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The effectiveness of activated charcoal vs garlic cloves dressing on cellulitis wound healing among snake bite patients

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Abstract

Introduction: Snake bite is a common medical emergency and an occupational hazard, more so in tropical India, where farming is a major source of employment.

Aims: To assess the level of wound healing before and after activated charcoal dressing among snake bite patients in experimental group I, To assess the level of wound healing before and after garlic cloves dressing among snake bite patients in experimental group II, To compare the effectiveness of activated charcoal Vs garlic cloves dressing on cellulitis wound healing among snake bite patients in experimental group I and II ,To find out association between the post test wound healing scores with their selected demographic profile among snake bite patients in experimental group I and II.

Findings: it can be concluded that there is highly significant difference in effectiveness of activated charcoal Vs garlic cloves dressing on wound healing among patients with snake bite. and demographic variables of snake bite cellulitis patients reveals that there is no significant association between snake bite patients cellulitis wound healing scores when compared to the age, sex, education, occupation , residence, site of the snake bite, co-morbidity conditions and Present history of first – aid management for the bitten site,

Conclusion: The post test result shows that the effectiveness of charcoal administration on cellulitis wound healing was found very effective and improving quality of life.

Keywords: Effectiveness, Activated charcoal, Garlic cloves dressing, Snakebite cellulitis patients

Introduction

Snake bite is a common medical emergency and an occupational hazard, more so in tropical India, where farming is a major source of employment. Over 2,000 species of snakes are known worldwide, of which around 400 are poisonous. These snakes belong to the families, Elapidae, Viperidae, Hydrophidae and Colubridae. Viper bites are more common than other poisonous snakebites in human beings. He different varieties of vipers, Russell's viper (Viperarusselli) commonly inhabits the south Asian countries, and the Russell's viper's bite is regarded as an occupational hazard for the farming community. The World Health Organization has estimated that nearly 1,25,000 deaths occur among 2,50,000 poisonous snake bites worldwide every year, of which India accounts for 10,000 deaths. The involvement of the predominantly young, healthy and the working population in rural areas which are compounded by poverty and the lack of access to health care services in these areas, signify the social and economic impact of this problem. delay in the antisnake venom administration especially in rural areas are the important factors responsible for high mortality.

Cellulitis is mainly caused by the Staphylococcus and Streptococcus bacteria. This infection occurs when these bacteria enter the skin via cuts or cracks. Skin injuries or wounds like cuts, insect bites, and surgical sites are the common sites that may harbor an infection (Shaheen Naser, 2018). Wounds of any kind can easily become infected which can then lead to worse complications. Activated charcoal has been shown to neutralize many different kinds of pathogens that directly or indirectly produce or promote infection. Activated medicinal charcoal binds these toxic substances and organisms so that the body can often heal itself. Garlic is valued by many because of its powerful antibacterial and antiviral properties, and potential ability to ward off antibiotic-resistant superbugs. Studies have found that garlic may help with more than 160 different diseases. To use garlic for cellulitis, simply take three to four raw cloves a day for several weeks.

Need for the Study

Snakebite is a serious problem with an average of 35,000 to 50,000 deaths in India (Garg A 2009). India has the highest number of deaths due to snake bites in the world with 35,000– 50,000 people dying each year according to WHO direct estimates (D. P. Punde, 2005). Many types of bacteria both aerobic and anaerobic are known to live in the mouth of healthy snakes and can lead to infections of the bite wound (Wong OF, 2010).

Incidence study have depicted that out of 520 total snake bite cases, 66 patients developed signs of cellulitis. In patients with cellulitis 49(74.24%) were males and 17(25.75%) were females. Males (74.24%) were commonly affected compared to females (25.75%). However, to date, very few studies have explored the clinical and laboratory profile of snake bite cellulitis and the beneficial role of anti-snake venom in the treatment of snake bite cellulitis. This study shows high incidence of cellulitis is in patients with snake bite, hence in any case of snake bite we should take proper precautionary measures to prevent cellulitis like strict limb elevation, Anti snake venom injection, antibiotics coverage, anti-edema measures. When cellulitis has already gone for complications like compartment syndrome, necrotizing fasciitis, then proper surgical intervention is required (Chetan P.R, 2014)

