WORLD JOURNAL OF PHARMACY AND PHARMACEUTICAL SCIENCES
SJIF Impact Factor 7.632
Volume 10, Issue 11, 2039-2046 Research Article ISSN 2278 – 4357

EXPERIMENTAL EVALUATION OF WOUND HEALING ACTIVITY OF IXORA POLYANTHA WIGHT. LEAF-A FOLKLORE DRUG

Dr. Anupama K. N.[1]*, Dr. Naveen V.[2] and Dr. Manjunath P. Mudgal[3]

[1]Final Year PG Scholar, [2]Associate Professor, Department of P.G. Studies in Dravyaguna, Sri Sri College of Ayurvedic Science and research, Bengaluru.

[3]Professor and Head of the Department, Department of Pharmacology, Acharya & BM Reddycollege of Pharmacy, Bengaluru.

Article Received on
19 Sept. 2021,

Revised on 09 October 2021,
Accepted on 29 October 2021

DOI: 10.20959/wjpps202111-20589

***Corresponding Author**
Dr. Anupama K. N.
Final Year PG Scholar, Department of P.G Studies in Dravyaguna, Sri Sri College of Ayurvedic Science and research, Bengaluru.

ABSTRACT

Background: Cutaneous wound have high incidence in India. *Ixora polyantha* wight is a folklore herb used in coastal regions of Karnataka for wound healing. It is necessary to scientifically validate its efficacy in wound healing. An experimental in-vivo study was carried out to assess the role of *Ixora polyantha* Wight in the treatment of Excised wound. **Aim:** The study was carried out to evaluate the wound healing activity of *Ixora polyantha* Wight. leaves in Wistar albino rats. **Materials and Methods:** Excision wound model was selected for the study using 3 groups, Control group, Standard and Trial group respectively each group containing 6 rats. In Control group no medication was administered, Leaf paste of Jasminum grandiflorum was used as Standard and *Ixora polyantha* Wight. leaf paste was used as trial drug. Leaf paste of both the drugs were applied externally. The assessment criteria are wound contraction percentage and number of days of epithelisation and histopathological study of wound tissue. **Results:** The experimental study showed that, *Ixora polyantha* Wight. had faster rate of wound healing in first 7 days when compared to *Jasminum grandiflorum* Linn. (Standard group) and Control group however, standard group was highly significant when compared to trial group at the end of 14 days. Histopathological study results revealed that thewound tissue is healthier in both Standard group and Trial group.

KEYWORDS: Wound, Ixora, Folklore, In-vivo.

INTRODUCTION

Wound remains as challenge for the medical community presenting the frequent cause of morbidity and mortality. According to a statistical analysis in India, cutaneous wounds have an incidence of 15 per 1000.[1] Wound care and maintainance of wound includes dressing, administration of pain killers, use of anti-inflammatory agents, topical systemic antimicrobial agents etc.

Even though many advanced therapies are available for wound, wound healing is facing challenges like high volume of exudates, microbial infection, less perfusion etc. Also due to multi drug resistant organisms and challenge to combat the complications of antibiotics, the treatment for wound healing is not much encouraging. *Ixora polyantha* Wight. is a medicinal plant used by folklore in coastal belt of Karnataka as external application in the form of fresh leaf paste for the purpose of wound healing.[2] Phyto constituents such as Saponins, Flavonoids, Tannins and alkaloids are present in leaves of *Ixora polyantha* Wight.Even though many researches regarding wound healing property of other Ixora species is available, the specific property of *Ixora polyantha* Wight. plant for wound healing is unexplored scientifically.

MATERIALS AND METHODS

Selection of animalsinclusion criteria

- Healthy Wistar Albino rats of either gender were taken.
- Wistar Albino rats weighing 100-200g were randomly selected.

Exclusion criteria

- Wistar Albino rats which were under other experiments.
- Wistar Albino rats which were pregnant.

Grouping

Grouping of experimental animals

Group	Group name	Number of animals	Medicine
1	Control	6	No medication
2	Standard	6	*Jasminum grandiflorum* Linn. leaf paste
3	Trial	6	*Ixora polyantha* Wight. leaf paste

Route of drug administration: External application.

