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Poly-Herbal Formulation On Burn Wound Healing For Diabetic Albino Rats

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Abstract

Burns are among the most prevalent and harmful types of injuries, with a wide range of effects. Wound healing in case of burn always faces difficulty for modern medicine. So, discovery of new medicine is required which should contain antimicrobial and antiseptic properties those would be helpful in wound healing. In recent years, researchers have looked at plants as potential medicines for the diagnosis and treatment of diseases. The medicinal effects of herbal products should, however, be verified using contemporary scientific methodologies.

Objective: In this work, a rat burn wound model was used to assess the activity of wound-healing capabilities of a newly resurged herbal cream made up by mixing of two herbs. So, it could be called a poly herbal cream which is derived from Indian Traditional Medicine (ITM).

Method: PHC comprising aqueous extracts of *Eucalyptus* leaves and *Curcuma Longa* rhizomes were utilized in this experimental study. Four sets of five rats each received second-degree burn injuries. In order to evaluate the effectiveness of this herbal cream with multiple groups. These group contains +ve / -ve control groups. Positive controls were taken as commercial antibiotics. Group II treated with plain cream base, Group III treated with the marketed preparation which contains API named silver sulphadiazine and Group IV which was treated with prepared poly herbal cream. Group I did not receive any treatment. On days

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second, sixth, tenth, and fourteen the healed area of rat was evaluated for judgement of efficacy of prepared formulation. After this histological characteristics of those cured wounds. Utilizing the micro-dilution and 2, 2-diphenyl-1-picrylhydrazyl (DPPH) techniques, antioxidant, and antibacterial properties of PHC were assessed.

Results: At the end of the treatment period, the percentage of rats that had healed much better than the other groups (68.6 % for PHC vs. 33 %, 48.9 %, and 71.7 % for the control, cream base, and SSD groups, respectively). Additionally, the lesions that had healed in the PHC-treated rat had less inflammatory cells and had admirable neovascularization along with acceptable re-epithelialization. Herbal cream demonstrated antibacterial efficacy against *Staphylococcus aureus* in addition to antioxidant properties.

Conclusion: Experimentally and histopathologically tested poly herbal cream indicated a burn wound healing activity that was likely brought on by the antioxidant, anti-inflammatory, and antibacterial properties of the phytochemicals present. This study thus supports the use of *Curcuma Longa* rhizomes and *Eucalyptus* leaves active ingredients in Indian Traditional Medicine burn prescriptions.

Key Words: Burn Wound Healing, Indian Traditional Medicine (ITM), Polyherbal Formulation, *Eucalyptus* leaves ; *Curcuma Longa* Rhizomes.

I INTRODUCTION:

Burns are one of the most frequent types of injuries due to their devastating effects. Burns can cause physical limitations as well as psychological and emotional problems [1,2]. Till now may antiseptics have been discovered but burn healing is still a problem for modern medicine [3]. Topical applications which are used to kill microbes i.e., disinfectant, or antimicrobial agents has their specific side effects. They can slow down skin healing and lengthen the recovery time, are allergic responses and skin irritations [2]. As traditional medicines can be used for multipurpose and according to the research data these have very less or negligible side effects. So, most of the researchers takes the favour of herbal products may be overwhelmingly favourable. However, in order to verify the declaration regarding the pharmacological effects of herbal substances, contemporary scientific methodologies should be used [4]. Plants have been employed in Indian Traditional Medicine (ITM) to treat a variety of pathological ailments and disorders. A combination of aqueous extracts from

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Curcuma Longa rhizomes and *Eucalyptus Globulus* leaves have been utilised in one of the ITM prescriptions for burn healing [5-7].

