERBAL OINTMENT AND CREAM IN WOUND HEALING

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ABSTRACT

Wound-It is a circumscribed injury which is caused by external force and it can involve any tissue and organ. A wound is a break in the skin's or tissues integrity, which is typically accompanied with structural and functional disturbance. Healing is the body's response to injury in an attempt to restore normal structure and function. The process of healing involves two distinct processes which includes regeneration and repair. Several herbs and floras were utilised in Ayurvedic cosmetics that actually functioned, thanks to the knowledge of Ayurveda. Ayurvedic cosmetics not only improved the appearance of the skin, but also protected the body from environmental influences. oily components are taken in a beaker and aqueous components in another beaker and to the oily components aqueous ingredients are added slowly by vigorous trituration in mortar. The process employed for the formulation of the ointment here is fusion method. 4 groups of animals were taken and small cut was made on the surface of the skin and the cut was made as deep over an area of 20mm. Group-I received control, group-II received herbal cream, group - III received herbal ointment and group IV received standard drug (saffromycin). Animals were treated with ointment and cream daily at same time as it received on day 0. Animals were checked for depth of the wound regularly with a span of 7 days. polyherbal cream shown good wound healing nature within first 7 days. Both polyherbal ointment and cream tend to show complete wound healing nut in comparison to the two polyherbal cream is acting rapidly on the site if action.

Keywords: Wound, Polyherbal cream, Polyherbal ointment, Ayurveda, Ayurvedic cosmetics

INTRODUCTION

A wound is a break in the skin's or tissues' integrity, which is typically accompanied with structural and functional disturbance. A wound is a form of damage that occurs very fast and involves skin being ripped, sliced, or pierced (an open wound), or blunt force trauma causing a contusion (a closed wound). It especially refers to an acute injury to the epidermis of the skin in pathology **[1]**.

Healing is the body's response to injury in an attempt to restore normal structure and function. The process of healing involves two distinct processes:

A. Regeneration

B. Repair

A. REGENERATION: Is a type of healing that occurs when parenchymal cells proliferate and result in the complete restoration of the original tissues. All surgical treatments should aim towards tissue regeneration, which restores normal microstructure and function. Regeneration tissue repair process consists of a sequence of molecular and cellular events which occur after the onset of a tissue lesion in order to restore the damaged tissue. The exudative, proliferative, and extracellular matrix remodelling stages are all linked together by dynamic mechanisms involving soluble mediators, blood cells, and parenchymal cells **[2, 3]**.

B. REPAIR: It is a healing outcome in which tissues do not return to their normal architecture and function. Repair typically results in the formation of scar tissue. tissue repair process occurs after the onset of lesion. be that due to the trauma or resulting from a specific pathological condition. Tissue repair is a straightforward linear process in which growth factors promote cell proliferation, resulting in the integration of dynamic changes involving soluble mediators, blood cells, extracellular matrix formation, and parenchymal cell proliferation **[4, 5]**.

STAGES OF WOUND HEALING

1. Stage of inflammation.
2. Stage of granulation tissue formation and organisation
3. Stage of epithelisation
4. Stage of scar formation and reposition
5. Stage of maturation.

For soft tissue wound healing:

1) Inflammatory phase: It can be divided further as followed:

a) Clot formation:clot formation begins with three events namely platelet degranulation of serotonin, platelet plug formation, activation of extrinsic and intrinsic clotting mechanism. These events stabilise hemostasis, start the generation of chemoattractants, and start the wound cleaning process. A

coagulum is formed as a result of this.

b) Early inflammation is characterised by the production of polymorphonuclear neutrophils (PMNs). PMNs begin to enter the wound site within 6 hours of clot stabilisation. The number of PMNs steadily increases, peaking at about 24 to 48 hours after the injury **[6, 7, 8]**.

2) Proliferative phase:
   - Characterised by formation of granulation tissue in the wound
   - 2 key cell types are present in this phase:
     a) Fibroblasts
     b) Endothelial cells
3) Maturation phase: There is a conversion of granulation tissue to fibrous connective tissue and a reduction in collagen parallelism to the plane of the wound starting 5 to 7 days after damage. The epithelial layer develops fast once the epithelial seal is formed **[9]**.

