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

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Abstract: *Sesbania grandiflora Linn* belonging to family *Leguminosae* is well known medicinal plant in various region of india. Flower extract used in various disease like nasal catarrh, headache, laxative, aperitif, gout, ozoena, bronchitis, pain. Present study is concern 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[1] and forms new blood vessel. *Sesbania grandiflora* belonging to family *Leguminosae* (Hindi:Agati, Hadga,) found in various region of India ,Srilanka[16] and southeast asia[20].Its leaf used in night blindness[15] and in treatment of ulcer[21], flower used as antiseptic, antioxidant[17,19,24], emollient[2], astringent, and in relieving pain[2] in folkloric medicinal use. Flower also used in obesity, thirst, headache[13,14], ozoena, dim vision[3], indigestion, anaemia[20] gout, bronchitis[7,20], nyctalopia, quarantan fever[20] also stimulate milk secretion, libido. The plant also shows anxiolytic , anticonvulsive [18] , hepatoprotective[20, 22] and antihelmintic [23]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 [11]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[4] and 4%(w/w) ointment where 4g of extract was incorporated in 100g simple ointment base[4]. Nitrofurazone ointment[10,12] (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 (amrut 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)[4], group 2 was reference standard and treated with 0.2%w/w Nitrofurazone ointment. The group 3 animal were treated with ethanolic extract and group 4 animal were treated with 4% w/w ethanolic extract flower. The animals were anesthetized with anesthetic ether. Paravertebral incision of 6cm long was made on either side of vertebral column of rat. Care was taken to make the incision at least 1cm lateral to vertebral column. The wounds were covered with interrupted suture of 1cm apart. The animal were caged separately according to group. The sutures were removed after 8th day of surgery. The tensile strength[5] of wound was measured after 10th day of surgery by tensiometer.

Excision wound

The animal were divided into four group of six animal each. The group 1 was considered as control (treated with 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[6].

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

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

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

Treatment	Tensile strength in g±SEM
Control (simple ointment base)	310±4.6
Ntrofurazone 2% (ref std)	564±1.8*
Ethanolic extract 4%	537±3.8*
Ethanolic extract 2%	449±4.2*

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 property[7,8].

Disscusion

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 contains[9] proteins, tannins oleanolic acid, keampferol, 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.

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