The Myrtaceae family of myrtles, which includes over 700 species of flowering trees, shrubs, and mallees, includes the genus *Eucalyptus* of which more than 300 species have leaves with volatile essential oil. [8]. Family Myrtaceae member *Eucalyptus* is also known as the gum tree, *Eucalyptus* (Latin), Eucalypt (English), Nilgiri (Hindi), Sugandh Patra (Sanskrit), and other names. Previous research showed that *Eucalyptus* essential oil was the first traded oil in history and that E. citriodora oil was the most traded *Eucalyptus* oil worldwide [9]. The oxygenated monoterpenes, monoterpenes, and oxygenated sesquiterpenes made up most of the essential oil. The amount of 1,8-cineole in *Eucalyptus* leaf essential oil may exceed 70% (v/v). But 1,8-cineole can also be found in the oils of other plants. Other substances include alkaloids, eucalyptin, phenols, flavonoids, macrocarpals (phloroglucinol-sesquiterpenes), monoterpenes (Dlimonene, -pinene, -pinene), and monoterpenes (p-cymene). 6,8-dimethylkaempferol-3,7-dimethyl ether, 2,3-dihydroxyurs-12-en-28-oic acid, 8-desmethyleucalyptin, tannins, terpenoid phenolaldehydes, 2,6-dihydroxy-3,4-methyl-4,6-methoxy-dihydrochalcone, and verbenone—a monoterpene bicyclic ketone—are among the compounds [10]. *Eucalyptus* has various kind of activities like Antidiabetic (Antihyperglycemic), Anthelmintic, Antiviral, Antihistaminic, Anti-inflammatory, Antimalarial, Antioxidant, Cytotoxic, Larvicidal, Nerve blocker, Pain killer, Respiratory diseases, Wound healing, as a repellent (insecticide, pesticide, nematicide) [11]. The taxonomical classification of *Curcuma* is given in table no. 1.

Table No.1: Classification of *Eucalyptus*

Kingdom	Plantae
Phylum	Tacheophyta
Class	Magnoliopsida
Order	Myrtales
Family	Myrtaceae
Genus	*Eucalyptus*

A successful treatment for jaundice is referred to as haridra in Sanskrit [12]. It is regarded as one of the oldest spices and has been used extensively in Ayurvedic treatment for thousands of years in India specially in west and south region [13]. In cosmetology, *Curcuma* is

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commonly used. Medical professionals have employed the rhizome of *Curcuma*, which is known to have medicinal properties, as an anti-diabetic, anti-inflammatory, anti-diarrheal, hepatoprotective, anti-asthmatic, and anti-cancerous medicine [13]. The taxonomical classification of *Curcuma* is given in Table No. 2.

Table No. 2: Classification of *Curcuma*

Kingdom	Plantae
Phylum	Tracheophyta Sinnott
Class	Magnoliopsida or monocotyledons
Order	Zingiberales
Family	Zingiberaceae
Sub-family	Zingiberoideae
Genus	*Curcuma*

Objective

Due to the significance of burns and the dearth of effective burn healing medications in contemporary medicine, research to discover novel medications, particularly those with an origination, is required. This study shows the wound healing potential of an herbal cream (Poly Herbal Cream) made up with the extracts containing *Curcuma* rhizomes and *Eucalyptus* leaves and retrieved from Indian traditional medicine was examined on 2nd degree burn wounds in diabetic albino rats. Additionally, evaluations of antioxidant and antimicrobial properties were carried out to identify the Herbal Cream's most likely mechanism for wound healing.

II Materials And Methods

Plant Material Collection: The aerial parts specially leave of *Eucalyptus* (Family: Myrtaceae) were gathered in the month of December, 2021 from Nearby area of DKNMU, Newai, Tonk, Rajasthan, India, and The Rhizomes of *Curcuma* (Family: Zingiberaceae) were gathered from DKNMU Medicinal Garden Newai, Tonk, Rajasthan, in the month of April in 2022.

Plant Material Authentication: Both the plants were recognized and identified by Pharmacy and Agriculture department of Dr. K. N. Modi University, Newai, Rajasthan. A voucher specimen for *Eucalyptus Globulus* and *Curcuma Longa* were submitted to

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Herbarium Department of Botany, Rajasthan University, Jaipur, Rajasthan with book no 343 and receipt no. 34282, the authentication no. was provided for *Eucalyptus Globulus* was RUBL 21218 and *Curcuma Longa* was RUBL 21219.

Preparation of Plant Extracts: *Eucalyptus* leaf powder was extracted for 30 minutes using the decoction method (1:20). The Soxhlet device was used to extract the powder from the *Curcuma* rhizomes. The extracts were filtered under reduced pressure and converted in concentrated form of 5 % of total extract. The extract dried on rotary evaporator and the yield was calculated.

