

## The Effectiveness of Using Banana Leaf Dressing in Management of Partial Thickness Burns' Wound

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**Abstract: Background & Aim:** An important factor in the healing of partial thickness burn is early and effective coverage with a dressing that is non-adherent; protects the wound from trauma and decrease pain during dressing change and ensures feeling of comfort and ease of handling. Wound care needs to be undertaken in the context of the local environment and access to costly wound products is not an option in many settings. In these situations, creativity and innovation have led to many excellent alternatives being developed. So this study aimed to investigate the effectiveness of Banana Leaf Dressing (BLD) over partial thickness burns in terms of pain reduction, increasing comfort, easy removability of dressing, and early wound healing among burns patients who admitted with burns up to 50% of TBSA in selected hospital.

**Methods & Materials:** A convenient sample of 38 patients with partial thickness burn wound over comparable areas, e.g. either upper extremities or lower extremities or both, comparable body areas were used as study and control areas in the same patient. Data were collected on three points of time during patient hospitalization using discomfort score, dressing removal pain score, and the easiness of dressing removal score.

**Results:** BLD has significant outcome on wound healing process. Patient suffered less discomfort and less pain during dressing removal with BLD than with ordinary dressing. Also with BLD removal of dressing was easier than ordinary dressing. In addition, time to complete healing was significantly less with BLD than others.

**Conclusion:** It was clear that BLD is a completely non-adherent, nearly painless, and cheaper dressing.

**Key words:** Banana leaf dressing and burn wound management.

### INTRODUCTION

Skin plays an important role in maintaining overall health and wellbeing. The skin fulfils a multitude of functions, many of which we are unaware of until something threatens to alter or impair its integrity. The consequences of an insult to the skin's integrity may be relatively minor, or may be devastating and life threatening. The major physiological impact of impaired skin integrity occurs in burns (1). Burn injuries usually result in significant morbidity and mortality around the globe in both developing and developed countries and have considerable physical, psychological and economic effects on the patients, their families and society (2-4). The World Health Organization in 2008 reported that burden of burn injury is one that falls predominantly on the world's poor. Also Mock et al, 2008 report that the vast majority (over 95%) of fire-related burns occur in low- and middle-income countries. Within this group of countries, not only are burn deaths and injuries more common in people of lower socioeconomic status but, also the economic burden makes them more likely to be thrown into further poverty as a consequence (5).

Worldwide, burn injury is a problem and cause intense pain. Long-term morbidity is often a significant problem for burn survivors that create suffering for the individual as well as for family and community (6-7). Whether acute or chronic, wounds can compromise an individual's wellbeing, self-image, working capacity, and independence (8, 3). Burn

wounds are often classified by depth: superficial (first-degree burn), partial-thickness (second-degree burn) or full-thickness (third-degree burn) (9). Partial thickness burns include superficial and deep partial-thickness burns. The superficial partial-thickness burn extends through the epidermis into the papillary (superficial) layer of the dermis. These wounds become erythematous, i.e. the skin reddens because the dermal tissue has become inflamed. The deep partial-thickness burns extend downward into the reticular (deeper) layer of the dermis and present as mixed red or waxy white (9).

The aim of treating any wound is to either shorten the time required for healing and or to minimize the undesired consequences (10). Management of partial-thickness burns requires extensive healthcare resources and is directed towards promoting healing, control pain, avoid infection and minimize disfigurement (11-12). In addition in a developing country with a fairly large incidence of burns and with financial constraints and limited budgets where all medical resources are stretched beyond practical limits, a major factor that must be considered is how to reduce the cost of therapy and reach a cost-effective management (13). The searching for the ideal dressing is ongoing with no currently available dressing that suits all patients or all wounds at all stages of the healing process (14). Pankhurst and Pochkhanawala, (2002) summarize the ideal burn dressing as one that must: protect the wound from physical damage and micro-organisms; be comfortable, compliant and

lasting; be non-toxic, non-adherent, and non-irritant. In addition it allows gaseous exchange and high humidity at the wound; be compatible with topical therapeutic agents; and be able to allow maximum activity for the wound to heal without retarding or inhibiting any stage of the healing process (15). It is now universally accepted that for early healing of partial thickness burn wound it needs to be protected from repeated tissue trauma and desiccation. Occlusive dressings using non-adherent material are best suited for this purpose.

Gauze dressings have been used in wound care for many years. It still remains one of the most widely used dressings. Many are used as packing agents, primary and secondary dressings, for wound infections and for mechanical debridement. However, Baranoski and Ayello (2003) stated that although intended for wet-to-moist use, gauze dressings are often allowed to dry out before removal and its removal may cause re-injury of the wound which result in pain and delayed wound healing. Moreover, woven gauze may leave lint fibers in the wound bed contributing to inflammation and possible infection. So Gauze cannot be used as a moist wound therapy intervention but, it can be used as a secondary dressing along with other moist wound products. Gauze does not create an optimal moist healing environment, even if moistened with saline (16).

