

Effect of Turmeric Ointment in Healing of Chronic Nonhealing Wounds on Topical Application

¹Dr Sanjeev Kumar Chowdhary, Professor, Department of Surgery, National Institute of Medical Science, Jaipur

²Dr Sunil Kumar Agarwal, Professor and Head, Department of Surgery, National Institute of Medical Science, Jaipur

³Dr.Namo Narayan Meena, Assistant Professor, Surgery, National Institute of Medical Science, Jaipur

Corresponding Author: Dr.Namo Narayan Meena, Assistant Professor, Surgery, National Institute of Medical Science, Jaipur

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Abstract

Though chronic nonhealing ulcers remain a serious problem, no definite solution has yet emerged out and thus present study was undertaken to prove or disprove the efficacy of turmeric in healing of chronic ulcers as claimed in Ayurveda. Out of 112 patients of chronic ulcers, 71 comprising Test group were treated by local application of turmeric ointment in petroleum jelly base and rest 41 comprising vehicle control group were treated by local application of petroleum jelly alone. The beneficial effect of turmeric started showing as early as from 2nd week with progressive decrease in smell & pus discharge, appearance of healthy granulation tissue and good / fair amount of epithelialization seen in more test group cases than in control group. By 8th week 45% wounds in test group healed and another 43.7% became clean and healthy and by 12th week 87.3% of wounds treated with turmeric ointment healed completely or successfully skin grafted against 7.3% in control group.

Keywords: Curcumin, Turmeric, Chronic Ulcers

Introduction

Wounds or ulcers, particularly chronic nonhealing ones poses as a serious problem to both patients as well as treating doctors. It was estimated in 1998 that there were over 2 million and perhaps up to 5 million, chronic wounds annually in USA alone(1). Most of these ulcers are associated with some underlying disorders like diabetes mellitus, leprosy and peripheral vascular diseases (2). Wound infection has been a major impediment in healing of wounds but even with advent of so many antibiotics, both systemic and local, the problem of nonhealing ulcers remain there(3). In spite of development and use of various pharmacological agents like vasodilators, antioxidants, vitamins, anti-inflammatory agents, immune modulators etc. lacunae still persist and further research on chronic wound healing agent bears good potential.

Herbal medicines are being used increasingly in modern medical practice and occupying a prominent position in national priorities. As per WHO report nearly 80% of population living in developing countries are using traditional medicine for their health

care(4).As only 1% of total plant species worldwide has been investigated phytochemically, there exists great potential for discovering novel bioactive compounds(5).Some Ayurvedic plants including Chandan (*Pterocarpussantalinus* Linn. f.), Gular (*Ficusracemosa*Roxb.), Yashtimadhu (*Glycyrrhizaglabra* Linn.), Daruharidra (*Berberisaristata* DC.), Haridra (*Curcuma longa* Linn.), Mandukaparni (*Centellaasiatica* (Linn.) Urban), Snuhi (*Euphorbia nerifolia* Linn.), and Ghritakumari (*Aloe vera* Tourn. ex Linn.) were found to be effective in wound healing in experimental models (6). Turmeric(Haldi, Haridra),a rhizome of *Curcuma Longa*, has been recommended by ancient Indian physicians like Carak(1000BC) and Dhanvantari (12th century AD) for topical use in surgery, wounds, ulcers and burns healing(7).Curcumin, active ingredient of this yellow coloured Indian condiment, has been scientifically studied for its anti-inflammatory effects(8,9) and has been chemically isolated and synthesized. It acts against damage by free oxygen radicals as anti-oxidant as powerful as vitamin C and E(10,11).It has been shown to prevent platelet aggregation, probably by potentiation of prostacyclin synthesis as well as inhibition of thromboxane synthesis and thereby improves circulation(12).Curcumin extract, in vitro, inhibited growth of Streptococci, Staphylococci, B.Subtilis and several strains of Clostridia and fungi like SacchromycesCerevisiae,Cryptococcusneoformans,Candidasteelatoidea,Microsporungypseum showing significant antimicrobial effect(13,14).Improvement in dermatophytes and fungi infected guinea pigs was noted with disappearance of lesions after 7 days application of turmeric(15).Curcuma longa(linn)drops topically were found to give encouraging results in

corneal wound healing(16).Topical application of turmeric paste and mouthwash were found to be effective in dental problems like gingivitis and periodontitis comparable to chlorhexidine(17).

