The role of honey in healing of bedsores in cancer patients

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Abstract

Background: Honey was used to treat infected wounds as long as 2000 years before bacteria were discovered. It has been reported to have inhibitory action to around 50 species of bacteria and fungi (aspergillus, penicillium). Usually, Metronidazole powder is used in our palliative clinic for wound healing due to low cost & effectivity. Honey is cheap, easily available ingredient with high astringent activity. **Objective:** Objectives of the study were to find out the effectiveness of Honey in terms of rate of wound healing & pain control in bedsores of cancer patients. **Materials and Methods:** 40 cancer patients with bedsore wounds were randomly assigned (1:1 ratio i.e. 20 in each arm) for Study Arm (Honey plus Metronidazole powder) and Control Arm (only Metronidazole powder), attending Palliative clinic of our department in between July 2010 to September 2011. Washing of the wound with normal saline done daily before application of above medicaments. Change of posture & soft bed were encouraged in both groups. A pre designed interview proforma, standardised Bates Jensen Wound Assessment Tool and Visual Analogue Pain assessment scale were used to collect and assess data. **Results:** There was significant difference in wound healing status (F value = 6.523; Critical Difference =14.03, $P<0.05$) from day 10 and pain reduction also (F value = 6.638 and Critical Difference = 1.667, $P<0.05$) from day 7 in study arm. **Conclusion:** Application of honey dressing provides a better wound healing, rapid pain relief in cancer patients with bedsores in palliative settings.

Key words: Honey, metronidazole, pain, wound healing

Introduction

Honey is a sweet and viscous fluid produced by bees and other insects from the nectar of flowers. It is composed mainly of a variety of sugars, traces of pollen and water. Honey was used to treat infected wounds as long as 2000 years before bacteria were discovered to cause infection.[1] It has been reported to have inhibitory action to around 50 species of bacteria and fungi (aspergillus, penicillium).[2,3] The prevalence of antibiotic-resistant microbial species has led to a re-evaluation of the therapeutic use of ancient remedies, including honey.[4] Honey rapidly clears infection from wounds, with no adverse effects to slow the healing process. Honey may actively promote healing.[5]

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Several studies have shown that, honey can be used as a supplementary material which takes much shorter time for healing, control of infection, use of antibiotics and hospital stay.[6] Swabbing of wounds dressed with honey has shown that infecting bacteria are rapidly cleared. The antibacterial activity of honey probably is attributed to its osmotic effect, oxidizing effect, acidity, phytochemical factor and intrinsic antibacterial potency. The major antibacterial activity of honey has been found to be due to hydrogen peroxide produced enzymaticallly in the honey.[6-8]

Cancer patients already suffer from severe physical distress. Besides, the disease itself makes them broken psychologically, financially and socially. Since living with dignity is a fundamental right of every human being, role of palliative care is immense in terminally ill cancer patients. Bedsore in cancer patients adversely affects physical, mental, social and spiritual condition of these patients. So management of bedsore in cancer patients in an economic way is essential. Several materials like metronidazole, povidone iodine solution, and sucralfate are used in day to day practice for dressing of bedsores and ulcers. Metronidazole powder (after crushing metronidazole tablets) is economic and effective antibacterial agent. Moreover, it prevents malodor.

So, metronidazole powder is widely used for dressing of bedsores. Though honey is not routinely used for this

purpose, yet we have performed our study using honey as a dressing material to prove its effectiveness in bedsore healing because it is economic, easily available ingredient with high astringent property.

Objectives

Objectives of the study were to find out the effectiveness of Honey in terms of rate of wound healing and pain control in bedsores in cancer patients. We compared honey with metronidazole powder in one group and metronidazole powder in another group. Normal saline wash was used in both the groups before application of above medicaments. Besides its anti-infective property, metronidazole prevented gathering of ants in honey due to its bitter metallic taste.

Materials and Methods

We performed our study with 40 cancer patients with bedsore attending Palliative clinic of our department in between July 2010 and September 2011. Approval from the Institutional Ethics Committee was taken before commencing of the study. Informed consent form signed from patients before recruiting of each patient. Those patients in palliative settings with bedsore wounds were randomly assigned (1:1 ratio) for study arm 20 patients and control arm 20 patients. Twenty bedsore patients in the study arm were treated with honey with metronidazole powder. Twenty bedsore patients in the control arm were treated with only metronidazole powder. Washing of the wound with normal saline done daily before application of above medicaments. Change of posture and soft bed were encouraged in both groups.