Statement of the Problem

A study to compare the effectiveness of Activated Charcoal Vs Garlic Cloves dressing on cellulitis wound healing among snake bite patients admitted in Dhanvantri Critical Care Center at Erode

Objectives of the Study

1. To assess the level of wound healing before and after activated charcoal dressing among snake bite patients in experimental group I
2. To assess the level of wound healing before and after garlic cloves dressing among snake bite patients in experimental group II
3. To compare the effectiveness of activated charcoal Vs garlic cloves dressing on cellulitis wound healing among snake bite patients in experimental group I and II
4. To find out association between the posttest wound healing scores with their selected demographic profile among snake bite patients in experimental group I and II

Research design

The design used for the present study will be true experimental design, selected to compare the effectiveness of activated charcoal vs garlic cloves dressing on cellulitis wound healing among snake bite patients.

Table 1: Schematic representation of true experimental design

Randomly selected snake bite patients	Pretest	Intervention	Post test
Experimental group I	0_1	X_1	0_2
Experimental group II	0_1	X_2	0_2

01- Implies the level of wound healing among snake bite patients before activated charcoal vs garlic cloves dressing in experimental group I and II

X_1- Implies activated charcoal dressing in experimental group I

X_2- Implies garlic cloves dressing in experimental group II

02- Implies the level of wound healing among snake bite patients after activated charcoal vs garlic cloves dressing in experimental group I and II

Research setting

The study will be conducted in Dhanvantri Critical Care Center at Erode.

The hospital comprises of 100 beds with all sophisticated units for both male and female patients. Annually about 250 to 300 snake bite patients are treated in this hospital.

Variables

Independent variable.

Activated charcoal dressing and garlic cloves dressing.

Dependent variable: Cellulitis wound healing.

Population

The population for the present study will be snake bite patients with cellulitis wound Sample size

Total participants are N= 130, out of which 65 in experimental group I and 65 in experimental group II.

Sampling technique

Simple random sampling technique will be used to recruit the participants. List of sample elements are made based on the inclusion criteria. By adopting random number table, 130 samples will be selected randomly in experimental group I and II. In each experimental group 65 samples will be recruited randomly.

Criteria for the selection of sample Inclusion Criteria:

Snake bite patients

- Venomous snake bite [Viper, bothrops and rattlesnakes]
- with cellulitis grade I to II
- with wound present in upper and lower limb
- who give consent to participate in this study
- who can understand Tamil and English
- who are present during the period of data collection

Exclusion Criteria

Snake bite patients

- With gangrene and extensive cellulitis wound
- With infection secondary to snake bite induced cellulitis.

Description of the Instrument

The instrument comprises of structured interview schedule which consists of the following parts **Part- I - A.**

Comprises of baseline demographic profile such as age, sex, education, occupation, residence .site of the snake bit, comorbid conditions and present history of first aid management for snake bitten area.

demographic variables.

Part-I-A.

Age (in years)

a. 16 to 30 years
b. 31 to 45 years
c. 46 to 60 years
d. above 60 years

Sex

1. Male
2. Female

3. Education

a. No formal education.
b. Primary school
c. High school
d. Higher secondary school

e. Graduate and above

4. Occupation.
a. Agricultural workers.
b. Building constructors.
c. Fisherman
d. Herders

5. Residence.
Urban
Semi urban
Rural area.
Remote rural.

6. Site of the snake bite
a. Upper limb
b. Lower limb

7. Co- morbid conditions.
a. Acute kidney injury.
b. Generalized myotoxicity.
c. Neuromuscular paralysis.
d. No co-morbidities.

8. Present history of first – aid management for the bitten site that is
a. Indigenous herbal medicines
b. Use of tourniquets
c. Incision and drainage
d. Suction

PART-B
Cellulitis grading scale was used to measure the grading of cellulitis wound. It consists of grade I to grade – IV.

Part- II
(Bates Jensen Wound Assessment Tool)
Bates-Jensen Wound assessment Tool
Complete the rating sheet to assess wound status. Evaluate each item by picking the response that best describes the wound and entering the score in the item score column for the appropriate date. If the wound has healed/resolved, score items 1,2,3, & 4 as =0.