Natural products which tend to have the properties of the wound healing were selected and further proceeded to formulation of herbal cream and ointment, the obtained formulations are checked for the activity by excision cut model on albino wister rats **[10]**.

MATERIALS AND METHODS

The herbal oils are preferred for the formulation which includes tea tree oil, turmeric oil, lemon oil, garlic oil, tulasi oil, neem oil, emu oil and olive oil. All the ingredients are taken in an appropriate quantity and proceeded for formulation.

Preparation of polyherbal cream:

Creams are the semisolid dosage forms where the oily components are being dispersed in a aqueous medium to form a highly viscous mass. These are the topical preparations used for multiple actions. Here all the oily components are taken in a beaker and aqueous components in another beaker and to the oily components aqueous ingredients are added slowly by vigorous trituration in mortar **[11]**. During the trituration a clicking sound was heard initially upon vigorous trituration the sound disappears and forms a white mucilaginous viscous preparation of the herbal cream. The obtained cream is packed in a well closed containers protected from heat and moisture. The ingredients used in the formulation are listed below in **Table 1**.

The formulated polyherbal cream is subjected to quality control tests which include appearance, colour, odour, phase separation, pH, viscosity, wash ability and skin sensitivity test.

Preparation and evaluation of polyherbal ointment:

Ointments are viscous semisolid preparations which are used topically on a variety of body surfaces. Any greasy or oily

semisolid preparation, usually medicated, that can be applied externally to skin in order to heal, soothe or protect it **[12]**. The components can be either suspended or emulsified in the ointment base. The ingredients used for formulation of ointment are listed in **Table 2**:

Table 1: Formulation table for polyherbal cream

S.No	Name of Ingredients	Quantity in Percent	Quantity Taken (ml/g)
1	Tea Tree Oil	0.64	0.5 ml
2	Tulasi Oil	0.64	0.5 ml
3	Garlic Oil	0.25	0.2ml
4	Turmeric Oil	0.64	0.5 ml
5	Lemon Oil	0.64	0.5 ml
6	Olive Oil	51.2	40 ml
7	Neem Oil	25.5	20 ml
8	Emu Oil	6.4	5 ml
9	Shea Butter	0.64	0.5 g
10	Bees Wax	10.8	8.5 g
11	Coconut Oil	1.28	1ml
12	Water	Q.s	Q.s

Table 2: Formulation table for herbal ointment

S.No	Name of Ingredients	Quantity in Percent	Quantity Taken
1	Bees Wax	14.5	9g
2	Shea Butter	1.6	1g
3	Olive Oil	32.2	20ml
4	Coconut Oil	24.1	15ml
5	Neem Oil	6.4	4ml
6	Emu Oil	1.6	1ml
7	Tea Tree Oil	0.8	0.5ml
8	Tulasi Oil	0.8	0.5ml
9	Garlic Oil	0.3	0.2ml
10	Turmeric Oil	0.8	0.5ml
11	Lemon Oil	0.8	0.5ml
12	Aloevera Juice	16	10ml

The process employed for the formulation of the ointment here is fusion method. In a porcelain dish waxy of the components are melted together and cooled with constant stirring until congealed, added non melting substances as ointment was being cooled and stirred to get a sticky mass.

The formulated polyherbal ointment is checked for quality control tests which include appearance, colour, irritancy test, viscosity and wash ability.

Selection of animals:

Adults in good health for the investigation, male albino Wistar rats weighing 250-280 gms were used. The animals were fed normal animal pellet feed and water after being acclimatised to regular laboratory conditions at a temperature of 25±2^{o}C. According to CPCSEA rules, the protocol was authorised by the Institutional Animal Ethics Committee (IAEC), which was formed for the purpose of animal testing.