For our study purpose we divided both the study and the control arm according to their demographic characteristics (age and sex); duration of illness, duration of bedsore wounds, types of therapy received [Tables 1-4]. We tried to derive whether variation of these features affect occurrence of bedsore wound in cancer patients or not.

From Tables 1 and 2 it is found that there is no significant difference in age distribution, gender distribution or duration of illness in both the groups.

A pre-designed interview proforma, standardised Bates Jensen Wound Assessment Tool and Visual Analogue Pain assessment scale were used to collect and assess data.

Interview proforma for background information of the patients are:

For pain assessment we used the standard, very popular and well accepted Visual Analogue Scale (VAS). The patient is asked to choose a number as marked in the scale between 0 and 10, that best describes his or her pain and scored accordingly daily.

Wound assessment was done using standard and internationally accepted most common Bates-Jensen wound Assessment Scale. It consists of thirteen items; each scores from 1 to 5 according to severity. The items are: Size; depth; edges; undermining; necrotic tissue amount; necrotic tissue type; exudates type; exudates amount; skin colour surrounding wound; peripheral tissue edema; peripheral tissue induration; granulation tissue; epithelisation. A rating sheet was used to assess the wound status. Rating must be done according to each item by picking the response that best describes the wound and entering that score, in the item score for the appropriate date. After rating the wound

Table 1: The sample characteristics of both the arms (study and control)

Sample characteristics	Study arm		Control arm		*P* value
	No.	%	No.	%	
Age in years					2.79
18-30	6	30	6	30	
31-50	10	50	12	60	
51-75	4	20	2	10	
Gender					0.99
Male	6	30	8	40	
Female	14	70	12	60	

Table 2: The duration of the illness of the patients of study arm and control arm

Features	Study arm		Control arm		*P* value
	No.	%	No.	%	
Duration of illness					2.102
<6 months	14	70	16	80	
6-12 months	0	0	2	10	
>12 months	6	30	2	10	

Table 3: The duration of the bedsore wounds of the patients of study arm and control group

Features	Study arm		Control arm		*P* value
	No.	%	No.	%	
Duration of bedsore wound					1.467
<30 days	18	90	16	80	
30-60 days	0	0	2	10	
>60 days	2	10	2	10	

Table 4: The type of therapy received by the patients of study arm and control arm

Features	Study arm		Control arm		*P* value
	No.	%	No.	%	
Type of therapy					3.11
General	4	20	2	10	
Radiotherapy	4	20	4	20	
Chemotherapy	2	10	4	20	
Radiotherapy+ chemotherapy	10	50	10	50	

on all items, determine the total score by adding together the 13 item scores.

Higher total score more severe wound status.

From Table 3 it is found that no significant difference in bedsore wound when both the groups were compared (*P*=1.467).

Based on the modality of treatment received patients in both the groups were divided into four subgroups viz. only general treatment, only radiotherapy, only chemotherapy and both radiotherapy and chemotherapy as shown in Table 4. There is no statistically significant (*P*=3.11) when both the groups were compared.

Variables under study
1. Independent variables: Honey, normal saline, metronidazole powder.
2. Dependent variables: Wound status, pain status due to wound.

Settings of the study
Since nature of setting can influence the way people behave or feel and how they respond to question, so selection of same setting was done. The study was conducted in Department of Radiotherapy of a tertiary care centre of Medical College.

Sampling technique
The sample selection was done by purposive sampling technique. Patients were randomly assigned as experimental subject and as comparison subject in 1:1 ratio, where first one selected as experimental group and second one as in comparison group. Each patient was picked up as per their randomization code and that was simple randomization. Blinding was not done.

Inclusion criteria
a. Bedsore ulcers of duration more than 7 days.
b. Adult patient ≥18 years.
c. Who are willing to participate in the study.

Exclusion criteria
a. Paediatric patients.
b. Known allergy to honey or metronidazole.

Study period
The study was performed on 40 cancer patients with bedsore attending Palliative clinic of our department in between July 2010 and September 2011.

End points
1. To assess and compare the pain status between day 1 and day 7 in both metronidazole group and honey plus metronidazole group.
2. To assess and compare the wound healing status between day 1 and day 10 in both metronidazole group and honey plus metronidazole group.