Optimal conventional treatment for chronic wounds are based on the concept of wound bed preparation by removing necrotic tissue and fibrous exudates(slough),control infection, establishing moisture balance, hasten granulation and stimulating re-epithelialisation by optimising epidermal margin(18).To achieve this many local preparations including herbal ones and some expensive ones like topical growth factors, collagen and skin substitutes have been used but search is still on for inexpensive, readily available, safe and simple therapy for chronic ulcers. Papaya pulp applied locally has been tried in burns and chronic skin ulcers (19,20).Honey has also been clinically tried as biological wound dressing and topical neem oil in combination with Haridra (turmeric) tried clinically in nonhealing wounds(21,3). Topical application of Curcumin was reported to be highly effective in providing relief in advanced cancerous ulcers reducing smell, itching and exudates with reduction in lesion size and pain (22).Curcumin has been used in commercial cosmetic creams and household remedies for long time without any significant side effects. Significant healing effect of hexane fraction of C. longa gel on wounds was found in mice without any adverse dermal toxic effects, rashes, swelling, inflammation, redness, irritation, itching or other toxicity and it has been suggested for use in management of diabetic wounds(23).

This study was undertaken to evaluate the beneficial effects of turmeric on local application in chronic nonhealingulcers, to finds effect on rate and quality of

healing, any adverse effect and antimicrobial property as well as healing promotion, if any.

Material and Methods

112 patients of chronic ulcers of more than 4 weeks duration coming to surgery OPD from 2010 to 2020 who agreed to give informed consent for the study were enrolled after thorough history, physical examination and proper investigations. Those patients with abnormally low Haemoglobin (markedly anaemic), poorly controlled diabetic with very high blood sugar level, uraemic, with abnormally low plasma protein level or abnormal blood counts, osteomyelitis and those unwilling to attend clinic regularly for treatment and assessment were excluded from the study. All these patients, enrolled for study, were randomly assigned to test group treated by turmeric ointment in petroleum jelly base and control group with vehicle treatment by petroleum jelly alone and standardised wound care in either group.

Preparation and application of curcumin ointment

Dried and finely powdered Curcuma longa rhizome was defatted with hexane at room temperature and defatted material was extracted with 95% ethanol four times. The alcoholic extract was concentrated in vacuum and the residue was triturated with ethyl alcohol acidified with acetic acid, filtered to pH 5-6 and orange residue was washed twice with 80% ethyl alcohol. The crude Curcumin yield was in the range of 2-3%. A paste was made with this extract in white petroleum jelly base and this ointment was used in dressing after proper sterilization in test group.

Wound treatment and assessment

Before starting the study the wounds (ulcers) were thoroughly cleaned with normal saline in either group and all foreign bodies, if any, were removed in both test and control group. Following standard wound treatment

protocol with all aseptic precautions daily dressing of the wounds was done in either group, with application of turmeric ointment in test group (Group A) and simple white petroleum jelly in control group (Group B), followed by cover of dry gauze, cotton and cotton bandage in that order.

During daily dressing, the wounds were examined with naked eye and through magnifying glass followed by palpation of edge, base and surroundings to assess the rate and quality of healing, relief of pain, presence/absence of clinical evidence of inflammation and infection and degree of infection. Presence/absence of systemic signs of infection (fever, tachycardia, lethargy, leucocytosis, raised ESR), general appearance of wound (clean/unclean, healthy/unhealthy, moist/dry), presence/absence of discharge, colour of discharge (creamy, yellow, green), smell (fishy, faecal or sweetish), amount of discharge (scanty, fair or copious), presence/absence of necrotic tissue/slough, presence/absence and degree of induration at the edge, base and surrounding skin, amount and colour of granulation (red or pale), degree of epithelialisation from margin and bed, presence/absence of enlarged regional lymph nodes and side/adverse effects, if any, were noted. Size of the wound was measured weekly by taking tracing of the wound edge on sterile transparent plastic sheet and calculated by multiplying longest perpendicular length and width dimensions and rate of healing was calculated by percentage of area healed ($\text{Area healed} / \text{Initial total wound area} \times 100$). The degree of epithelialisation was measured by slide calipers.