Duration of the study: 21 days

Methodology

Excision wound model (Morton and Malone method)[3]

Hair was shaved from dorsal plane of sub-scapular region of the skin with an epilator. After that, a round seal of 2 cm diameter was impressed on dorsal plane of subscapular region, 1-1.5 cm away from the vertebral column on either side, 5 cm away from the ears on the depilated part of skin and was excised extending to a depth of 0.2cm to get a wound under anaesthesia. Starting from the day of excision, the leaf paste was topically applied once a day for 21 days.

Assessment criteria

By using a camera, the progressive changes in wound area was monitored once in 7 days till 21 days. Wound area was marked using a OH paper and later, markings of the OH paper was measured using a millimetre scale graph paper.Similarly, Wound contractions contributing to wound closure was studied using the formula

$$\text{Percentage of wound healing} = \frac{\text{Area of wound on day zero-Area of wound on respective day X 100}}{\text{Area of wound on day zero}}$$

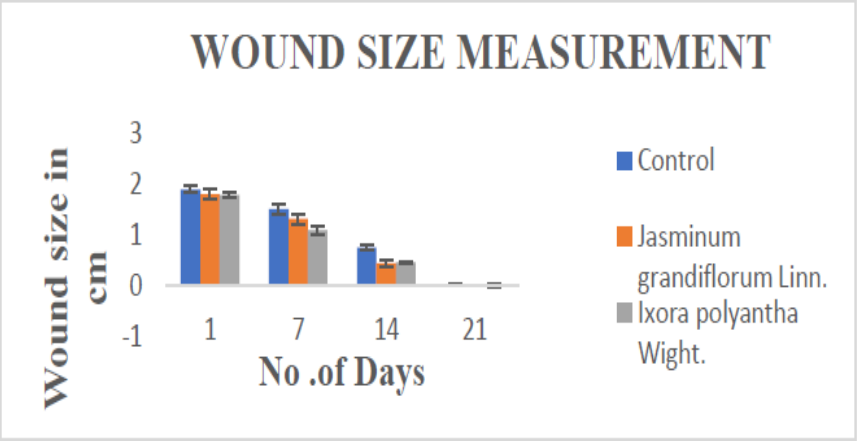
Falling of scab without leaving any raw material behind was taken as completion of epithelization. The days required for this was considered as period of epithelization.

RESULTS

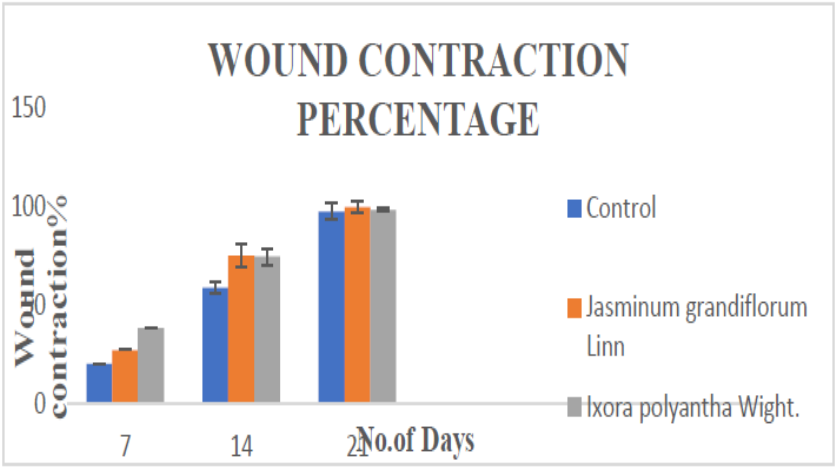
Wound size measurement

Effect of *Ixora polyantha* Wight. on wound size measured on 7th,14th and 21st post wounding day

Group	Weekly interval (Days)			
	1st	7th	14th	21st
Control (Group 1)	1.9 ±0.06	1.51±0.09	0.76±0.06	0.06±0.03
Jasminum grandiflorum Linn. (Group 2)	1.8±0.09	1.31±0.11*	0.45±0.07**	0.03±0.03
Ixora polyantha Wight. (Group 3)	1.78±0.05	1.1±0.09*	0.46±0.02**	0.06±0.04



Graph indicating wound size measurement



Graph indicating Wound contraction percentage.