Development of a topical formulation from extracts: Using 5% of each of the aqueous extracts of *Eucalyptus* and *Curcuma* in a cream base of eucerin, white petrolatum and bees wax in the concentration of 25%, 28%, and 4% poly herbal cream was created based on Indian Traditional formulary or ITM.

Confirmation of Polyphenols and Tannins in developed Herbal Cream: BP with modifications was used to determine the Inorganic phenols and tannin concentrations of Herbal cream using the hide powder and the Folin-Ciocalteu reagent [14]. The aqueous portion of Herbal Cream (25% w/v) was used for colorimetric experiment. Briefly, Folin-Ciocalteu reagent was used to oxidise the required dilution of the aqueous fraction, and a sodium carbonate aqueous solution (29% w/v) was used to neutralise the combination. To determine the total amount of polyphenols present, can be confirmed by taking the absorbance of the at 760 nm after 30 minutes using water for blue colour as a compensatory liquid. By combining the same amount of water with hide powder for separation of tannins from polyphenols. The determination of tannins was carried out as a continuation of the above-mentioned procedure. The mixture was filtered after vigorously shaking for 60 minutes, and the preceding colorimetric approach was applied to the collected filtrate to ascertain number of poly-phenol that were not absorbed by the hide powder. The following equation was used to calculate the solution's tannin content:

Tannins Content = (Total content for phenolic) - (Polyphenolic non-adsorbed content)

The pyrogallol standard curve served as the foundation for the quantification. For each gramme of PHC, the results were expressed as mg of pyrogallol equivalent. At room temperature, three copies of each measurement were taken.

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2,2-Diphenyl-1-Picrylhydrazyl (DPPH) Radical Scavenging Assay: One of the most thorough techniques that offers a simple and quick way to assess the anti-radical activity of antioxidants in herbals is the DPPH radical scavenging test. The antioxidant content efficacy sample of plant is determined by plant's capacity to scavenge free radicals of 2,2-Diphenyl-1-Picrylhydrazyl, which results in solution of radicals get decolorize, according to this colorimetric approach [15-17]. In the present investigation, the methanol fraction of the cream (1:2 w/v) was used to assess the DPPH radical scavenging activity of PHC. In a 96-well microplate, 100 L of serial PHC methanol fraction dilutions (0.2 to 125 mg/mL) were mixed with 100 L of DPPH methanol solution (0.004 % w/v). The solutions' 517 nm absorbance was measured after shaking for 30 minutes. The blank mixture had 100 mL of methanol and 100 mL of PHC methanol fraction, whereas the negative control contained 100 mL of DPPH solution and 100 mL of methanol. As a positive control, butylated hydroxy toluene (BHT) was utilised. The following equation was used to calculate antioxidant activity:

$$\text{Scavenging capacity\%} = \quad A_S - A_B \quad X \quad \frac{100}{A_C}$$

Where,

AS = Sample,

AB = Blank, and

AC = Negative control absorbances.

The plot of the inhibition percentage against the concentration of the herbal cream methanol fraction was used to compute the specified quantity of herbal cream in methanol fraction that provides 50% suppression or inhibition. It can be denoted by IC50. There were three duplicates of each test run.

Antimicrobial Activity Assessment

Microorganisms: In the experiment, Staphylococcus aureus, a Gram-positive bacterium, and Pseudomonas aeruginosa, a Gram-negative bacterium, were both employed.

Procedure: Using the micro-dilution method, the antimicrobial activity of aqueous extracts of *Curcuma* rhizomes, *Eucalyptus* leaves, and PHC was assessed. With few adjustments, the assay was carried out in accordance with Soberón et al. [18]. To create the bacterium inoculum, cultures were suspended in tryptic soy broth (TSB) for a whole night before being photometrically calibrated at 600 nano-meter to density of cell corresponding to the 0.5

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standard of Mc-Farland (1.5 x 108 colony forming unit /mL). In 96-well microplates, extracts and creams were diluted serially two-fold (7.81–1000 g/mL).

