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RESEARCH ARTICLE

WOUND HEALING ACTIVITY OF EPIPREMNUM AUREUM METHANOLIC EXTRACT IN RABBITS

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Abstract

In general, plants offer enormous promise for managing and healing wounds. The current study seeks to examine the effects of methanolicEpipremnumaureum extract on wound healing activity. This methanol-rich fraction of the plant's leaves was made into an ointment and tested for in vivo wound healing. At the studied concentration, it demonstrated a significant percentage wound protection. To investigate the biological efficacy of each particular tannin and flavonoid it should go through various preclinical and clinical trials of the separated molecules and more research must be done.

Introduction:-

Plants offer a great deal of potential for managing and healing wounds. Many plants are used as traditional remedies to treat a variety of wound injuries and skin. Physical harm can result in wounds, which cause the skin to split or open. The restoration of the structural and functional integrity of the injured tissue is accomplished through integrated cellular and biochemical pathways involved in wound healing. Inflammation, cell proliferation, and migration all play a role in the process of the wounded tissues being repaired. Following an injury, the inflammatory stage starts with vasoconstriction, which leads to homeostasis and releases a number of inflammatory mediators. The angiogenesis and granulation tissue formation by fibroblasts that make up the proliferative phase are what it's mostly made of. Remodelling stage is characterised by reformulated and improved collagen fibre components that boost tensile strength. The beginning and promotion of wound healing appear to need a number of growth factors, including TGF-β, EGF, platelet activation factor (PAF), and platelet-derived growth factors (PDGF).Epipremnumaureum is a common decorative house plant in the Araceae family. This plant is indigenous to Southeast Asia and New Guinea. It is an elegant climbing evergreen shrub with variegated leaves and aerial roots.The current study set out to evaluate the effectiveness of Epipremnumaureum plant parts in treating wounds. Additionally, phytochemical testing of the most potent extract was carried out.

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Methodology:-

Wound Healing Evaluation

Preparation of ointment

The materials for the ointment base were combined according to the British Pharmacopoeia (1980) in a beaker at 65°C on a water bath. The ingredients were wool fat (5g), hard paraffin (5g), cetostearyl alcohol (5g), and soft paraffin (85g). The mixture was homogenised for 10-15 minutes at 1500 rpm in a homogenizer after chilling. To create a homogenous ointment formulation, the test extract (5 percent w/w) was blended with the ointment base using a mortar and pestle. A new medication formulation was created every fifth day. Wool fat, cetostearyl alcohol, soft paraffin, and hard paraffin are products of Burgoyne Burbidges and Co Company and were acquired from the pharmaceutical school at Vaageswari College of Pharmacy in Karimnagar.Povidine ointment was procured from a local chemist.

Preparation of animals for in vivo wound healing study

6 Rabbits each weighing between 180-200g were procured from the animal house of Vaageswari college of pharmacy, Karimnagar. The animals were housed in regulated climatic settings at a temperature of 25°C, a relative humidity of 45–55%, and a natural light cycle. They were also given access to food and water. Before the trial started, they underwent a week of acclimation.

Treatment protocol

Three sets of six rabbits each were created. The institutional animal ethics committee of the School of Pharmaceutical Sciences at Vaageswari College of Pharmacy in Karimnagar gave its approval to the current study project. VCP/1720/12/2021/001 is the registration number.

Group(i) functioned as the control and received topically a straightforward ointment base.
Group(ii) received topical application of a 5 percent Povidine-iodine ointment as the standard of care.
Group(iii) was provided as test treatment with Plant residue ointment topically.

Wound healing study in excision wound model

Excision of wounds was done as Smitarani and K. Remya described (2017). The animals are first given anaesthesia with the anaesthetic ether before being put on a dissection table in their natural position. After using ethanol to disinfect the area, a 1.5 cm wide by 0.2 cm deep square incision was produced in the dorsal thoracic area. A simple ointment base was used to topically treat the animals in Group(i). Povidinium iodine ointment was applied topically to the Group(ii) animals. Once daily, until the epithelization was finished, 5 percent test ointment was applied topically to the Group(iii) animals. To protect the wound and avoid infection, all of the rabbits were housed in separate, clean cages right after being injured. Neither an oral nor a systemic antibiotic was given after the procedure. The animals were inspected daily for any indications of an infection. Day 0 stood for the day of the injured. Later on days 0, 3, 6, 9, 12, 15, 18, and 21 the wound contraction, scar residue, area, and length of complete epithelization were also evaluated. To analyse the wound contraction, the raw wound area was drawn onto graph paper. The length of epithelization as well as the percentage of wound closure were recorded.

