RESEARCH PAPER | Pharma | Volume : 3 | Issue : 8 | Aug 2013 | ISSN - 2249-555X

A Comparative Clinical Study of Wound Healing Properties of Aloe Vera Gel and Datura Metel Extract in Traumatic Wounds in a Tertiary Care Hospital

KEYWORDS: Aloe vera, Datura metel, Traumatic wounds, Wound healing

V. P. Karthik
Assistant Professor, Department of Pharmacology, Sri Ramachandra Medical College and Research Institute, Chennai, India

S. Seethalakshmi
Professor and H.O.D, Department of Pharmacology, Sri Ramachandra Medical College and Research Institute, Chennai, India.

Durairaj
sociate Professor, Department of Pharmacology, Sri Ramachandra Medical College and Research Institute, Chennai, India.

ABSTRACT *The importance of traditional systems of medicine and of certain traditional medical practices has now been recognized all over the world. The present study was undertaken to compare the efficacy of Aloe vera gel and Datura metel extract in traumatic wounds and also evaluate and compare the safety and tolerability of Aloe vera and Datura metel in traumatic wounds. Both the drugs were applied topically 2-3 times a day in patients who were randomised into two groups; first group was given Aloe vera gel, second group was given Datura metel extract.Ulcer severity was graded based on Slough, Granulation tissue, Margin of the ulcers and Surrounding area of the ulcer. All the above parameters were assessed on baseline, 7th day, 14th day & 21st day. The slough reduction was more by 28% (p>0.05) in Datura metel group than in Aloe vera group. The improvement seen in granulation tissue of after 3 weeks of drug treatment were more in Datura metel group by 16.63% (p>0.05) when compared with Aloe vera group. The ulcer margin reduction was considered extremely significant in both the groups (p<0.05). Aloe vera showed 14.38% (p>0.05) more reduction in ulcer scoring for surrounding area than Datura metel. From the results it was concluded that Datura metel is a safe, effective and well-tolerated therapy and a proven alternative to Aloe vera for patients with traumatic wounds.*

INTRODUCTION

A wound is described as 'a break in the continuity of tissue, from violence or trauma' and is regarded as healed if there is a restoration of the wounded or inflamed tissue to normal condition[1]. Wounds remain a huge public health issue, at least in terms of morbidity and long term disability, throughout the world, especially in the developing countries. Nearly 50 lakh people lost their lives due to wound as per WHO estimates during the year 2008 and it comes to 9% of the total deaths worldwide. The global wound mortality rate is estimated to be 98/100,000 population, with male and female rates of 128/100,000 (38 lakh deaths) and 67/100,000 (19 lakh deaths), respectively (WHO). Worldwide prevalence of traumatic wounds occurs at a rate of about 1.6 million cases every year [2]. The prevalence of wounds in the population studied in India was 15.03 per 1000. The prevalence of acute and chronic wounds was 10.55 and 4.48 per 1000 of the population respectively. Five of the top ten causes of death globally are due to injuries. Among the total disability-adjusted life-year (DALYs), 13% were due to injury [3]. Important causes of wound are accidental falls (28%), sports and unspecified accidents (26%), traffic accidence (19%), cutting and piercing instruments (10%), and violence (4%). The highest incidence rates occurred among men aged 20-29, while males were 1.8 times more at risk of trauma than females.The rate among different age groups was: 8.2% (<14 years), 62% (15–44years), 20% (45–59 years) and 9.2% (>60 years) [3]. Percentage of wound hospitalised inpatients is around 14.7%. In India, the attributable cost of wound care in 2006-2007 was 340 cores [2].

From time immemorial several plant products are in use in various system of medicine like Ayurveda, Siddha etc., and the plant products are also extensively used in folklore medicine. The wound healing effect of these plant products are cheap and affordable and they produce less hypertensive reactions. The main principle of these phytochemical compounds involves disinfection, debridement of wound and providing a moist environment to encourage the establishment of the suitable environment for natural healing process [4]. Aloe vera is one such plant used for the treatment of various acute and chronic wounds. Daturametel is another type of plant extract used for wound healing.

In view of the paucity or availability of safe, economic and efficacious prohealing agents without adverse or side effects for the management of wounds, studies to investigate such agents are always called for. There are no recorded studies done on the wound healing property of Datura metel. Hence the present study was undertaken to evaluate the wound healing profile of Datura metel in comparison with Aloe vera.

MATERIALS AND METHODS

STUDY DESIGN

This is randomized, parallel group open-label, comparative controlled study, of Aloe vera and Datura, conducted at the outpatient clinics of Department of Surgery, Sri Ramachandra Medical college and Research, Porur, Chennai, between February 2011 and August 2011 after procuring approval from Institutional ethics committee. Patients who met the inclusion criteria were randomised into 2 treatment groups. The patient was given either Aloe vera or Datura metel based on assigned randomisation for 3 weeks.

