Wound healing activity of *Sesbania grandiflora* Linn flower ethanolic extract using excision and incision wound model in wistar rats

Aijaz .A.Sheikh*1, Zaferuddin Sayyed1, A.R. Siddiqui2, A.S. Pratapwar1, Sameer.S. Sheakh3

1Department of Pharmacology,S. N. Institute of Pharmacy, Pusad, Maharashtra, India, 
2Department of Pharmacognosy,S.B. College of Pharmacy, Aurangabad, Maharashtra, India, 
3Department of Pharmaceutics,S.W. College of Pharmacy, Yavatmal, Maharashtra, India.

*Corres.author: aijazpsd@gmail  
Cell no. 08983659591

Abstract: *Sesbania grandiflora* Linn belonging to family *Leguminosae* is well known medicinal plant in various region of India. Flower extract was used in various disease like nasal catarrh, headache, laxative, aperitif, gout, ozoena, bronchitis, pain. Present study is concerned mainly with evaluation of wound healing activity of flower ethanolic extract in Wistar rats using excision and incision wound model in the form of ointment using two concentration (2 and 4 % w/w ointment) of flower extract in simple ointment base. Both concentration of ethanolic extract showed significant response in both the wound type tested when compared with control group. Nitrofurazone ointment (0.2%w/w) was used as standard drug.

Key words: wound healing, *Sesbania grandiflora*, ethanolic extract, Nitrofurazone.

Introduction

Wound healing involves various steps like coagulation, formation of granulation tissue, coagulation and acquisition of wound strength. During the formation of new tissue endothelial cell proliferates and forms new blood vessel. *Sesbania grandiflora* belonging to family *Leguminosae* (Hindi:Agati, Hadga,) found in various region of India, Sri Lanka, and southeast asia. Its leaf used in night blindness and in treatment of ulcer, flower used as antiseptic, antioxidant, emollient, astringent, and in relieving pain in folkloric medicinal use. Flower also used in obesity, thirst, headache, ozoena, dim vision, indigestion, anaemia, gout, bronchitis, nystagmus, quaranian fever also stimulate milk secretion, libido. The plant also shows anxiolytic, anticonvulsive, hepatoprotective and antihelmintic properties. The literature survey revealed that no scientific study on wound healing activity of flower extract of this plant has been reported. Their fore objective of present study was to evaluate wound healing activity of *Sesbania grandiflora* Linn flower extract against excision and incision wound model in wistar rats.

Materials and Method

Plant material

*Sesbania grandiflora* flower were collected from Pusad local area in Yavatmal district of Maharashtra India.
Preparation of extract
Powdered flower were soxhlet extracted with 70% ethanol. The ethanolic extract was evaporated in vacuo.

Preparation of drug formulation
The drug formulation with different concentration of extract were prepared, viz 2%(w/w) ointment, where 2g extract was incorporated in 100g simple ointment base and 4%(w/w) ointment where 4g of extract was incorporated in 100g simple ointment base. Nitrofurazone ointment (0.2% w/w) was used as standard for comparing wound healing potential of extract in different animal model.

Animal
Healthy wistar rats of either sex weighing 150-200g were used. They were kept in a standard conditions of temperature (23±1º), 12h light/dark cycle and feed with rodent diet (amrutt seeds pranav agro industries ltd sangali) and water ad libitum.

Wound healing activity
The wound healing activity was investigated in ether anesthetized rats in two different wound model (at two different concentration 2 and 4% w/w).

Incision wound
Animal were divided into six animals each, group 1 control (simple ointment base B.P), group 2 was reference standard and treated with 0.2% w/w Nitrofurazone ointment. The group 3 animal were treated with 2% w/w ethanolic extract ointment and group 4 were treated with 4% w/w ethanolic extract ointment of flower extract. A circular wound about 2.5 cm diameter was made on depilated dorsal thoracic region of animal under light ether anesthesia. The observation of percentage wound closer was made on 4th, 8th, 12th and 16th post wounding days. Number of days required for falling the scar without any residual raw wound gave the period of epithelization. The ointment of flower extract, reference standard and simple ointment (control) was applied to wound twice daily, until recovery to respective group of animals.