Values are mean ±SEM (Percent) of 6 rats in each group. P<0.05, P<0.01, P<0.001 compared to respective day control group (Statistical analysis was done by one-way analysis ofVariance followed by Dunnett's test for multiple comparisons.)

Slight significant changes in the size of the wound were observed on 7th day in standard and trial group when compared with the control. Highly significant changes in size of the wound was observed in standard and trial group on 14th day. At the end of 21st day changes inthe size of wound was statistically significant when compared between the groups.

Wound contraction percentage

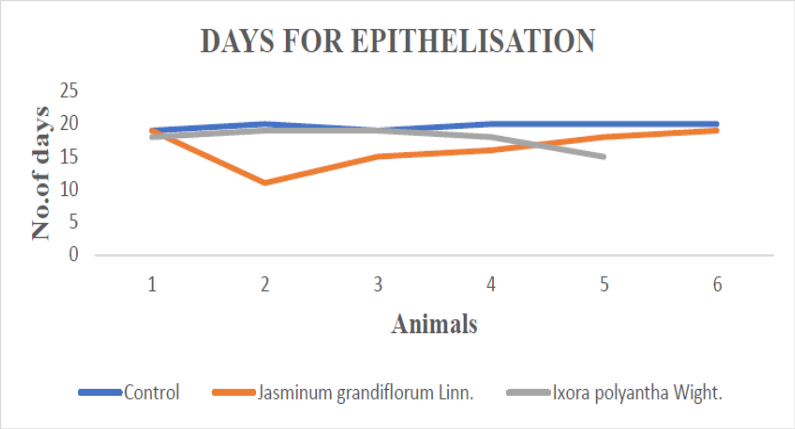
Group	7th day	14th day	21st day
Control (Group 1)	20.32±3.21	59.17±4.41	96.42±1.72
Jasminum grandiflorum Linn. (Group 2)	27.47±5.87*	75.51±3.25**	98.14±1.85
Ixora polyantha Wight. (Group 3)	38.53±4.39*	74.73±1.11**	96.66±2.22

Values are mean ±SEM (Percent) of 6 rats in each group. P<0.05, P<0.01,P<0.001 compared to respective day control group (Statistical analysis was done by one-way analysis ofVariance followed by Dunnett's test for multiple comparisons).

Slight significant changes in the percentage of wound contraction were observed on 7thday in standard and trial group when compared with the control.

Highly significant changes in percentage of wound contraction was observed in standard and trial group on 14th day. At the end of 21st day percentage of wound contraction was statistically significant when compared between the groups to the 1st day.

Days of epithelisation



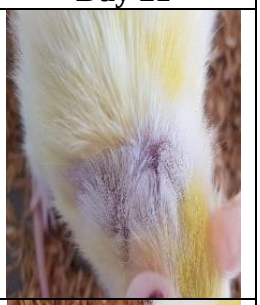
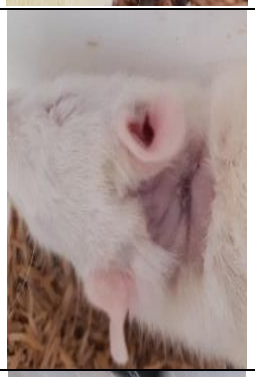
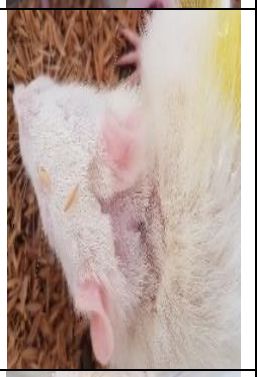
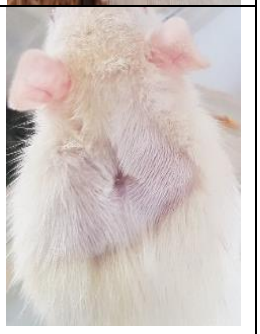
Wound measurement was reduced in trial and standard group when compared to controlgroup might be due to the presence of saponins, flavonoids and tannins which possess wide range of pharmacological activities like anti-inflammatory, anti-microbial, anti-septic etc.

Days required for epithelization was less in standard and trial group when compared to trial group thus indicating faster wound healing in these 2 groups.