Location: Anatomic site. Circle, identify right **(R)** or left **(L)** and use **"X"** to mark site on body diagrams:
Sacrum & coccyx
Lateral ankle
Trochanter Medial ankle Ischial tuberosity Heel
Buttock Other site: _____.

Shape: Overall wound pattern; assess by observing perimeter and depth.
Circle and date appropriate description:
Irregular Linear or elongated
Round/oval Bowl/boat
Square/rectangle Butterfly
Other Shape

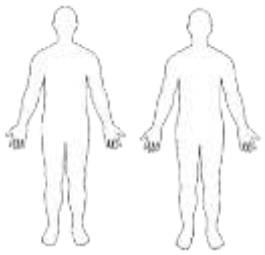
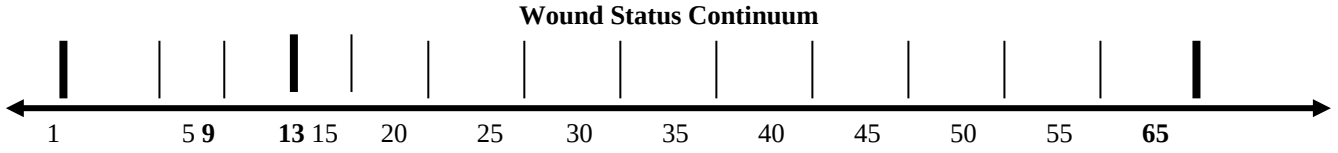


Table 2

Item	Assessment	Date Score	Date Score	Date Score
1. Size*	*0 = Healed, resolved wound 1. = Length x width <4 sq cm 2. = Length x width 4--≤16 sq cm 3. = Length x width 16.1--≤36 sq cm 4. = Length x width 36.1--≤80 sq cm 5. = Length x width >80 sq cm			
2. Depth*				
3. Edges*	*0 = Healed, resolved wound 1 = Indistinct, diffuse, none clearly visible 2 = Distinct, outline clearly visible, attached, even with wound base 3 = Well-defined, not attached to wound base 4 = Well-defined, not attached to base, rolled under, thickened 5 = Well-defined, fibrotic, scarred or hyperkeratotic			
4. Undermining*	*0 = Healed, resolved wound 1 = None present 2 =Undermining < 2 cm in any area			
	3 = Undermining 2-4 cm involving < 50% wound margins 4 = Undermining 2-4 cm involving > 50% wound margins 5 = Undermining > 4 cm or Tunneling in any area			
5. Necrotic Tissue Type	1 = None visible 2 = White/grey non-viable tissue &/or non-adherent yellow slough 3 = Loosely adherent yellow slough 4 = Adherent, soft, black eschar 5 = Firmly adherent, hard, black eschar			

6. Necrotic Tissue Amount	1 = None visible 2 = < 25% of wound bed covered 3 = 25% to 50% of wound covered 4 = > 50% and < 75% of wound covered 5 = 75% to 100% of wound covered			
7. Exudate Type	1 = None 2 = Bloody 3 = Serosanguineous: thin, watery, pale red/pink 4 = Serous: thin, watery, clear 5 = Purulent: thin or thick, opaque, tan/yellow, with or without odor			
8. Exudate Amount	1 = None, dry wound 2 = Scant, wound moist but no observable exudate 3 = Small 4 = Moderate 5 = Large			
9. Skin Color	1 = Pink or normal for ethnic group 2 = Bright red &/or blanches to touch			

Item	**Assessment**	**Date Score**	**Date Score**	**Date Score**
Surrounding Wound	3 = White or grey pallor or hypopigmented 4 = Dark red or purple &/or non-blanchable 5 = Black or hyperpigmented			
10. Peripheral Tissue Edema	1 = No swelling or edema 2 = Non-pitting edema extends <4 cm around wound 3 = Non-pitting edema extends >4 cm around wound 4 = Pitting edema extends < 4 cm around wound 5 = Crepitus and/or pitting edema extends >4 cm around wound			
11. Peripheral Tissue Induration	1 = None present 2 = Induration, < 2 cm around wound 3 = Induration 2-4 cm extending < 50% around wound 4 = Induration 2-4 cm extending > 50% around wound 5 = Induration > 4 cm in any area around wound			
12. Granulation Tissue	1 = Skin intact or partial thickness wound 2 = Bright, beefy red; 75% to 100% of wound filled &/or tissue overgrowth 3 = Bright, beefy red; < 75% & > 25% of wound filled 4 = Pink, &/or dull, dusky red &/or fills ≤ 25% of wound 5 = No granulation tissue present			
13. Epithelialization	1 = 100% wound covered, surface intact 2 = 75% to <100% wound covered &/or epithelial tissue extends >0.5cm into wound bed 3 = 50% to <75% wound covered &/or epithelial tissue extends to <0.5cm into wound bed 4 = 25% to < 50% wound covered			
Item	**Assessment**	**Date Score**	**Date Score**	**Date Score**
	5 = < 25% wound covered			
	Total Score			
	Signature			