Statistical analysis
The results are expressed as mean ±SE of six animals in each group. The data were evaluated by Student’s t-test and value of p<0.01 were considered statistically significant.

Table 1: Effect of ethanolic extract ointment of flower of *Sesbania grandiflora* Linn on % wound closer of excision wounds

<table>
<thead>
<tr>
<th>Treatment</th>
<th>4th day</th>
<th>8th day</th>
<th>12th day</th>
<th>16th day</th>
<th>Period of epithelization in days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (simple ointment base)</td>
<td>15.82±0.68</td>
<td>27.21±1.02</td>
<td>48.21±1.80</td>
<td>68.53±2.60</td>
<td>24</td>
</tr>
<tr>
<td>Nitrofurazone 2% (ref. std)</td>
<td>35.28±0.15</td>
<td>76.80±0.19</td>
<td>89.81±0.58</td>
<td>97.11±0.48</td>
<td>18</td>
</tr>
<tr>
<td>Ethanolic extract(4%)</td>
<td>34.42±1.01</td>
<td>76.86±1.24</td>
<td>84.32±2.36</td>
<td>92.56±2.10</td>
<td>18*</td>
</tr>
<tr>
<td>Ethanolic extract(2%)</td>
<td>20.16±1.02</td>
<td>35.33±1.82</td>
<td>61.40±2.78</td>
<td>80.12±2.32</td>
<td>20</td>
</tr>
</tbody>
</table>

Value’s are ±SE, P<0.01 vs control by students t-test

Table 2: Effect of ethanol extract ointment of flower of *Sesbania grandiflora* Linn on tensile strength of wound incision wounds

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Tensile strength in g±SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (simple ointment base)</td>
<td>310±4.6</td>
</tr>
<tr>
<td>Nitrofurazone 2% (ref std)</td>
<td>564±1.8*</td>
</tr>
<tr>
<td>Ethanolic extract 4%</td>
<td>537±3.8*</td>
</tr>
<tr>
<td>Ethanolic extract 2%</td>
<td>449±4.2*</td>
</tr>
</tbody>
</table>

Value’s are ±SE, P<0.01 vs control by students t-test
Results
The effect of ethanolic flower extract ointment on incision model, the wound healing contracting ability in different concentration was significantly greater than that of control (simple ointment treated group). The 4% w/w treated group showed significant wound healing from 4th day onwards, which was comparable to that of standard drug Nitrofurazone ointment treated group. The wound closer time was lesser, as well as the percentage of wound contraction was more with the 4% w/w extract ointment treated group (18±1 days for 100% contraction which was almost similar to that of Nitrofurazone treated group) the 2% w/w extract ointment treated group showed significant wound contraction from 8th day onwards and achieved 100% with the wound closer time of 20±2 days (Table1)

The result of tensile strength wound model is shown in Table 2. The tensile strength of 4% extract ointment treated group showed a lesser but significant increase in tensile strength compared to control group. Thus both concentrations of flower extract as well as standard drug showed a significant increase in tensile strength in 10 days of old wound. The result of present study revealed that both concentrations (2 and 4% w/w) of ethanolic extract of *Sesbania grandiflora* Linn flower have significant wound healing property7,8.

Discussion
Wound healing is fundamental property to tissue injury that results in restoration of tissue integrity. This is mainly achieved by synthesis of connective tissue matrix. Collagen is a major protein of extracellular matrix and is major component that mainly contribute to wound strength. Tannins promote wound healing through several cellular mechanisms. Chelating reactive radical reactive species of oxygen, promoting contraction of wound and increasing formation of capillary vessel and fibroblast. *Sesbania grandiflora* Linn flower contains9 proteins, tannins oleanolic acid, kaempferol, grandifloral, cystine, isolucine, aspargine, phenylalanine, valine, nicotinic acid, vitamin c, and also showed immunomodulatory action. Flower also posses antimicrobial activity. Astringent nature of flower also contribute to antimicrobial activity.

Conclusion
It can be inferred from present study that wound healing activity of flower plant *Sesbania grandiflora* Linn is due to tannin and other nutritious content.

References
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