PATIENTS

Informed consent was obtained from all the patients before the start of the study. All the eligible participants that entered the study were informed about their freedom to withdraw from the study without giving any reason at any given time and while doing so they will not be denied the option of continuing quality medical care in the same Institute. Case record forms were prepared for each of the patient and kept with the Investigator.

STUDY MEDICATIONS

Aloe vera 90% w/w gel was procured from Health Secure Pvt Ltd. Datura metel extract was procured from Tamil Nadu Medicinal Plant Farms And Herbal Medicine Corporation Ltd. (TAMPCOL).

MODE OF ADMINISTRATION

Both the drugs were applied topically 2-3 times a day in pa-

Volume : 3 | Issue : 8 | Aug 2013 | ISSN - 2249-555X

tients who were randomised into two groups; first group was given Aloe vera gel, second group was given Datura metel extract, comprising of 49 and 50 patients in each group respectively.

ULCER SEVERITY GRADING

Ulcer severity was graded based on Slough, Granulation tissue, Margin of the ulcers and Surrounding area of the ulcer. All the above parameters were assessed on baseline, 7th day, 14th day & 21st day. Ulcer area (cm^2) and circumference (cm) were also measured using a normal 15cm scale on each visit from baseline[5].

Table 1: Ulcer Assessment Scale

Score	Slough	Granulation tissue	Margin	Surrounding area
0	Absent	Healthy	Epithelialized	Normal
1	Mild	Healthy only in places	Blue with entire ulcer	Edema
2	Moderate	Unhealthy with patch	Blue but only apart	Cellulitis
3	Severe	Absent	Angry red	Induration

Demographic and baseline data were collected from the study patients. General physical and systemic examination was done. Wound evaluation was carried out and grading was done. Eligible patients were informed about the study in detail and informed consent was taken from them. Patients were instructed to follow the advice according to the study protocol without fail and to come for review. Patients were randomized into two treatment groups: Aloe vera and Datura group. Patients were given respective drugs at free of cost. Patients were advised to report any adverse effects immediately and were given a telephone number to which they have to dial if they experience any adverse events. Patients were advised to return back on 7th, 14th and 21st day. On the 7th day, drug compliance was assessed. Patients were enquired of any adverse events and they underwent wound examination. Grading scale was used and scoring was done according to that. Physician's scale of assessing wound healing includes assessment of slough, granulation tissue, margin of the ulcer and surrounding area. On the 14th day, drug compliance was assessed. Patients were enquired of any adverse events and they underwent wound examination. Patients were advised to report any serious adverse effects immediately. Patients were advised to return back on 21st day. On the 21th day, patients were enquired for any adverse drug effects and they underwent final wound examination.

ADVERSE EVENTS

All patients are questioned about adverse events at each follow-up visit. Both serious and non-serious adverse events are recorded and the data reviewed. If a serious adverse event occurs the investigator may interrupt or discontinue study drug at their own discretion. Safety assessment included recording of treatment-emergent adverse events. Also physical, general and systematic examination was performed during the study. All the patients who received the drugs were included in the safety analysis, and safety data summarized descriptively.

STATISTICAL ANALYSIS

Statistical analysis was done using Statistical Package for the Social Sciences (SPSS) and was analysed by using unpaired 't' test and one way ANOVA. The p value below 0.05 was considered to be significant. No adjustment was performed for pair wise comparisons between treatments.

RESULTS & DISCUSSION

Several drugs obtained from plant sources are found to increase healing of different types of wounds. Some of the drug has been screened scientifically for evaluation of wound healing activities in different pharmacological model. But the potential of many of traditionally used herbal medicines remain unexplained [11]. In our randomised parallel group comparative study, the mean age of the study patients in Aloe vera (Group A) was 37.78 with a SD of 10.296 ranging from 19 to 60 years. The mean age of the study patients in Datura metel (Group B) was 39.08 with a SD of 9.589 ranging from 19 to 60 years. As per prediction of Holt et al.,in healthy humans, aging leads to delayed epithelialization. With ageing accumulation of wound noncollagenous protein was decreased. This decrease may impair the mechanical properties of scarring in aged human beings [12]. In our study we have purposefully excluded patients below 18 years and patients above 60 years so age could not therefore be a confounding factor. Most of the study patients were males in both Group A (69.4%) and Group B (64%) which coincides with the previous studies. According to Oskam et al., males are roughly four times more likely to present with wound than females [13].

There were 36.7% of the study patients who were taking concomitant medications in Group A and 38% in Group B like Antipyretics, Antihistamines, Hypolipidemics, Antihypertensive and Oral hypoglycaemic drugs. OnlyCytotoxic agents, Antimetabolites, Anti-inflammatory, Corticosteroids, Anabolic steroids and Antidepressants drugs affect wound healing [5,10]. Further topical application of concomitant medication is an exclusion criteria in our study so, taking concomitant medications can't be a confounding factor too in our study.