The process continued till the wound healed completely or skin grafting done after achieving healthy wound condition suitable for skin grafting. Those cases who did not respond to treatment in either group and showed poor or no healing with or without uncontrolled frank

infection after 12 weeks were excluded from the study and subjected to detailed investigation and appropriate treatment.

Bacteriological examination

A surface swab culture was taken at the time of enrolment and at weekly interval under standard collection protocol and sent to microbiology lab for microscopic examination and culture & sensitivity test till the wound healed or study abandoned.

Results

Out of 112 patients participating in this study, 64 were males with male female ratio being 1:1.33 and were of age ranging from 14 years to 73 years with more than 40% in above 50 years age group (vide table no.1 & 2). As in table no. 3 showing aetiological distribution of the cases, majority of chronic ulcers were of traumatic origin (38.4%) followed by diabetic (17.8%), neurogenic (12.5%) and others. 71 patients consented for test group (Group A) and were treated with turmeric ointment while 41 for vehicle control group (Group B).

Though healing effect of turmeric was more evident from 8th weeks onwards with 45% of wounds either healed completely or became healthy enough to be successfully skin grafted in test group against only 4.9% in control group, the beneficial effect of turmeric started showing as early as from 2nd week with progressive decrease in smell & pus discharge, appearance of healthy granulation tissue and good/fair amount of epithelialisation seen in more test group cases than in control. By 4th week itself about 40% of cases in test group showed clean and healthy wound against about 7% in control group and good/fair epithelialisation in 52% of cases in test group as compared to only 7% in control group. Finally at the end of 12 weeks, 87.3% of chronic ulcers in test group treated with turmeric ointment healed completely or

successfully skin grafted as compared to only 7.3% in control group (vide table no. 4 & 5).

Bacteriological examination by swab culture also correlated well with clinical findings as shown in table no 6. There was progressive decrease in positive microbial culture reports in test group from 2nd week to 12th week with only 7% positive report on 12th week against 91.5% on day 1. No such trend pattern was seen in control group with 75.6% positive reports at 12th week against 87.8% on day 1.

No side-effect or adverse reaction was noted in any case treated with local application of turmeric ointment except slight yellow discoloration.

Discussion

As turmeric has been popularly used as traditional household medicine for wound healing from time immemorial and its antiseptic and healing effects has been widely mentioned in Ayurveda, The major objective of present study was to scientifically establish or refute the efficacy of topical application of turmeric in healing of chronic wounds or ulcers.

Turmeric, in our study, was found to give promising result as far as antiseptic and healing effect is concerned on local application in chronic ulcers. Diminished pus discharge, reduction of slough and appearance of healthy granulation with beginning of epithelialisation started showing in more and more number of wounds in test group from 2nd week onwards and by 4th week about 40% of wounds appeared clean and healthy against about 7% in vehicle control group. By 8th week 45% wounds in test group healed and another 43.7% became clean and healthy and by 12th week 87.3% of wounds treated with turmeric ointment healed completely or successfully skin grafted against 7.3% in control group. Even microbial swab culture reports also confirmed beneficial anti-septic effect of

Curcumin with progressive decrease in positive reports in test group from 91.7% on day 1 to only 7% on end of 12th week. These findings probably indicated a gradual but sustained antimicrobial effect of turmeric providing soothing environment conducive for healing interfering less with epithelialisation. Turmeric was found to be free from any side-effect and was painless and soothing on local application and thus found to be safe which satisfies another major concern of our study. In another study also addition of turmeric to neem in treatment of chronic ulcers increased healing rate from 43% to 70% by 8th week and from 75% to 90% by 12th week (3).

In our study as majority of cases of chronic ulcers were of nonspecific type (about 80%) and more so of traumatic variety (about 38%), topical chemoprophylaxis by turmeric may have some definite role in preventing or controlling infection and in promoting or stimulating healing by providing moist soothing environment and antioxidant activity resulting in such successful result. As far as specific ulcers are concerned any topical cream, including turmeric, has only a secondary role as complimentary to appropriate primary treatment of that specific disease. On the other hand advanced malignant ulcers included in this study in either group were never expected to heal by local application of turmeric ointment which exactly was the final outcome but turmeric ointment helped these patients by reducing pain & itching, smell and amount of discharge in Comparison to control correlating well with similar findings of Kuttan et al (22).

