

Research Article

WOUND HEALING ACTIVITY OF *PARTHENIUM HYSTEROPHORUS* (CONGRESS GRASS) BY  
INCISION WOUND MODEL IN WISTAR RATS

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ABSTRACT

**Context:** *Parthenium hysterophorus*, a weed belonging to Asteraceae family possesses many significant medicinal properties like anti-inflammatory, anticancer, antirheumatic, antidiabetic and many more. Plant has been found to be pharmacologically active in the process of wound healing activity too.

**Aims:** The study was planned to study the wound healing activity of *Parthenium hysterophorus* in Wistar Albino Rats.

**Material and Methods:** Experimental study was planned in healthy adult Wistar rats of either sex weighing 150- 250 gms in the laboratory. Incision wound model test was used to evaluate the wound healing activity of hydro-alcoholic extract of aerial parts of plant. The results were expressed as Mean  $\pm$  Standard Deviation (SD). The differences between experimental groups were compared by one-way Analysis of Variance (ANOVA) followed by test.

**Results:** The results obtained are clearly indicating that plant extract in both strengths i.e. 5% and 10% showed excellent wound healing activity as compared with standard drug Soframycin in terms of increase in tensile strength. Particularly with 10% strength test ointment exhibited almost equivalent increase in the tensile strength as comparable with standard. Overall, there was dose dependent increase in wound healing activity.

**Conclusions:** *Parthenium hysterophorus* extract showed significant wound healing activity in terms of increase in tensile strength in experimental analysis.

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INTRODUCTION

Herbal medicine is a major component in all indigenous people's traditional medicine and common element in Ayurveda, Rasa Siddha, Unani, Homeopathy, Naturopathy, traditional oriental and Native American Indian medicine. At the time of Charaka and Sushruta many herbal medicines in different oral and topical formulations have been recommended for the treatment of various human diseases.<sup>1</sup> World Health Organization (WHO) estimates that 4 billion people i.e. 80% of the world's population presently use herbal medicines for some aspect of primary health care.<sup>2</sup> Plants have been a main source of large numbers of drugs being used today with many of plant extracts as potentially curative ones. Some of these extracts can boost the humoral and cell mediated immunity against viruses, bacteria, fungi, protozoa and cancer and produces the potential cure.<sup>3</sup> Amongst these, *Parthenium hysterophorus* is one of the aggressive annual herbaceous weed with medicinal properties. Recently many innovative uses of this hitherto notorious plant have been discovered. It's decoction has been used in traditional medicine to treat fever,

diarrhoea, neurologic disorders, urinary tract infections, dysentery, malaria and as emmenagogue.<sup>4</sup> Additionally, it is also used by some tribes as remedy for inflammation, eczema, skin rashes, herpes, rheumatic pain, cold, heart trouble and gynaecological ailments etc. The major constituent of the plant Parthenin exhibits significant medicinal attributes including anticancer property.<sup>5</sup> The flowers showed significant anti tumour activity and parthenin exhibited cytotoxic properties against T cell leukaemia, HL-60 and Hela cancer cell lines.<sup>6</sup> Plant also has hypoglycaemic activity against alloxan-induced diabetic rats. So, flower extract of this weed can be used for developing drug for diabetes mellitus.<sup>7</sup> Till now very less work has been done due to lack of scientific data with respect to the pharmacological properties of this plant especially wound healing activity. Hence this study was conducted to evaluate these unexplored properties of *Parthenium hysterophorus*.

MATERIALS AND METHODS

**Animals:** Healthy adult Wistar rats of either sex weighing 150-250 gms were used to study wound healing activity by Incision wound model.

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**Plant material:** Fresh *Parthenium hysterophorus* were collected and were authenticated by local botanist. Aerial parts were shade dried and powdered in the department of pharmacology with the help of mortar & pestle.

**Extract preparation:** The powders (Aerial parts) were macerated for 24 hours in 70 % v/v ethanol. The hydro-alcoholic extracts were obtained by percolation using 70 % v/v ethanol as a solvent. Percolated solution was again shade dried and extract was obtained. Fresh solution was prepared by dissolving extract in distilled water before each experiment.

**Preparation of drug formulation:** For topical application plant extract was mixed with simple ointment as mention below.

**Preparation of ointment:** Simple ointment (100gm IP) was prepared by mixing Soft Paraffin (85 gm), Hard Paraffin (10 gm) and Lanolin/wool fat (5 gm)

5% (w/w) ointment was prepared using Simple ointment (95gm) and plant extract (5 gm) 10% (w/w) ointment was prepared using Simple ointment (90gm) and plant extract (10 gm). Drugs used were Pentobarbitone and Soframycin.

Ethical clearance was taken from Institutional Animal Ethics Committee (IAEC) prior to commencement of actual experimental work.

**Method for evaluating wound healing activity:-** Incision wound model used to assess the wound healing activity in this experiment.<sup>8-9</sup>

Total 24 albino Wistar rats of either sex were divided into 4 groups, 6 animals in each group.

Group 1 was applied control as simple ointment locally once daily.

Group 2 was applied extract (5% ointment) locally once daily.