Almost half of the study patients were suffering from associated illness 46.9% in group A and 46% in group B like fever, hypertension, upper respiratory tract infection, gastritis, hyperlipidaemia, bronchial asthma etc. Only certain diseases like jaundice, diabetes [19], uraemia [6], malignancy [7] delay wound healingsupported by the literature survey made.

Only 6.1% of study patients have reported drug allergies in Group A and 16% in Group B. The study patients were allergic to antibiotics like Penicillins, Sulphonamides and Local anaesthetics like Lignocaine. All the patients were informed not to take drugs which they are allergic to during the study period so that there is no need for any intervention.

The results obtained from the present study after three weeks of treatment revealed that the reduction in slough was significant in both the groups. In Aloe vera group, the reduction was 63.07% ($p<0.05$) and 91.07% reduction in Datura metel group ($p< 0.05$). The slough reduction was more by 28% ($p>0.05$) in Datura metel group than in Aloe vera group. This is in accordance with the results of Shanmugapriya et al., which proves that Datura have good wound healing pattern and a marked prohealing activity [8].

The percentage of patients who got completely healed after 21 days of drug therapy was 16.33% more with Datura metel group when compared with Aloe vera which emphasizes the importance the drastic reduction in healing time with Datura metel (Table 2&3).

Total percentage of ADR's reported in the study is 14.1%. As both the groups have reported side effects, their safety profile is also equivalent. Three patients developed redness [20] and redness disappeared after 2 days of stopping the drug. This coincides with the finding of Somboonwong et al., which is attributed to the therapeutic effects of Aloe vera on cutaneous microcirculation[18].

In Datura metel group, two patients developed pain of thigh (Myalgia) after one week of tropical application and this disappeared after 3 days of stopping the drug. Another two participant developed xeroderma (Dry skin) and puritis after a week of drug therapy, which completely subsided after a week of stopping drug. The Xeroderma and puritis which occurred during the study period is mainly due to its constitu-

Volume : 3 | Issue : 8 | Aug 2013 | ISSN - 2249-555X

ents such as hyoscyamine, scopolamine, anisodamine and anisodine which have same physiological effects as that of atropine (Anticholinergic). Myalgia is an unexpected adverse effect which may need further scientific validation. There were no other adverse events reported in the study (Table 4).

Table 2: Baseline Characteristics for the Study

Baseline characters	Aloe vera	Datura metel
No. of patients	n=49	n=50
Age (mean±SD) yr	37.78 ± 10.296	39.08 ± 9.589
Men	34 (69.4%)	32 (64.0%)
Women	15 (30.6%)	18 (36.0%)
Concomitant medications	18 (36.7%)	19 (38.0%)
Associated illness	23 (46.9%)	23 (46.0%)
Drug allergy	3 (6.1%)	8 (16%)

Table 3: Mean Baseline Ulcer Severity Grading

Baseline ulcer severity grading	Aloe vera	Datura
Slough	0.65 ± 0.805	0.56 ± 0.760
Granulation tissue	1.49 ± 0.767	1.40 ± 0.728
Margins	1.24 ± 0.630	1.26 ± 0.751
Surrounding Area	1.29 ± 0.935	0.98 ± 0.714
Ulcer size	8.43 ± 1.915	7.90 ± 1.898

Results were expressed as mean ± SD. P>0.05 considered as significant.

Table 4: Reported ADR's

Reported ADR	Aloe vera	Datura
Redness	3 (6.1%)	-
Myalgia	-	2 (4%)
Xeroderma	-	2 (4%)
Total	3 (6.1%)	4 (8%)

CONCLUSION

To conclude, Datura metel was non-inferior to Aloe vera in reducing slough, margin and surrounding area of the wound and there was greater improvement in granulation tissue of the wound. Datura metel also showed higher and well documented compliance when compared to Aloe vera. The safety profiles of both the drugs appeared to be almost equal. Thereby, our study proves that Datura metel is a safe, effective and well-tolerated therapy and a proven alternative to Aloe vera for patients with traumatic wounds.