Dimethyl sulfoxide (DMSO) 10% v/v was used to dissolve the material at a concentration of 4 mg/mL to create stock solutions of the test chemicals. Cephalexin taken in quantity of 0.75-125 g/mL and imipenem was taken in quantity of 0.09-12.5 g/mL as positive controls against ***Staphylococcus aureus*** and **Pseudomonas** aeruginosa respectively, in similar two-fold serial dilutions. Wells with 10% DMSO content were used as negative controls. The wells were seeded with 50 microliters of adjusted culture inoculums and then incubated for 24 hours at 37°C. The samples and medium's sterility were verified. The turbidity after incubation revealed bacterial growth. Antibacterial activity was assumed to be the cause of the lack of turbidity, which showed no bacterial growth. The lowest sample concentration that completely prevented (100%) bacterial growth under experimental conditions was defined as the MIC value [18].

III Pharmacological Activity

Animal Ethical Committee and observation:

This experiment was done in the animal house at B. N. College of Pharmacy, Bhupal Nobles University, Udaipur under supervision of Institutional Animal Ethical Committee Registration No. 870/PO/Re/S/05/CPCSEA. There each animal was housed in a typical plastic and stainless-steel cage.

Natural environment was maintained for better easy result finding. Institutional Animal Ethical Committee of Bhupal Nobles University, Udaipur granted the study after taking the presentation and viva with issued approval letter with approval number 12/BNCP/IAEC/2023. Time requires anyone get set in new environment. Rats were given specific time to become used to new place before studies began. The rats kept apart during the studies using different cages.

Animals: The investigation at hand was an experimental one. In the study, male Wistar rats weighing 250–300 g was employed. The rats were housed in cages with controlled lighting (12-hour cycles of light and dark), temperature of room set at (23 ± 2 °C), and relative humidity was controlled to (50 ± 10%), with access to unlimited food and water.

Burn Induction: Twenty rats had their backs shaved while being given 100/10 mg/kg of ketamine and xylazine intraperitoneally (IP) for anaesthesia. On their dorsal portions, a deep burn wound measuring 15 mm in diameter and covering 177 mm^2 was it was done by 110

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degree temperature heating for at least 10 seconds on an electrical heater. Normal saline was used to clean the underlying skin [19].

Procedure for Experiment: In this study, the wistar rats with 2nd degree burn injuries were got separated into their specific four groups and these groups were names from 1-4. Each group contains five number of wistar rats, with group 1 serving as the controlled and receiving no treatment, group 2 receiving only base of the prepared formulation without API, group 3 receiving SSD cream which has 1% concentration of silver sulphadiazine. This was recommended as a positive controlled group, and group number 4 was treated with formulated herbal cream. The dressing of wounds done on everyday basis and treated topically according to the group with SSD, cream base, and herbal cream. The 14-day treatment process began right after the burn induction.

Assessment of Burn Wounds

Rate of Wound Healing: Every four days starting on the second day of treatment, the percent-age of reduction in the initial wound area was used to calculate the pace of wound healing. This was done by capturing pictures with a digital camera for the determination and assessment of wound area for records. The equation is given below which was used to determine of wound healing percentage: [19]

$$\text{Healing of burn wound percentage} = \frac{(\text{Wound area on first day} - \text{specific day wound area})}{\text{Wound area on first day}} \times 100$$

IV Histopathological Evaluation: On the final day of the experiment, granulated tissues were extracted from the animals' dorsal regions and fixed in 10% buffered formalin. Haematoxylin-eosin was used to generate a series of sections that were 3 to 4 m thick. The sections were then photographed at 100 or 400 magnifications. A blind histopathologist assessed the speed of formation of epithelial layer, collagination, formation of new blood vessels, and inflammatory cells.

Statistical Analysis: The mean SD was used to express all values. One-way ANOVA was used to analyse the data. At $P < 0.05$, the results were deemed to be statistically different.

Results

Contents of Herbal Cream (Phenol and tannin): As phenolic and tannin content have capability to stop microbial growth and increase proliferation. Their presence matters. So, in

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prepared herbal cream the presence of these contents was determined by using a colorimetric method which is a quantitative method and experiment was done by using the hide powder and Folin-Ciocalteu reagent, with values for total tannins 0.15 ± 0.01 mg per 1 g and for polyphenols 0.70 ± 0.025 mg in one gram of the cream.