Tissue Healed Wound
Wound
Health Regeneration

Degeneration

Plot the total score on the Wound Status Continuum by putting an **"X"** on the line and the date beneath the line. Plot multiple scores with their dates to see-at-a-glance regeneration or degeneration of the wound.

Table 3

Level of wound healing	**Actual Scores**	**Percentage**
Primary intention healing	1-7	<35 %
Secondary intention healing	8-13	36- 65%
Tertiary intention healing	14-20	>66%

Validity and Reliability of the instrument

Validity: Content validity of the tool will be established in consultation with nursing experts in the field of medical surgical nursing (critical care nursing), toxicology and critical care medicine and statistician. The expert's suggestions will be incorporated in designing the final tool.

The reliability of the tool will be established by administering the tool to 15 snake bite patients in Dhanvantri Critical Care Center at Erode. The tools will be translated in Tamil and the reliability is tested.

The reliability of (Bates Jensen Wound Assessment Tool) will be tested by test retest method to assess the stability by using Karl Pearson correlation coefficient method.

Data collection procedure

This study is approved by Institutional Human Ethical Committee. After obtaining written informed consent, snake bite patients who fulfill the inclusion criteria will be recruited and enrolled in the study. The total sample size is 130 snake bite patients. Simple random sampling technique will be adopted by using random number table. Participants are assigned randomly to either experimental group I (n=65) or experimental group II (n=65).

Pre test

Cellulitis Grading Scale will be used for screening the grade of the wound. Grade I – IV is included in the study.

After screening, 130 participants will be interviewed before intervention by assessing demographic profile such as age, sex, education, occupation, residence, site of the snake bite. comorbid conditions and present history of first aid management for bitten area. The level of wound healing will be assessed by (Bates Jensen Wound Assessment Tool) in experimental group I and II.

Intervention

Immediately after pretest the participants will receive sterile activated charcoal dressing in experimental group I and garlic cloves dressing in experimental group II among snake bite patients. The nature of the intervention is nurse administered dressing pertaining to the hospital stay by reason of cellulitis wound among snake bite patients.

Activated charcoal dressing (Experimental group I)

Experimental group I (n=65) will receive One tablespoon (15 gr) of activated charcoal powder mixed with 15 ml of water to make a paste and is applied over the cellulitis wound using a sterile spatula and covered with single layer of gauze piece. This dressing is applied once a day with the duration of 2nd, 3rd and 4th weeks depending on the level of wound healing of the cellulitis wound.

Garlic Cloves dressing (Experimental group II)

Experimental group II (n=65) will receive two to six peeled and crushed garlic cloves fried with one table spoon of coconut oil then cooled after blending the garlic with coconut oil to make a paste and apply over the cellulitis wound using sterile spatula and covered with single layer of gauze piece, This dressing is applied once a day with the duration of 2nd, 3rd and 4th weeks depending on the level of wound healing of the wound.

Post test

Posttest will be conducted by using the same assessment instruments in experimental group I and II

Pilot Study Findings

Percentage distrubation of snake bite patients with cellulitis according to their demographic variables.

(N_1 =10, N_2 = 10.)

Experimental group – I

Distribution of cellulitis wound healing among snake bite patients according to their age group shows that the highest percentage (60%) of snake bite patients with cellulitis were in the age group of 31 - 45 years. (80%) were Male, (80%) of them had no formal education (80%) of the patients were agriculture, (80%) percentage of the patients are living in rural areas, (80%) of patient's bitten site was in the lower limb, (60%) of patients were not having co- morbid conditions and (80%) 0f patients were using tourniqutes.