All the 4 groups of animals were taken and small cut was made on the surface of the skin and the cut was made as deep over an area of 20mm with the help of dissection knife. Before the cut was made animals were treated with centrally acting analgesic morphine sulphate 5mg/kg body weight. During the course of the wound healing everyday animal was treated with morphine sulphate to pain sensation to the animal during the process of wound healing activity.

The animals were weighed and numbered. Divided into three groups and each group contains six animals. Group-I received Control group, Group-II received herbal cream, Group - III received herbal ointment. Group II and III received cream and ointment till wound completely heals and skin regains its normal morphology. Group IV received the standard drug saffromycin.

RESULTS AND DISCUSSION:

The prepared polyherbal cream was subjected to evaluation the results are represented in **Table 3**.

The prepared polyherbal ointment was subjected to evaluation the results are represented in **Table 4**.

The formulated polyherbal cream is subjected to quality control tests which include appearance, colour, odour, phase separation, pH, viscosity, wash ability and skin sensitivity test.

Preparation and evaluation of polyherbal ointment:

Ointments are viscous semisolid preparations which are used topically on a variety of body surfaces. Any greasy or oily semisolid preparation, usually medicated, that can be applied externally to skin in order to heal, soothe or protect it **[12]**. The components can be either suspended or

emulsified in the ointment base. The ingredients used for formulation of ointment are listed in **Table 2**.

Preclinical studies results:

All 4 groups of animals received the drug daily at same time. The surface area of the wound was checked on 0^{th} day followed by on 7^{th} day next on 14^{th} day finally on 21^{st} day. Based on the values obtained wound healing capability of both polyherbal cream and polyherbal ointment was evaluated. The values were compared for better activity within the formulated polyherbal formulations.

Table 3: Evaluation test results for polyherbal cream

S.no	Test	Observation	Inference
1	Appearance	Clear without any particles	Homogenicity is present
2	Colour	White to yellow	Clear consistency is seen
3	Odour	Pungent	Due to presence of garlic oil pungent smell is often seen
4	Phase separation	Not seen	Stable cream
5	pH	6.7	Suitable for topical preparations.
6	Viscosity	200 cp	Highly viscous
7	Wash ability	Water washable	Optimal property for topical preparations
8	Sensitivity test	No irritation is seen	Passes the test

Table 4: Evaluation test results for polyherbal ointment

S.no	Test	Observation	Inference
1	Appearance	Clear	Homogenicity is present
2	Colour	White to pale yellow	Clear consistency is seen
3	Odour	Pungent	Due to presence of garlic oil pungent smell is often seen
4	Viscosity	400 cp	Highly viscous
5	pH	6.9	Suitable for topical preparations.
6	Wash ability	Water washable	Optimal property for topical preparations
7	Sensitivity test	No irritation is seen	Passes the test