DPPH testing for free radical activity determination: The DPPH activity was inhibited according to dose concentration in the methanol fraction of herbal cream. The herbal cream methanol fraction's IC50 value was 6.50 ± 0.50 mg/mL.

Anti-microbial activity determination: Table no. 3 displays the minimum inhibitory concentrations (MIC) of specific plant and combination of extracts, herbal cream, SSD cream, and +ve control against ***Staphylococcus aureus*** and **Pseudomonas** aeruginosa. *Curcuma Longa* extract found most sensitive sample compared with *Eucalyptus* extract, showed the greatest antibacterial activity against *S. aureus* of all the samples.

Rate of Wound Healing: Table no. 4 displays the speed of healing of wound by herbal cream and SSD cream, and +ve control treated groups. Over the course of 14 days, the re-epithelialization percentage was increased in all groups.

On days 10 and 14, it was discovered that all treatment groups had considerably smaller wound areas than the control group ($P < 0.05$). On day 2, SSD considerably outperformed other groups in terms of wound healing ($P < 0.05$), however on the 6th day no discernible difference between SSD and herbal cream. On the 10th day, there was no discernible difference between cream base and SSD in terms of the ability to heal wounds. On the fourteenth day, there was a significant difference between herbal cream and the other groups' wound healing activity ($P < 0.05$).

Table 3.: (MIC) of specific plant and combination of extracts, herbal cream, SSD cream, and +ve control against *Staphylococcus aureus* and Pseudomonas aeruginosa Determined by Micro-Dilution Assay

Microorganisms	MIC, µg/mL					
	Eucalyptus Extract	*Curcuma* extract	poly herbal cream	SSD	Imipenem	Cephalexin
S. aureus	500	1000	500	250	4.25	0.75
P. aeruginosa	300	800	450	225	3.25	0.66

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PHC = poly herbal cream.

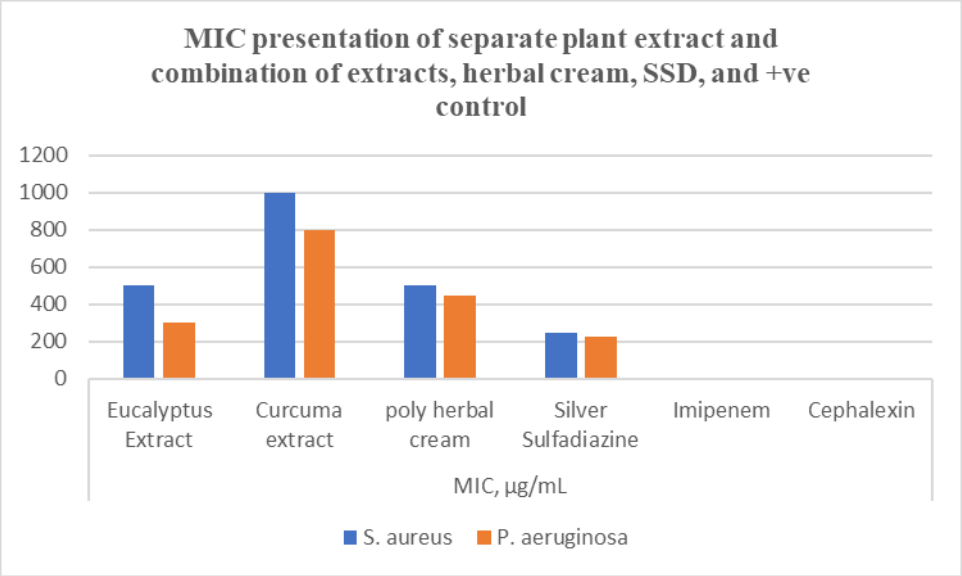

Figure 1: MIC presentation of separate plant extract and combination of extracts, herbal cream, SSD, and +ve control

Table 4. Percentage rate of re-epithelialization in experimental groups separately

Groups	Percentage of wound healing			
	II day	VI day	X day	XIV day
Controlled	13.4	14.8	23	33
Cream base	17.2	25.3	40.6	48.9
SSD	27.5	39.7	54.3	71.7
Herbal cream	16.1	27.2	43.6	68.6