DISCUSSION

Wound measurement was reduced in trial and standard group when compared to controlgroup might be due to the presence of saponins, flavonoids and tannins which possess wide range of pharmacological activities like anti-inflammatory, anti-microbial, anti-septic etc.

Days required for epithelization was less in standard and trial group when compared to trial group thus indicating faster wound healing in these 2 groups.

Group	Day 0	Day 7	Day 14	Day 21
Control				
Standard				
Trial				

Histopathological study of the skin was evaluated in all the 3 groups after the experimental study as an added value. One rat from each group was subjected to histopathological study. Regeneration of wound describes the specific substitution of tissue. The superficial epidermis, mucosa displays an unspecific form of healing in which the wound heals by fibrosis or scar formation. On comparison to control group, scab was present both in standard and trial group which indicates better wound healing property of these two group in comparison to the control group. The innumerable inflammatory cells present in standard and trial group indicated the inflammatory phase, denoting the early phase of wound healing.[4] Marked erosion and ulceration observed in the control group indicated lesser rate of wound re-epithelization phase when compared to standard and the trial group. Nearly developed epithelium was seen in the standard and the trial group indicating significant re-epithelization phase.[5] Less immature granulation tissue and more mature granulation tissue was present in the standard and trial group, indicating the faster remodelling phase when compared to the control group.[6] Higher angiogenesis leads to better nutritive perfusion

leading to early closure of the wound, which is significant in the trial group.

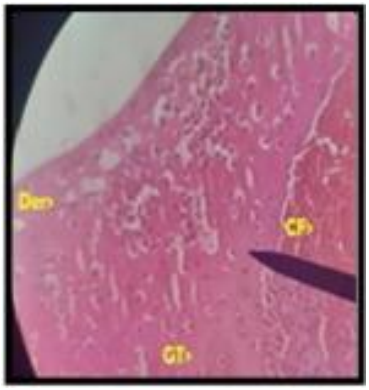
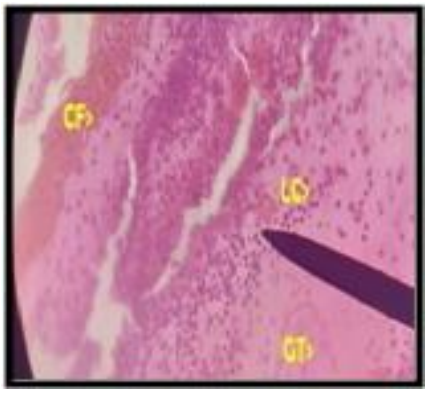


Figure No.1.a.



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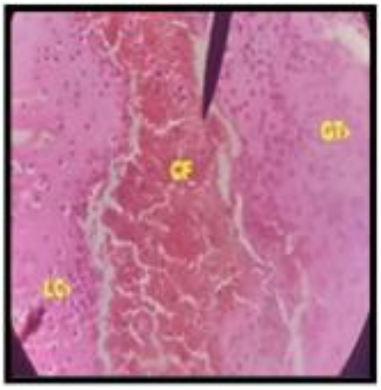
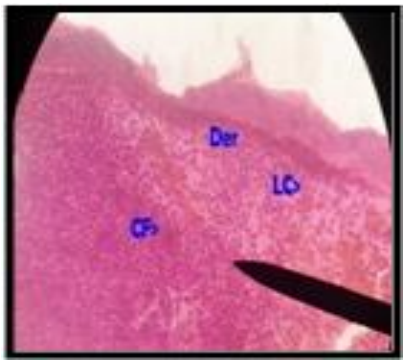


Figure No.1.c

Figure no. 1.a-1.c-Histopathology of wound tissue of control group.

GT- Granulation tissue, CF: Collagen fibres, LC: Leucocytes, Der: Dermis



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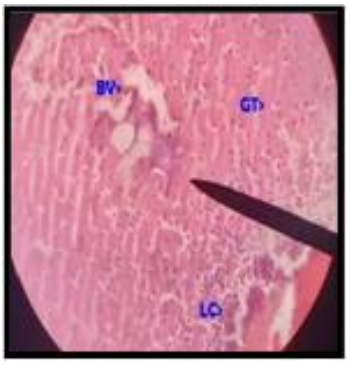

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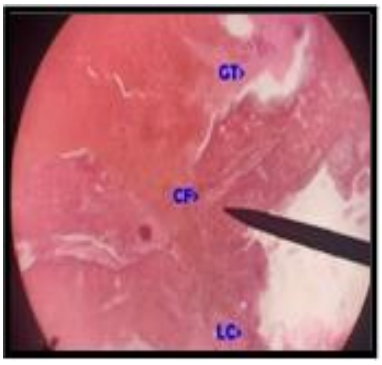


Figure no. 2.c

Figure no. 2.a-2.c-Histopathology of wound tissue of standard group

GT- Granulation tissue, CF: Collagen fibres, LC: Leucocytes, Der: Dermis, BV: Blood vessels.