Experimental group – II

Distribution of cellulitis wound healing among snake bite patients according to their age group shows that the highest percentage (60%) of snake bite patients with cellulitis were in the age group of 31 - 45 years. (80%) were Male, (60%) of them had no formal education (80%) of the patients were doing agriculture, (80%) percentage of the patients live in rural areas, (80%) of patient's bitten site was in the lower limb, (80%)of patients were not having co- morbid conditions and (80%) 0f patients were using tourniqutes.

Table 4: Frequency and percentage distribution of pre test and post test scores of cellulitis wound healing among snake bite patients in experimental group I. (N_1 =10).

Level of wound healing	Pre test score		Post test score	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
Primary intention healing	2	20	4	40
Secondary intention healing	5	50	2	20
Tertiary intention healing	3	30	4	40

Frequency and percentage distribution of pre and post test scores on cellulitis wound healing among snake bite patients in experimental group I depicts that, in pre test most (60%) of them were tertiary intention healing and (40%) of cellulitis wound healing were secondary intention healing, whereas in post test most (80%) of them were primary intention of wound healing and (20%) of them were secondary intention of healing. It seems that charcoal administration on cellulitis wound was effective in wound healing among snake bite patients.

Table 5: Frequency and percentage distribution of pre test and post test scores of cellulitis wound healing among snake bite patients in experimental group II. (N_1 =10).

Level of wound healing	Pre test score		Post test score	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
Primary Intention healing	4	40	3	30
Secondary Intention healing	3	30	5	50
Tertiary Intention healing	3	30	2	20

Frequency and percentage distribution of pre and post test scores on cellulitis wound healing among snake bite patients in experimental group II depicts that, in pre test most (30%) of them were tertiary intention healing, (30%) of snake bite patients were secondary intention healing and (40%) of snake bite patients were primary intention of healing whereas in post test most
(30%) of them were primary intention of healing ,(50%) of them were secondary intention of healing and (20%)of . of them were tertiary intention of healing It seems that garlic cloves administration on cellulitis wound was effective in wound healing among snake bite patients.

Table 6: Frequency and percentage distribution of post test scores of cellulitis wound healing among snake bite patients in experimental group I experimental group II.

Level of wound healing	Post test score Experimental group – I. [Charcoal administration]		Post test score Experimental group-II. [Garlic cloves administration]	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
Primary intention healing	8	80	6	60
Secondary intention healing	2	20	4	40
Tertiary intention healing	-	-	-	-

Frequency and percentage distribution of post test scores on cellulitis wound healing among snake bite patients in experimental group I depicts that, in post test most (80%) of them were primary intention of wound healing and (20%) of snake bite cellulitis wound was secondary intention of healing and experimental group II depicts that, in post test most (60%) of them were primary intention of wound healing and (40%) of snake bite cellulitis wound was secondary intention of healing. It seems that charcoal administration on cellulitis wound was more effective in wound healing than garlic cloves administration among snake bite patients.

Unpaired 't'test.

Unpaired 't' test value of post test scores of experimental group I and II.

Table 7: Unpaired't' test value of post test scores of experimental group I and II.

S. No	Attributes of wound healing	't' value	Table value	Level of significance.
1.	Size	6.09	2.62	$P < 0.05$ Significant
2.	Depth	7.10	2.62	$P < 0.05$ Significant
3.	Edges	8.96	2.62	$P < 0.05$ Significant
4.	Undermining	6.93	2.62	$P < 0.05$ Significant
5.	Necrotic tissue type	8.67	2.62	$P < 0.05$ Significant
6.	Necrotic Tissue Amount:	9.54	2.62	$P < 0.05$ Significant
7.	Exudate type	8.21	2.62	$P < 0.05$ Significant
8.	Exudate Amount:	8.20	2.62	$P < 0.05$ Significant
9.	Skin Color Surrounding Wound	8.15	2.62	$P < 0.05$ Significant
10.	Peripheral Tissue Edema & Induration	7.13	2.62	$P < 0.05$ Significant
11.	Granulation Tissue	7.12	2.62	$P < 0.05$ Significant
12.	Epithelialization	7.15	2.62	$P < 0.05$ Significant
13.	Total	10.09	2.62	$P < 0.05$ Significant

Unpaired't' test was calculated to analyze the effectiveness between experimental group I and II, post test score on cellulitis wound healing . The unpaired't' test total score was 10.09, when compared to table value (2.62) it was high and the null hypothesis is rejected. Hence it can be concluded that there is highly significant difference in effectiveness of activated charcoal Vs garlic cloves dressing on wound healing among patients with snake bite.