Description of wound dressing in both the groups
Patients were identified as per randomization code. We have explained the procedure to be done daily. Privacy was maintained by using screens. Hand washing was done thoroughly for 30 seconds. Adhesive tape was loosened every day at the edges away from wound centre by gloved hand. Washing of the wound with normal saline done daily before application of medicaments in both the study and control arm. In the study arm honey with crushed metronidazole powder was applied daily and in the Control arm metronidazole powder was sprinkled after normal saline application daily. We did not select honey dressing only, and selected metronidazole in both the groups as metronidazole has bitter taste and bitter odour, that prevents gathering of ants. Soiled dressing was discarded every day in yellow bag. Change of posture and soft bed were encouraged in both groups.

Table 5: After application of medicaments in both the groups, the nature of pain reduction

Pain in days	Group	Mean	Mean difference	SD difference	SE difference	F value (critical difference)
D1	S	8.5	−0.80	−0.7	0.403	6.638 (1.667)
	C	7.7				
D2	S	7.9	−0.10	−0.78	0.401	
	C	7.8				
D3	S	7.2	1.00	−0.72	0.372	
	C	8.2				
D4	S	7	1.3	−0.73	0.396	
	C	8.3				
D5	S	6.8	1.5	−0.74	0.414	
	C	8.4				
D6	S	6.5	2.1	−0.75	0.433	
	C	8.6				
D7	S	6.0	2.7	−0.5	0.32	
	C	8.7				

S=Study arm, C=Control arm, SD=Standard deviation, SE=Standard error of mean

Data collection tools

a. Pre-designed interview proforma - questioning technique.
b. Wound status assessment - Bates Jensen wound assessment tool.
c. Wound pain status - Visual Analogue Scale.

Statistical analysis

Softwares used: Vassarstat, Medcalc.

The statistical analysis was done by the statistician of department of community medicine of our institute.

We evaluated pain status of every patient in both study arm and control arm daily using Visual Analogue Scale (VAS) starting from day 1 to day 7. We calculated mean, mean difference, standard deviation difference, standard error difference between two groups daily and presented them in a tabular manner [Table 5]. We put those data in the statistical software and calculated F value, critical difference, *P* value.

We evaluated wound healing status of each and every patient in both study and control arm daily using Bates-Jensen Wound Assessment Scale starting from day 1 to day 10. Mean, mean difference, standard deviation difference, standard error difference between two groups daily was calculated. F value, critical difference, *P* value were calculated.

Critical difference is the smallest difference between sequential results which is associated with a true change in the subject. Since we were interested with sequential results (day1 to day 7 for pain and day 1 to day 10 for wound status, we calculated critical difference to show the precise differences.

F value by one way ANOVA (Analysis of Variance) test signifies variance of the group means or means of the within group variances. It is the ratio between two mean squares, the numerator is the treatment mean square and denominator is experimental error mean square. F value process the hypothesis that the variance due to treatment in study group is significantly larger than the variance of the data set (experimental error). If F value exceeds critical difference, we reject null hypothesis and conclude that there is significant effect due to treatments.

Plan for data analysis

a. Mean difference and analysis of variance (two ways ANOVA) for showing differences in wound status between study and control arm between first and tenth day's observations.
b. Same tests were used for showing differences in pain status due to wound between study arm and control arm based on first to seventh day's observation.

Results

We evaluated pain status in each and every patient in both the study arm and control arm as per visual analogue scale

Table 6: The wound status in both the groups between day 1 and day 10

Day	Group	Mean	Mean difference	SD difference	SE difference	F value (critical difference)
D1	S	50.10	−2.5	1.04	3.068	6.523 (14.03)
	C	47.7				
D2	S	48.9	−1.2	0.94	3.094	
	C	48.0				
D3	S	47.6	0.1	0.83	3.123	
	C	48.1				
D4	S	45.2	2.4	0.66	3.004	
	C	48.8				
D5	S	42.6	6.4	0.59	2.906	
	C	49.7				
D6	S	41.2	7.3	0.56	2.792	
	C	49.8				
D7	S	38.2	10.1	0.49	2.648	
	C	50.1				
D8	S	36.8	14.0	0.46	2.478	
	C	50.9				
D9	S	35.4	15.3	0.59	2.414	
	C	51.2				
D10	S	34.1	17.3	0.78	2.362	
	C	51.6				

S=Study arm, C=Control arm, SD=Standard deviation, SE=Standard error of mean

and scored daily accordingly. Pain reduction was significant (F value=6.638 and critical difference=1.667, $P<0.05$, here F value exceeds critical difference, so statistically significant) from day 7 in study arm as compared to control arm, showing that honey provides early, rapid pain control compared to normal saline dressing as evident from Table 5.