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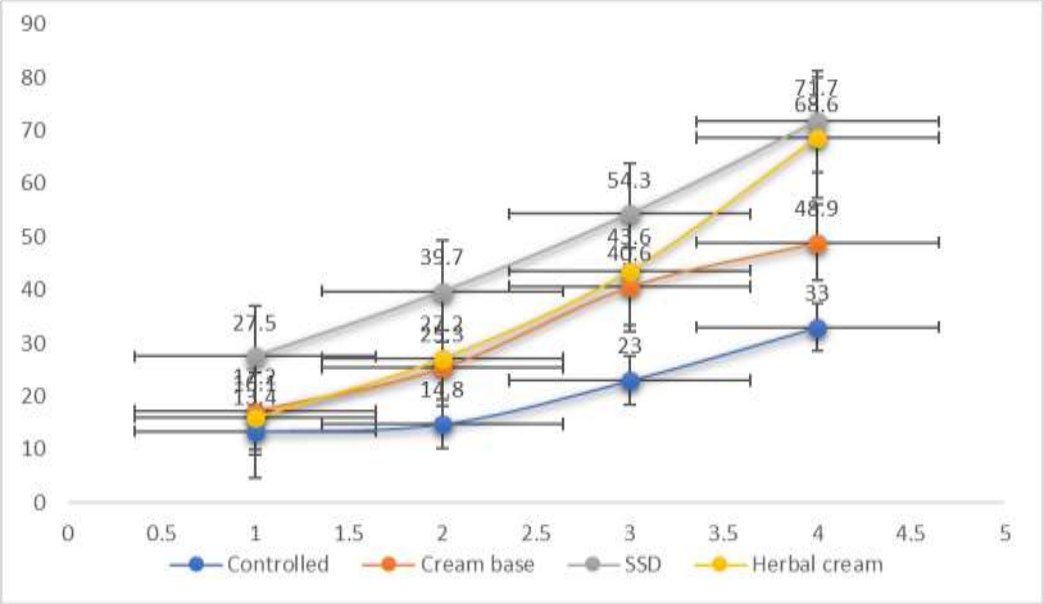

Figure 2: Percentage of Wound Healing in Experimental Groups

Histopathological Study: Granulation tissue samples taken from herbal cream-treated and control group rats revealed a noticeably faster rate of wound healing in the herbal cream-treated group. In Figure 3, the microscopic perspectives are displayed.