Figure 1: Photographs showing wound healing effect of Aloe Vera in right leg of a male patient

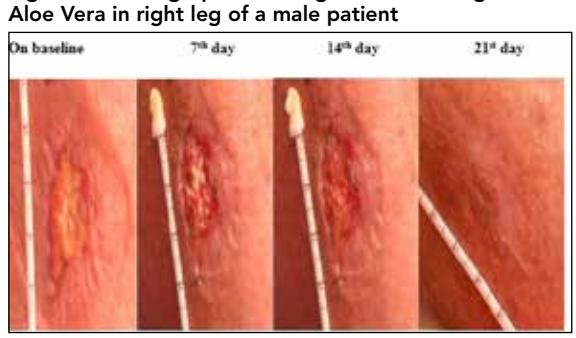
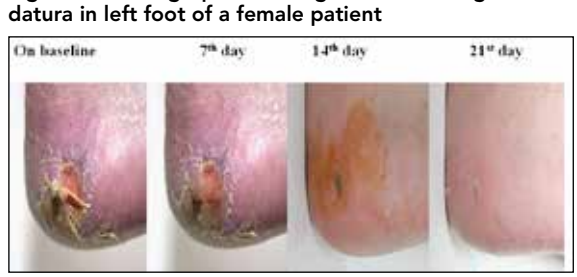


Figure 2: Photographs showing wound healing effect of datura in left foot of a female patient



REFERENCE

1. Taber C. W. Taber's Cyclopedic Medical Dictionary, 10th edition, F. A. Davies Company, U. S. A.1965. | 2. The World Health report 2008; Commission on Macroeconomic and Health, Wounds in India. Published by WHO, 2008. | 3. Gupta N., Gupta S.K., Shukla V.K., Singh S.P. An Indian community based epidemiological study of wounds Journal of Wound Care, 2004, 13(8) : 323- 325. | 4. Karodi R., Jadhav M. Evaluation of the wound healing activity of a crude extract of Rubia cordifoliaL. (Indian madder) in mice, International Journal of Applied Research in Natural Products, 2009, 2(2):12-18. | 5. Smith R.W., Sampson M.K., Lucas C.E., Ledgerwood A.M., Grabow D.E. Effects of Vinblastine, Etoposide, Cisplatin and Bleomycin on rodent wound healing. Surg Gynecol Obstet. 1985, 161(4):323-6. | 6. Raju S.S., Kulkarni D.R. Vitamin A reverses the wound-healing suppressant effect of Cyclophosphamide. Ind J Pharmacol, 1986,18: 154-157 | 7. Kumar A., Rao M., Kulkarni D. Zinc incorporation reverses suppressant effect of Ibuprofen on wound healing. Indian J Exp Biol. 1988, 26(6):483-5. | 8. Meadows E.C., Prudden J.F. A study of the influence of adrenal steroids on the strength of healing wounds; preliminary report. Surgery. 1953, 33(6):841-8. | 9. Demling R.H.Oxandrolone, an anabolic steroid, enhances the healing of a cutaneous wound in the rat.Wound Repair Regen. 2000, 8(2):97-102. | 10. Muppayyanavarmath S.S., Patil P.A. The influence of tricyclic antidepressants on resutured incision and dead space wound healing in albino rats. Indian J. Pharmacology, 1999, 31: 290-293. | 11. Dereure O., Vin F., Lazareth I., Bohbot S. Compression and peri-ulcer skin in outpatients' venous leg ulcers: results of a French survey. Journal of wound care, 2005, 14(6); 123-141. | 12. Nilani P., Pranavi A., Duraisamy B., Damodaran P., Subhashini V., and Elango K. Formulation and evaluation of wound healing dermal patch.African Journal of Pharmacy and Pharmacology, 2011, 5(9); 1252-1257. | 13. Holt D.R., Kirk S.J., Regan M.C., Hurson M., Lindblad W.J., Barbul A. Effect of age on wound healing in healthy human beings, Surgery, 1992, 112(2):293-298. | 14. Oskam J., Kingma J., Klasen H.J. Injury patterns in a Dutch trauma centre. Eur J Emerg Med, 1994, 1(4):167-72. | 15. ShanmugaPriya K., Gnanamani A., Radhakrishnan N., Mary Babu. Healing potential of Datura alba on burn wounds in albino rats. Journal of Ethnopharmacol, 2002, 83; 193. | 16. Davis R.H., Leitner M.G., Russo J.M., Byrne M.E. Wound Healing, Oral & Topical Activity Of Aloe vera. J Am Podiatr Med Assoc, 1989, 79; 559-62. | 17. Nilesh Gupta., JainU.K. Prominent wound healing properties of indigenous medicines. Journal of Natural Pharmaceuticals, 2010, 1(1):2-13. | 18. Somboonwong J., Thanamittramanee S., Jariyapongskul A., Patumraj S. Therapeutic effects of Aloe vera on cutaneous microcirculation and wound healing in second degree burn model in rats. J Med Assoc Thai, 2000, 83(4):417-25. | 19. Seifter E., Rettura G., Padawer J., Stratford F., Kambosos D., Levenson S.M. Impaired wound healing in streptozotocin diabetes. Prevention by supplemental vitamin A. Ann Surg. 1981, 194(1):42-50. | 20. Ernst E. Adverse effects of herbal drugs in dermatology. Br J Derm.2000, 143:923-929. |