Multiple confounding variables were found to influence healing of wounds including age, nutritional status, hygiene, comorbidities, compliance to treatment protocol, smoking and other addiction as well as size and site of ulcers, it was really difficult to control all these variables though no obvious segregation of

confounding variables to one of treatment arms was noted but errors might have crept in. Thus before jumping to any definite conclusion more controlled trials with larger samples in different geographical area and in demographic population are needed to accept turmeric as a gem or discard it as dross.

Conclusion

Our findings suggested a gradual sustained progressive differentiable and measurable quality antimicrobial and healing effect of turmeric on local application in chronic ulcers without any significant adverse effect.

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Legend Figure

Table 1: Sex Distribution of Cases (n=112)

SEX	NUMBER	PERCENTAGE
MALE	64	57.1%
FEMALE	48	42.9%

Table 2: Age Distribution Of Cases (n=112)

AGE GROUP	NUMBER	PERCENTAGE
11-20 YEARS	4	3.6%
21-30 YEARS	11	9.8%
31-40 YEARS	21	18.7%
41-50 YEARS	31	27.7%
ABOVE 50 YEARS	45	40.2%

Table 3: Distribution of Cases According To Aetiology (n=112)

TYPE OF ULCER	NUMBER	PERCENTAGE
A.NON-SPECIFIC-		
1.TRAUMATIC(including Pressure Sores)	43	38.4%
2.ARTERIAL	5	4.5%
3.VENOUS	7	6.3%
3.NEUROGENIC(including leprotic ulcers)	14	12.5%
4.DIABETIC	20	17.8%
5.SPECIFIC-		
1.TUBERCULOSIS	12	10.7%
2.FUNGAL	5	4.5%
3.MALIGNANT ULCERS	6	5.3%

Table 4: Local Appearance Of Wounds (Group A-n=71,Group B-n=41)

General Appearance	1 st Day		2 Weeks		4 Weeks		8 Weeks		12 Weeks	
	Gr A	GrB	GrA	Gr B	GrA	GrB	GrA	GrB	GrA	GrB
Clean healthy wounds	0 (0%)	0 (0%)	8(11.3%)	0 (0%)	28 39.4%)	3(7.3%)	31(43.7%)	4 (9.8%)	4(5.6%)	5(12.2%)
Unclean unhealthy wounds	71 (100%)	41 (100%)	63(78.7%)	41 (100%)	34 47.9%)	38(92.7%)	8 11.3%)	35(85.3%)	5(7.1%)	33(80.5%)
Healed wounds/skin grafted	0 (0%)	0 (0%)	0 (0%)	0 (0%)	9 12.7%)	0(0%)	32(45.0%)	2(4.9%)	62(87.3%)	3(7.3%)

Table 5: Degree of Epithelialisation in Chronic Ulcers (Group A-n=71, Group B-n=41)

Epithelialisation	2 Weeks		4 Weeks		8 Weeks		12 Weeks	
	GrA	GrB	GrA	GrB	GrA	GrB	GrA	GrB
GOOD	6(8.5%)	0(0%)	16(22.5%)	0(0%)	42(59.1%)	2(4.9%)	62(87.3%)	4(9.8%)
FAIR	2(2.8%)	0(0%)	21(29.6%)	3(7.3%)	21(29.6%)	4(9.8%)	4(5.6%)	4(9.8%)
POOR	63(88.7%)	0(0%)	34(47.9%)	38(92.7%)	8(11.3%)	35(85.3%)	5(7.1%)	33(80.4%)

Table 6: Bacteriological Isolate Reports In Chronic Ulcers (Group A -n=71, Group B- n=41)

Treatment Group		1 st Day	2 Weeks	4 Weeks	8 Weeks	12 Weeks
Group A Curcumin(test)	Positive report	65(91.5%)	46(64.8%)	21(29.6%)	6(8.5%)	5(7.0%)
	Negative report	6(8.5%)	25(35.2%)	50(70.4%)	65(91.5%)	66(93.0%)
Group B Control	Positive report	36(87.8%)	35(85.4%)	30(73.2%)	29(70.7%)	31(75.6%)
	Negative report	5(12.2%)	6(14.6%)	11(26.8%)	12(29.3%)	10(24.4%)