However, there is very little reliable evidence on the use of complementary and alternative medicines for burns (17). Two systematic reviews of the use of hyperbaric oxygen therapy for the treatment of burns reported that there was insufficient evidence to support its routine use (18-19). In addition Khorasani *et al* (2009) concluded from their study that aloe vera cream promoted wound healing in burned patients better than silver-sulfadiazene (SSD) cream, with smaller lesions and shorter healing times and the re-epithelialization process was faster in the skin of patients treated with aloe than in those treated with SSD. They reported that the mechanism of the remarkable efficacy of aloe cream in the healing of burn injuries may be explained by its antimicrobial, cell proliferation, and inflammatory effects (20).

Also there is some evidence that honey helps superficial and partial thickness burns to heal faster compared with conventional dressings, but more research is needed. Baghel, Shukla, Mathur, Randa, (2009), in their study to compare effect of honey dressing and silver-sulfadiazene (SSD) dressing on wound healing in burn patients (n=78), they report that honey dressing improves wound healing, makes the wound sterile in lesser time, has a better outcome in terms of prevention of hypertrophic scarring and postburn contractures, and decreases the need of debridement irrespective of time of admission, when compared to silver-sulfadiazene dressing (21). In addition, potato peel dressing is used for the survival of superficial skin cells in burn patient. However, Boiled Potato Peel Bandages (BPPB) may cause discomfort for some patients and its preparation is time-consuming. An even cheaper alternative is Banana Leaf Dressing (BLD). Its preparation is very simple and can be easily taught to previously treated patients, relatives of patients and literate as well as illiterate individuals. Banana

leaves are easily available in most of the cities, towns and villages (22)

Jurjus *et al*, (2007) reported that banana leaf dressing (BLD) is non-adherent, protects wounds from trauma, and prevents them from becoming too dry. It is 11 times cheaper than BPPB, 160 times cheaper than Sofratulle (Soframycin impregnated gauze), 1750 times cheaper than Kollagen (collagen sheet), and 5200 times cheaper than Skin temp (biosynthetic dressing) (23). It is readily available and widely used, not only for burn wounds but also for eroded areas in dermatological conditions such as pemphigus and toxic epidermal necrolysis (24). However, an article raised concerns about the risk of infection from use of banana leaves, showing that only autoclaving and aseptic handling prevented culture of organisms from banana leaves (25).

### **Significance of the study:**

Wound care needs to be undertaken in the context of the local environment and access to costly wound products is not an option in many settings (26). In these situations, creativity and innovation have led to many excellent alternatives being developed. BLD provides cost effective care for burn patients. It reduces evaporation of liquid because there is a layer of wax. The leaves also create a cooling sensation on the skin of the body, not attached to the wound, and has a wide surface so that it can cover all parts of the body (27). Even though it has been practiced in many burn care centers in India, no studies have been found regarding using BLD in Egypt. So, the researchers were interested to do this study to investigate the effectiveness of Banana Leaf Dressing over partial thickness burns in terms of pain reduction, increasing comfort, easy removability, and early wound healing among burn patients who got admitted with burns up to 50% of TBSA in selected hospital

- a. **Study aimed to:** Investigate the effectiveness of using Banana Leaf Dressing over partial thickness burns in terms of pain reduction, increasing comfort, easy removability of dressing, and early wound healing among burn patients who got admitted with burns up to 50% of TBSA in selected hospital.
- b. **Hypotheses:** The following hypotheses are formulated for the study, and will be tested at 0.05 level of significance.
- c. **H1:** Applying banana leaves dressing for partial thickness burn wound will reduce patient's pain, discomfort, make dressing easy to remove, and enhance wound healing.
- d. **H2:** Applying banana leaves dressing for partial thickness burn wound will not reduce patient pain and discomfort, make dressing easy to remove, and enhance wound healing.

### **MATERIALS AND METHODS**

- a. **Design:** A quasi-experimental design was used in this study
- b. **Setting:** This study was conducted on patients with partial thickness burn in the burn unit in Shamlla Hospital (Assuit General Hospital), Egypt. The unit capacity was 15 beds
- c. **Subject:** A convenient sample of 38 burn patients with partial thickness burn, was used, 60.5% of them were male. Inclusion criteria include patients of either sex

their age ranged from 18- 55years with burns up to 50% of TBSA and patients with partial thickness burn wound over comparable areas, e.g. either upper extremities or both lower extremities. Comparable body areas with partial thickness burn wound in the same patient were used as study and control areas. This avoided the influence of multiple other variable factors such as anemia, nutritional status, immunosuppression, etc. which are all known to influence burn wound healing. Exclusion criteria include patients with diabetes, hypertension or known renal or hepatic dysfunction, pregnant females, patient with first degree of burn, patients with burn area more than 50% TBSA.