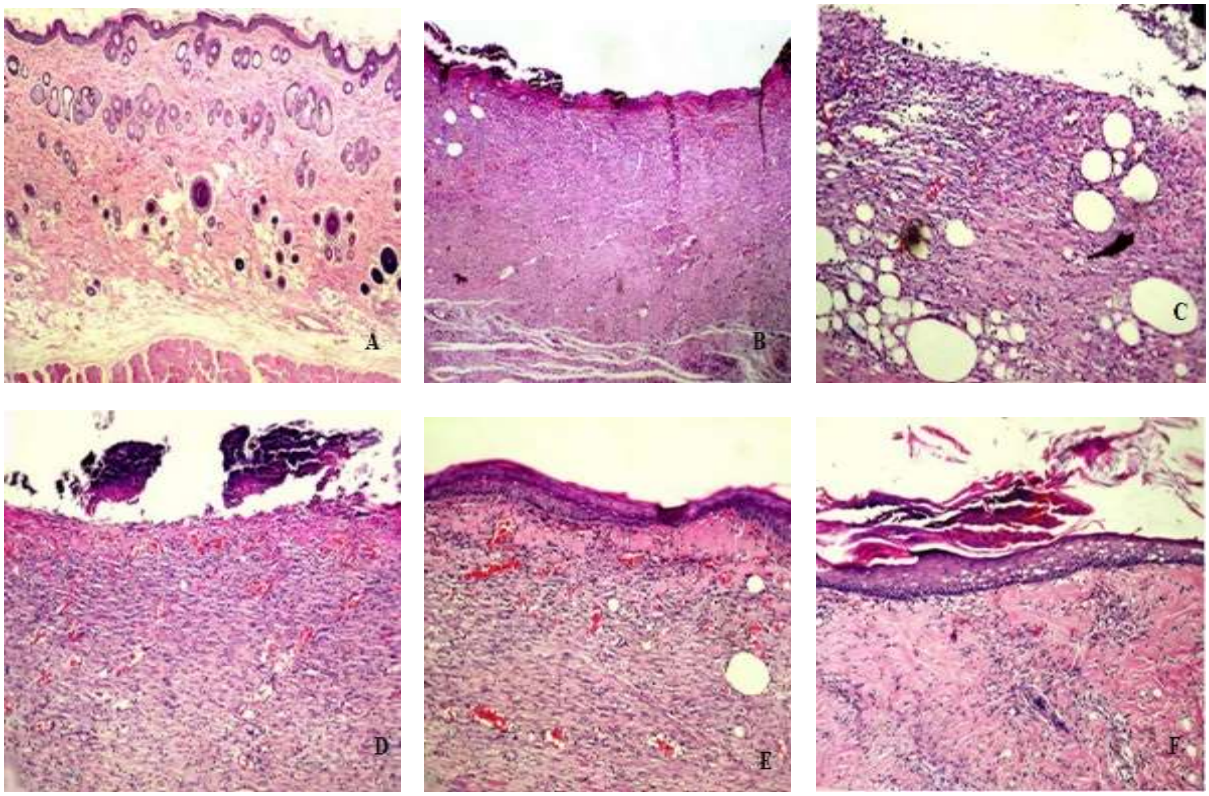

Figure 3:Microscopic evaluation of Burns on XIV Day after Treatment

A) Normal epidermis and dermis layers (about 400).

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B) Invasive inflammatory cells lacking an epithelial layer (less than 100).

C) Control: 400 or fewer invasive inflammatory cells lacking an epithelial layer.

D) Cream base: significant infiltration of inflammatory cells and absence of epithelialization (100).

E) Herbal cream: Perfect re-epithelialization, well-generated granulation tissue, striking neovascularization, and minimal infiltration of inflammatory cells (100).

F) SS: less infiltration of inflammatory cells and increased collagination and neovascularization (100). PHC, or poly herbal cream, and SS, or silver sulfadiazine.

Skin that was healthy had normal conditions in both the epidermis and dermis. Significant numbers of hair follicles, sweat glands, sebaceous glands, and fibrils were also seen (Figure 3 A). The control group showed signs of immaturity including vacuolization of the dermal cells, substitution of adipose tissue, and invasive inflammatory cell infiltration without an epithelial layer. There was edema, haemorrhage, and clogged capillaries in the transparent dermis, which was devoid of hair follicles, sebaceous glands, or sweat glands (Figure 3 B and C).

The cream base group had more new capillaries and active fibroblasts visible at the dermis, but microscopic analysis showed no obvious wound healing as shown by a lack of epithelialization and a significant infiltration of inflammatory cells (Figure 3 D). Significant wound healing, complete re-epithelialization, well-formed granulation tissue of the epidermis, and little inflammatory cell infiltration, mainly in the perivascular region, were all seen in the PHC group. Collagen fibres, an abundance of fibroblasts, an increase in the number of new capillaries, and unequal myofibroblast distributions were all signs of neovascularization (Figure 3 E). In the SSD group, there were fewer inflammatory cell infiltrations, complete epithelialization, more collagination, and neovascularization (Figure 3 F).

V DISCUSSION AND CONCLUSION

Injured tissue goes through a difficult process called wound healing in order to rebuild the tissue and get it back to normal as quickly as feasible [21]. The three stages of wound healing include inflammation, proliferation, and change of the extracellular matrix. The proliferative phase is characterised by angiogenesis, collagen deposition, epithelialization, and wound

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contraction [22]. Preventing pathogen infiltration, verifying the health of injured tissue, and re-establishing physiological functions of skin is the goals of the healing process [23].

Due to their capacity to cause cell damage, oxidants are variables that prevent wounds from healing. Studies on humans or animals have shown a significant improvement in the healing of wounds and the defence of tissues against oxidative damage when chemicals with free radical scavenging properties are applied topically. Additionally, antioxidants might be crucial for the survival of ischemic skin flaps or the acceleration of wound healing [24].