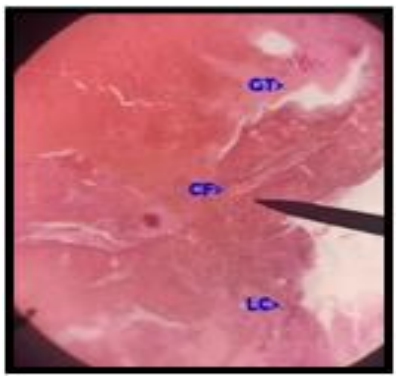
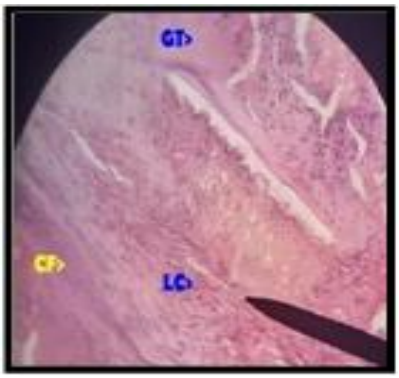


Figure no. 3.a



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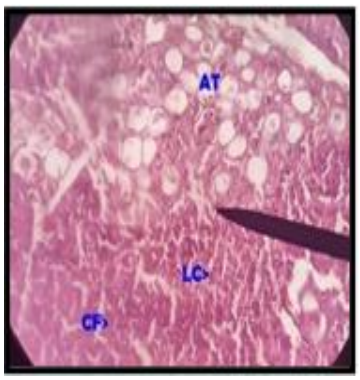

Figure no. 3.c

Figure no. 3.a-3.c-Histopathology of wound tissue of trial group.

GT- Granulation tissue, CF: Collagen fibres, LC: Leucocytes, Der: Dermis, AT:

Areolar tissue.

CONCLUSION

The experimental study showed that *Ixora polyantha* Wight. had a role almost similar to the standard group. Histopathological study results reveal that the wound tissue is healthier in *Jasminum grandiflorum* Linn. (Standard group) and *Ixora polyantha* Wight. treated group (Trial group). Lesser day for epithelisation was observed in standard and trial group indicating the faster healing when compared to the control group.

REFERENCES

1. Ram Manohar P. Sustainable harvesting of medicinal plants: some thoughts in search for solutions. Ancient science of life [Internet]. 2012; 32(1): 1-2. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3733198/ DOI:10.4103/0257-7941.113789.
2. Venkatrama Daithota P S, Oushadhiyasasyasampattu, Puttur: Vivekananda Samshodhanakendra, 2000; 126: 11. from:https://www.oecd.org/environment/test-no-402-acute-dermal-toxicity- 9789264070585-en.htm.
3. M. subalakshmi, A. Saranya, M. Uma Maheshwari, ,A. Jarina, S. Kavimani, R. Murali, An overview of the current methodologies used for the evaluation of drugs having wound healing activity, International Journal of Experimental Pharmacology,2014; 4: 128-129 .
4. Koht TJ, DiePietro LA. Inflammation and wound healing: the role of the macrophage. Expert Rev Mol Med. [Internet], 2011; 11(13): 23. Available from: https://pubmed.ncbi.nlm.nih.gov/21740602.
5. Irena Paster, Olivera Stojadinovic et al; Epithelization in Wound healing: A Comprehensive Review. Adv Wound Care[Inetrnet], 2014; 1, 3(7): 445-464.
6. Ana Cristina de Oliveira Gonzalez, Tila Fortuna Costa et al; Wound Healing-A Literature Review. An Bras Dermatol [Internet], 2016; 91(5): 614-620.