Wound contraction rate

Every two days, the rate of wound contraction was assessed. It is a percentage decrease in the size of the wound. It may also be thought of as a portion of wound protection. Transparent paper and an appropriate marker were used to track the shrinkage of wounds at predetermined intervals. The percentage of wound closure obtained as a result shows the development of new epithelial tissue to heal the lesion. The proportion of the initial wound size that was reduced to represent wound contraction.

% of wound=(initial area of wound day 0-area of wound on N^{th} day)/(wound area on day 0) x100

Wound healing study in the incision model

Ether was used to make the animals unconscious. The animals were kept in the standard posture on the operation table. Using a scalpel blade, a six-centimetre-long paravertebral straight incision was created on either side of the vertebral segment. Cotton balls dipped in 70% alcohol were used to disinfect the wound. The animals were housed in separate cages. Animals in Group (i) received topically applied treatments with a basic ointment base, those in Group (ii)received povidine iodine ointment, and those in Group (iii) had 5 percent test ointment administered topically daily for ten days. Sutures were taken out nine days after the wound. Tensile strength was assessed on the tenth day following injury.

Determination of tensile strength

The process of repair results in wound healing and tissue strength recovery. In the procedure described above, the ultimate tensile strength, or breaking strength, is the most important step. The elastic fibre networks and collagen in the dermis are in charge of giving skin its mechanical qualities. The minimal amount of effort needed to separate the incision, which indicates the degree of healing, the resilience of the wound tissue, and the effectiveness of the healing process.

The skin sutures are taken out nine days after surgery. On the tenth day, one side of the incision received application with progressively more weight while the other was fixed. The breaking strength, also known as tensile strength, is the weight at which the wound completely detaches from the incision line. The average breaking strength at the two paravertebral incisions on the animals' opposite sides was used to calculate the breaking strength of each individual animal.

Results:-

Table 1:- Preliminary phytochemical screening of the methanolic extract of Epipremnum aureum leaves.

Phytoconstituents	Methanolic extract
Alkaloids	■
Flavonoids	■
Glycosides	■
Steroids	□
Terpenoids	■
Tannins	■
Carbohydrates	■
Anthraquinone	□
Reducing sugars	■
Saponins	■

■-present □-absent

Table 2:- Effect of methanolic leaf fraction of Epipremnumaureum on excision wound model.

	Initial day	4^{th} day	8^{th} day	12^{th}day	Final Day
Test drug length	2.41±0.1.6	2.16±0.14	1.8±0.16	1.41±0.20	0.76±0.19 (19^{th} day)
width	2.4±0.17	2.08±0.19	1.7±0.16	1.3±0.25	0.9±0.42 (19^{th} day)
Standard drug length	2.26 ±0.17	1.96 ±0.14	1.6±0.08	1.23±0.11	0.7± 0.12 (16^{th} day)
width	2.23 ±0.14	2.1±0.15	1.78± 0.14	1.33 ±0.12	0.78±0.13 (16^{th} day)
Control drug length	2.3±0.13	2.55± 0.22	1.65 ±0.09	1.25±0.09	0.73±0.14 (23^{rd} day)
width	2.66±0.11	2.3±0.1	1.81±0.15	1.38 ±0.22	0.88±0.21 (23^{rd} day)