Group 3 was applied extract (10% ointment) locally once daily.

Group 4 was applied Standard drug Soframycin ointment locally once daily

The animals were anesthetized using pentobarbitone (30 mg/kg) intraperitoneally. Para vertebral straight incision of 6 cm length was made through the entire thickness of the skin, on either side of the vertebral column with the help of a sharp scalpel. After complete haemostasis, the wound was closed by means of interrupted sutures placed at equidistance points about 1cm apart. (Fig 1) Animals were treated in the form of local application of test ointments and Soframycin ointment as mentioned above once a day from day 0 day to 9<sup>th</sup> post-wounding day.

The wound breaking strengths of control, test ointment and standard Soframycin was compared to assess the wound healing activity.

### Statistical Analysis

All the results were expressed as Mean  $\pm$  Standard Deviation (SD). The differences between experimental groups were compared by one-way Analysis of Variance (ANOVA) followed by test. The results were considered statistically significant when \* $p < 0.05$ , \*\* $p < 0.01$ -very significant, \*\*\* $p < 0.001$ -Highly significant as compared to control.

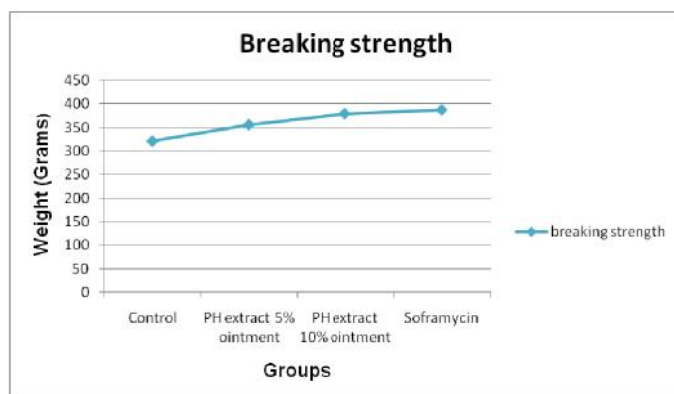
## RESULTS

In incision wound model, it was found that highest increase in the tensile strength was found with standard Soframycin ointment. Animals treated with 5% ointment of test extract showed significant ( $p < 0.05$ ) increase in tensile strength as compare to control. Whereas, animals treated with 10% ointment of test extract showed very significant ( $p < 0.01$ ) increase in tensile strength as compared to control. Animals treated with Soframycin showed highly significant ( $p < 0.001$ ) increase in tensile strength as compare to control as well as test groups. Test group with 10% ointment of test extract exhibited almost equivalent increase in the tensile strength as comparable with the standard Soframycin ointment. (Table 1 and Graph 1)

**Table 1** Wound healing activity of *Parthenium Hysterophorus* extract by Incision wound model on rats

| Groups        | Dose mg/kg      | Tensile strength (gm) mean $\pm$ SD |
|---------------|-----------------|-------------------------------------|
| 1- Control    | Simple ointment | 321 $\pm$ 5.932                     |
| 2- PH extract | 5% ointment     | 356 $\pm$ 33.339 *                  |
| 3- PH extract | 10% ointment    | 379 $\pm$ 36 **                     |
| 4-Standard    | Sofracycin      | 387 $\pm$ 25.123 ***                |

Notes: Number of animals n=6; PH- *Parthenium Hysterophorus*; Results are expressed in Mean  $\pm$  SD; \* $P < 0.05$ -significant, \*\*  $P < 0.01$ - very significant \*\*\* $P < 0.001$ - Highly significant compare to control



**Graph 1** Wound healing activity of *Parthenium Hysterophorus* (PH) extract on rats by Incision wound model



**Figure 1** Incision wound

## CONCLUSION

The chemistry of *Parthenium hysterophorus* is now well defined. More than 45 sesquiterpene lactones were identified from leaves and flower among them the major is parthenolide, which is up to 0.9% of total constituents.<sup>10-11</sup> Twenty-three compounds, representing 90.1% or more of the volatile oils have been identified from this plant too.<sup>12</sup>

Literature surveys revealed that plant metabolites like luteolin, parthenolide, parthenolid, reynosin, santamarin, santin, apigenin etc. may play an important role in wound healing activity.<sup>13-17</sup>

The results of this study clearly indicate that, in incision wound model animals treated with 5% ointment and 10% ointment of this plant extract as compare to control. Even, 10% ointment of this plant extracts almost showed comparable results with standard drug Soframycine. Kuhn and Winston and Zhou et al. suggest that the antioxidant property of the *Parthenium hysterophorus* extract conferred upon it by the presence of high apigenin & canin may also be responsible to the pro-healing action of the extract.<sup>15-18</sup>

Literature survey has revealed that constituents like apigenin and canin promote wound healing activity through several mechanisms like chelation of free radicals, antioxidant, antimicrobial properties etc.<sup>17-18</sup> Thus, it can be suggested that various photochemical constituents present in this plant may be responsible for its wound healing activity. From this study, it is almost clear that *Parthenium hysterophorus* extract has excellent wound healing activity, but further scientific experiments in this regard are necessary to finalize this.

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