Wound status was assessed daily according to Bates-Jensen wound assessment scale in all the patients of both study arm and control arm. There was significant difference in wound healing status (F value=6.523; critical difference=14.03, $P<0.05$, F value exceeds critical difference, so statistically significant) from day 10 in study arm as compared to the control arm, showing that application of honey provides a better wound healing as compared to normal saline shown in Table 6.

So application of honey dressing provides a better wound healing, rapid pain relief in cancer patients with bedsores in palliative settings.

Discussion

Honey has been used as a medicine from the earliest ages. It has excellent astringent property and antimicrobial property, topical wound healing properties for sores, wounds and skin ulcers.[5] Honey is cost effective and can provide a better healing which can ultimately provide a improves sense of well being and reduce the burden of multiple drug resistant infections.[6-9] Honey may be used instead of high-tech products.

Honey has been used to treat infections in a wide range of wound types.[14] We have already showed that topical honey dressing provides excellent results in bedsore healing in cancer patients as compared with others as metronidazole, etc.[10] Even certain studies showed that honey has been used to heal wounds not responding to treatment with conventional antibiotics and antiseptics within five weeks of application.[11,12]

Honey has been suggested as an effective healing agent for various kinds infected ulcers in both traditional and modern medicine.[13] Topical application of honey has been shown to be effective in treatment of the postoperative wound infections, reducing the need for antibiotics and finally reducing remaining scar.[14] There is a massive accumulation of collagen in the scar tissue but investigations in the embryonic ulcers that healed without scar have shown that collagen organization plays a more important role in the development of the scar than collagen deficiency.

Honey is effective in wound healing through improvement of granulation and epithelializition stages, improvement of debridement and reduction of wound malodour.[14-17] Studies have shown that honey produced from flowers in the Australia and New Zealand (leptospira species) has antibacterial properties.[17,18] In some reports, honey has antileishmania and anti rubella virus activity.[19,20] In addition, topical hot honey has been used as a traditional treatment in the endemic areas.[20]

Molan *et al.* in a randomised control trial showed 26 patients with postoperative wound infection had their wounds treated with honey and 24 had their wounds washed with 70% ethanol and povidone iodine applied. The group treated with honey had infection eradicated and achieved complete healing in less than half the time compared with antiseptic treated group.[21]

Similarly, another study was done by Molan *et al.* compared 20 consecutive cases of patients with Fournier's gangrene were treated conservatively with topical application of honey and compared retrospectively with 21 similar cases, managed by orthodox wound debridement methods. Response to treatment and alleviation of morbidity were faster in the honey dressing group.[22]

The role of palliative care is immense among the cancer patients and majority of our hospital patients come at late stage of the disease in physically, mentally, socially, psychologically deranged condition. It is most important to find out an easily available, cost effective method in palliative care.

Indiscriminate use of antibiotics is a matter of great concern now a day. This leads to development of antibiotic resistance, so for major infections those antibiotics no more remain effective.

Moreover cost is a major issue. Topical as well as oral or parenteral drugs used for control of infection and pain of bedsore ulcers are highly expensive and beyond the affordability of the patients in hospital settings. Honey is a cost effective alternative.

The above discussed fact, easy availability and cost effectiveness of honey influenced us to identify the effectiveness of honey in bedsore healing in cancer patients in our hospital. We have clearly concluded that application of honey dressing provides a better wound healing, rapid pain relief in cancer patients with bedsores in palliative settings. The findings of our study may help to incorporate honey as a safe, satisfying, cost effective topical dressing material for bedsore wounds for patients in the palliative settings.

Conclusion

Application of honey dressing provides a better wound healing, rapid pain relief in cancer patients with bedsores in palliative settings. Compared to other dressing material honey is economic, more effective in terms of infection control, healing of bedsore wounds as well as control of pain of bedsore wounds. So honey can be chosen as a safe and effective material for dressing of bedsore wounds in cancer patients in palliative settings.

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