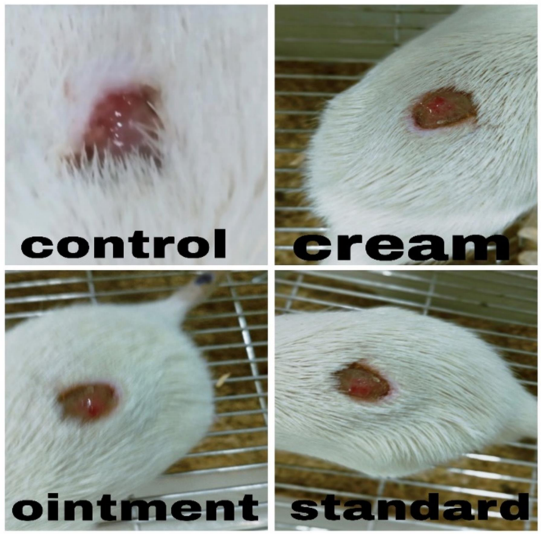

Figure 1: animals wound status on 0^{th} day

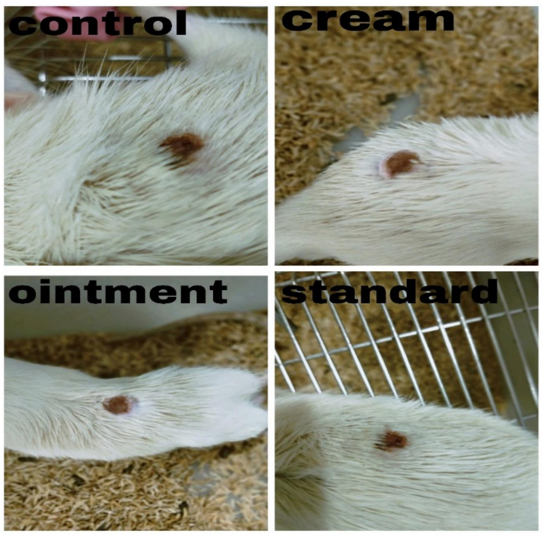

Figure 2: animals wound status on 7^{th} day

Figure 3: animals wound status on 14th day

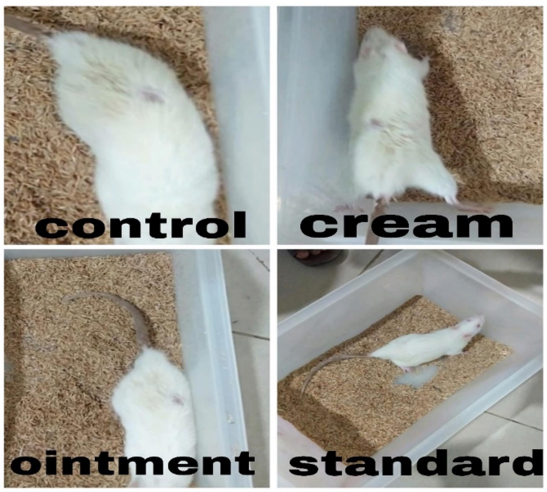

Figure 4: animals wound status on 21st day

Table 5: Results of wound healing activity

GROUP	0th day	7th day	14th day	21st day
Control	18mm	11.2mm	7.5mm	2.9mm
Test 1 (polyherbal cream)	17.6mm	10.03mm	4.2mm	0.00mm
Test 2 (polyherbal ointment)	17.9mm	9.6mm	3.6mm	0.00mm
Standard (saffromycin)	17.8mm	9.2mm	3.3mm	0.00mm

The status and amount of wound healed was calculated by the formula

$$\%\ \boldsymbol{wound\ healing} = \frac{\boldsymbol{initial\ wound\ area - wound\ area\ on\ test\ day}}{\boldsymbol{initial\ wound\ area}} \boldsymbol{x100}$$

Based on the above values it is clearly evident that animal group which are being treated with control group shown slow wound healing and healing is seen steadily. The second group of animals which received polyherbal cream shown good wound healing nature within first 7 days with almost half of the wound area is seen and it has been continuously showing incremental levels of healing by the end of 14th day almost more than 4/5th of the wound has healed, followed by finally on 21st day there was no wound presence is seen. Third group of animals which have received polyherbal ointment also shown almost half of wound has been healed followed by nearly a quite portion over 3 quarters amount of wound was healed by 14th day. However, by 21st day total amount of wound area is healed. However, both ointment and cream tend to show complete wound healing nut in comparison to the two polyherbal cream is acting rapidly on the site if action. The group which have received standard drug has shown much rate of wound healing when compared to polyherbal cream and ointment.

CONCLUSION

Wound-It is a circumscribed injury which is caused by external force and it can involve any tissue and organ. A wound is a break in the skin's or tissues integrity,

which is typically accompanied with structural and functional disturbance. Healing is the body's response to injury in an attempt to restore normal structure and function. The process of healing involves two distinct processes namely regeneration and repair. Polyherbal cream and ointments were formulated to check the activity for wound healing in albino wister rats. Polyherbal cream was formulated by rapid agitation of oily phase in aqueous phase, while ointment was prepared by fusion technique. Based on testing the formulations for wound healing activity polyherbal cream was more efficient than polyherbal ointment in initial stages of wound healing, however finally two formulations has shown complete wound healing activity but the results of standard drug has better wound healing rate than remaining animals.

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