The body's defensive mechanism of inflammation serves to rid the body of damaging stimuli and kickstart the healing process. Excessive and imbalanced inflammation, however, may prolong the healing process and increase scarring, suggesting a tempting target for potential therapeutic approaches or possibly predisposing tissue to the formation of cancer [25-27]. Anti-inflammatory drugs are therefore thought to be efficient wound healing agents [28]. Despite the wound healing process of burn progressing naturally, by occurring infection epithelization slow down by a variety of processes, including reduced blood flow, promoted aberrant leukocyte function, prolonged inflammatory and debridement phases, and production of proteolytic enzymes. Consequently, infection is the main side effect of burn injuries, and antibacterial medicines are crucial to the wound healing process [26, 28-30].

Due to their antioxidant, anti-inflammatory, and antibacterial properties, plants have a wide range of possibilities for the management and treatment of burns and wounds [22, 29]. The results of the current study's analysis of the healing potential of herbal cream, which was made up of aqueous leaf extracts of *Eucalyptus* leaves as well as an extract of *Curcuma Longa* rhizomes, revealed that despite SSD superior early-stage wound healing effects, herbal cream had a significantly higher potential for burn wound healing than SSD by the end of the treatment period. The promise of herbal cream in burn wound healing was further supported by a histological analysis that revealed a fully regenerated epithelium, well-formed granulation tissue and neovascularization. Our study also demonstrated PHC's antioxidant and antibacterial activity against *S. aureus*, a prominent the root of soft tissue and skin infections. Numerous studies on the three herbal PHC medicines' biological actions have been conducted. Numerous investigations have revealed *Eucalyptus* extract antioxidant and radical-scavenging properties [20,31,32]. Additionally, the plant has demonstrated topical anti-inflammatory abilities [32].

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Staphylococcus aureus, Bacillus subtilis, Pseudomonas aeruginosa, and Escherichia coli are methicillin-resistant bacteria have all been shown to be susceptible to *Eucalyptus* extract antibacterial properties [33,34]. The rhizome extracts in acetone, methanol, and water for *Curcuma* have been shown by many articles to have +ve ion donating efficacy. It can be related as its free radical scavenging property due to antioxidants. The essential oil from the leave extract of *Eucalyptus Globulus* showed antioxidative activity by scavenging unrestricted radicals and preventing the lipid metabolism [36-39].

In our work, a quantitative colorimetric assay revealed the presence of tannins and phenolic chemicals in herbal cream. Numerous investigations have uncovered several facets of plant polyphenols. The antioxidants found in phenolic compounds can serve as reducing substances, H^+ donors, and singlet oxygen producers. It has been demonstrated that the unique phenolic composition of numerous plant extracts is related to their antibacterial effectiveness [38, 40-44]. Because of their activity against oxidation, inflammation, and fungi infection, herbal preparations containing tannins are recognised to have pharmacological applications in the healing of burns and wounds [45]. Tannins' antibacterial characteristics would aid in the process of healing wounds and avert complicated side effects of infection [45]. A quick scab can form as a result of tannins' ability to precipitate proteins in injured tissues. With this characteristic, they can lessen wound capillary permeability, tissue edema, and exudation [23,46].

It can be considered that tannin extract helpful in wound healing as tannins are helpful in the development of new blood vessels [23]. Formulated herbal cream may have a healing effect by accelerating formation of epithelial layer and vessel formation, cleaning of harmful free radicals, reduce swelling, and controlling contamination through the actions of plant components that act as antioxidants, anti-inflammatory, and antibiotics used to make the cream, with poly-phenol and tannins serving as the primary element. Therefore, this research supports the advantage of *Eucalyptus* and *Curcuma* in Indian Tradition Medicine (ITM) burn prescriptions.

The most popular topical burn injury treatment is silver sulfadiazine cream. This substance is frequently used in burn wounds due to its potent antimicrobial properties. However, the most significant therapeutic side effect of SSD, it delayed wound healing after treatment limits if someone usage it for long time, especially on large wounds [2,3]. The simultaneous use of herbal cream and SSD is recommended at the initial phases of burn therapy, whereas utilising

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herbal cream alone could be better for further stages of the curing period, according to this research study, herbal cream showed better effects as comparison to the SSD and it can used for later stages without multiple side effects. Future research on diabetic ulcers and bed sores may be beneficial due to the cream's angiogenic properties.

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