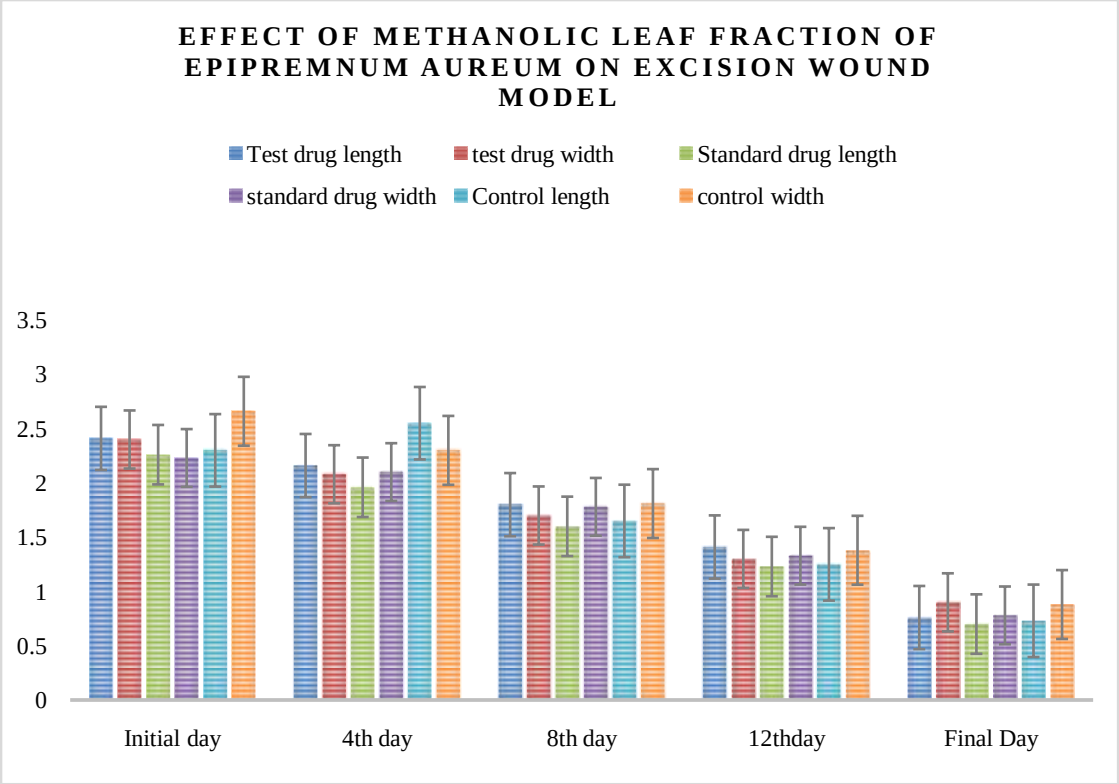
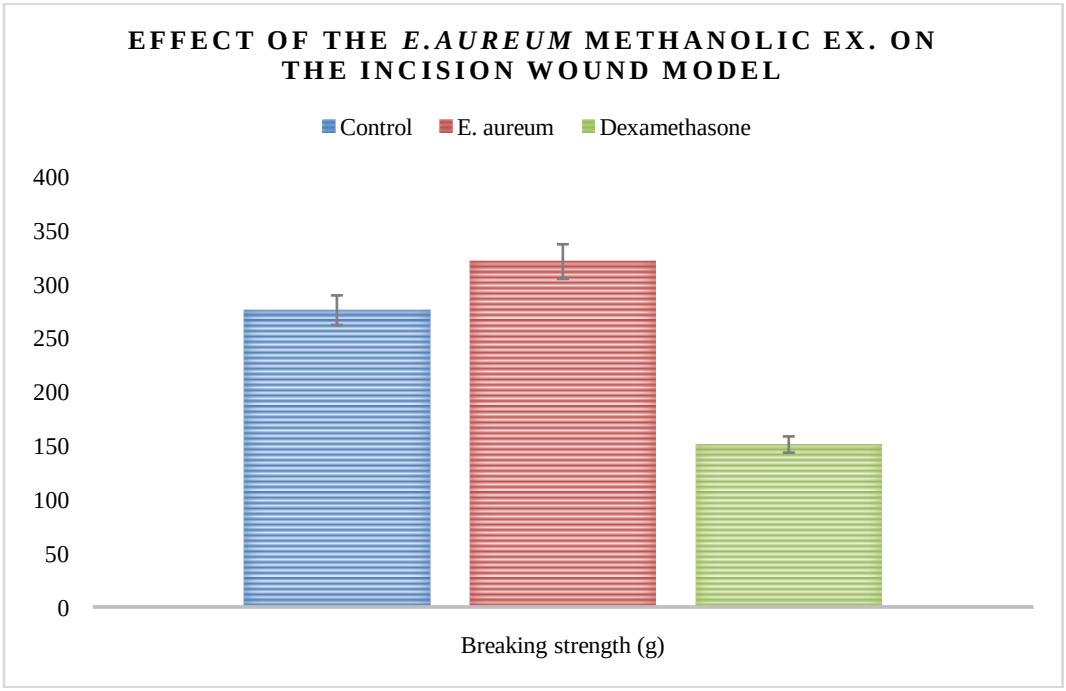


Table 3:- Effect of the E.aureummethanolic extract on the incision wound model.

Group	Drugs	Dose and route	Tensile/breaking strength (g)
G-i	**Control**	**Dis.H_2O 2ml**	**275.94±2.36**
G-ii	**E. aureum**	**400 mg/kg, (o)**	**321.15±1.83**
G-iii	**Dexamethasone(DEX)**	**0.17 mg/kg, im**	**151.15±0.84**



Conclusion:-

The wound's contraction during the healing process represents the rate at which the unhealed area is reducing. Therefore, a rapid rate of wound contraction indicates that the medication is effective. Several physical, histological, and biochemical indices of wound healing activity in our methanolic extract of E. aureum were positive. More study is required to confirm the main active components responsible for the activity. The information provided above could be in favour of employing the plant to treat wounds in conventional medicine.

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