Table 8: Association between experimental group I post test scores and demographic variables of the snake bite cellulitis patients.

Sl. No.	Variables	Degrees of freedom	$\chi 2$	Level of Significant
1	Age (in year)	1	0.01	Not Significant
2	Sex	1	0.16	Not Significant
3	Education	1	0.03	Significant
4	Occupation	1	0.05	Not Significant
5	Residence	1	0.07	Not Significant
6	Site of the snake bite	1	0.04	Not Significant
7	Co morbidity conditions	1	0.02	Not Significant
8	Present history of first – aid management for the bitten site that is	1	0.08	Not Significant

Association between post test score and demographic variables of snake bite patients reveals that there is no significant association between snake bite patient's cellulitis

wound healing scores when compared to the age, sex, education, occupation, residence, site of the snake bite, co-morbidity conditions and Present history of first – aid management for the bitten site, so accept the null hypothesis in these variables. Hence it can be concluded that there is no significant association between the post test score with the demographic variables of snake bite patient's cellulitis wound healing.

Table 9: Association between experimental group II post test scores and demographic variables of the snake bite patients.

Sl. No.	Variables	Degrees of freedom	$\chi 2$	Level of Significant
1	Age (in year)	2	0.14	Not Significant
2	sex	1	0.16	Not Significant
3	Education	1	0.05	Significant
4	Occupation	1	0.03	Not Significant
5	Residence	1	0.08	Not Significant
6	Site of the snake bite	1	0.01	Not Significant
7	Co- morbidity conditions	1	0.08	Significant
8	Present history of first – aid management for the bitten site that is	1	0.05	Not Significant

Association between post test score and demographic variables of snake bite cellulitis patients reveals that there is no significant association between snake bite patients cellulitis wound healing scores when compared to the age, sex, education, occupation, residence, site of the snake bite, co-morbidity conditions and Present history of first – aid management for the bitten site, so accept the null hypothesis in these variables. Hence it can be concluded that there is no significant association between the post test score with the demographic variables of snake bite patient's cellulitis wound healing.

Conclusion

Finding shows that the level of wound healing wise post test scores in experimental group-I I shows that the highest mean percentage (82%) was observed for wound healing in snake bite cellulitis patients. The similar mean (2.46 ±0.72) .which is 78% of total score was shown by the wound healing in snake bite cellulitis patients for experimental group II. The post test result shows that the effectiveness of charcoal administration on cellulitis wound healing The post test result shows that the effectiveness of charcoal administration on cellulitis wound healing was found very effective. However, the level of wound healing wise the post test scores shows that the highest mean percentage (45%) was observed in snake bite cellulitis patients. The similar mean difference between per and post test is (31%) of total score was shown by the wound healing in snake bite cellulitis patients. The post test result shows that the effectiveness of garlic cloves administration on cellulitis wound healing was found effective and improving quality of life. It reveals that patients were able to carry on daily activities normally. Unpaired't' test was calculated to analyze the effectiveness between experimental group I and II, post test score on cellulitis wound healing . Unpaired't' test was calculated to analyze the effectiveness between experimental group I and II, post test score on cellulitis wound healing. The unpaired't' test total score was 1.71, when compared to table value (2.05) it was high and the null hypothesis is rejected. Hence it can be concluded that there is highly significant difference in effectiveness of activated charcoal Vs garlic cloves dressing on wound healing among patients with snake bite. and demographic variables of snake bite cellulitis patients reveals that there is no significant association between snake bite patients cellulitis wound healing scores when compared to the age, sex, education, occupation, residence, site of the snake bite , co-morbidity conditions and Present history of first – aid management for the bitten site, so accept the null hypothesis in these variables. Hence it can be concluded that there is no significant association between the post test score with the demographic variables of snake bite patient's cellulitis wound healing.

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