#### **Ethical considerations and human rights:**

In the planning stage, the study protocol was approved by ethical review committee of the Faculty of Nursing, Mansoura University. In addition, permission to conduct the study was obtained from the Shamlla Hospital (Assuit General Hospital) authorities, and consent was then obtained from the director of the burn unit and the head nurse after providing and explanation of research proposal. The study was conducted according to the Declaration of Helsinki. All patients were informed about each procedure and their rights to agree or disagree to participate in the study was assured. They were informed that they were free to withdraw from the study at any point of time and this will not effect on their care. Then, written informed consent was obtained from patients and nurses who agreed to participate.

#### **Tools of data collection:**

The data collected by using questionnaire consisted of 5parts

- a. The **first part** concerned with the socio demographic and medical characteristics of the patients which included: age, gender, marital status, education, living class, cause of burn, and extent of burn (TBSA).
- b. The **second part** concerned with the discomfort score: The severity of discomfort was evaluated by the visual analogue scale (VAS), by tracing a vertical mark on a 10-cm horizontal line with anchor points of 0 (no discomfort) and 10 (unbearable discomfort). The patients were asked to give discomfort score for each dressing while the dressings were on the wounds. They were asked to give these scores three times during the trial period and average was taken.
- c. The **third part** concerned with the dressing removal pain score; The severity of pain was evaluated by the visual analogue scale (VAS), by tracing a vertical mark on a 10-cm horizontal line with anchor points of 0 (no pain) and 10 (unbearable pain). This score was done by patients separately for each type of dressing. The patients were asked to give the score at least three times during the trial period and an average score was taken.
- d. The **fourth part** concerned with ease of dressing removal score: The easiness of dressing removal was evaluated by the visual analogue scale (VAS), by tracing a vertical mark on a 10-cm horizontal line with anchor points of 0 (easy) and 10 (so difficult).The health care professionals carrying out the dressing removal gave this score for each dressing separately at least three times during the trial period and an average score was taken.

- e. The **fifth part** concerned with the time spent to complete healing, which was calculated for each dressing from the date of initial admission to the day of discharge to ambulatory care, this equates total length of hospital stay. In addition evidence of signs of wound infection (bad odor, presence of pus ) in both parts was recorded.

#### **Procedure and intervention:**

After approval of the study protocol by ethical review committee of the Faculty of Nursing, Mansoura University and obtaining permission to conduct the study from the Shamlla Hospital (Assuit General Hospital) authorities, this study was initiated in July, 2011 and was completed in May, 2012. On the completion of the study 38 patients were recruited.

#### **Banana leaf dressing preparation:**

- a. We brought banana leaves used in the work from a banana plantation in EL Asara region at El Fateh Center in Assiut Governorate. Banana leaf was prepared by cutting the midrib of the leaf, carefully washed and dried, and then it has been cut to pieces with average size 40 cm × 60 cm. Every piece was rolled and four to six of such rolls were placed in a brown paper bag and autoclaved at temperature of 135 C for 20 minutes.
- b. Under supervision of the head of burn unit who is a plastic surgeon and the head of nursing staff, the nurses and the researchers implement the dressing using ordinary dressing (antimicrobial ointment then layers of gauze were applied) for one part and the BLD (antimicrobial ointment then banana leaves was applied) for the others part for the same patient. After applying dressing, layers of cotton was applied then elastic or gauze bandage were used for both dressings.
- c. Data were collected on three points of times during patient hospitalization using comfort score, pain score, dressing removal pain score, and the easiness of dressing removal score.

#### **Pilot study:**

A pilot trial was carried out on five patients to test the clarity and practicability of the tools. Pilot subjects were later included in the study as there was no radical modifications in the study tools.

#### **Statistical analysis:**

Data analysis: Data entry and statistical analysis was done using SPSS version 15. Data were presented using numbers, percentages, means and standard deviations. The difference between the two types of dressings was checked by using t test for quantitative data and chi square test for qualitative data. Level of significance was threshold at 0.05

## **RESULTS**

**Table;1** represents demographic characteristics of the study sample. As shown more than half of the sample (60.5%) was male and 68.4% were having secondary school. More than two thirds (71.1%) from the moderately living class, 63.2% burned by dry heat, half of them their extent of burn ranged from 15% to 20%, and their age ranged from 18- 55years with mean score 27.6±8.53.

Table: 1 Demographic characteristics of the study sample N=38

Characteristics	No = 38	%
<b>Sex</b>		
Male	23	60.5
Female	15	39.5
<b>Level of education</b>		
Illiterate	12	31.6
Secondary	26	68.4
<b>Living class</b>		
Low	11	28.9
Medium	27	71.1
<b>Cause of burn</b>		
Dry heat	24	63.2
Moist heat	14	36.8
<b>Extent of burn (TBSA)</b>		
15% to 20%	19	50
21% to 25%	12	31.6
26% up to 45%	7	18.4
<b>Participants' Age</b>	Range 18- 55	Mean ± SD 27.6±8.53

**Table 2:** represents the comparison between BLD and ordinary dressing in relation to outcome criteria (level of patient' discomfort, dressing removal pain score, easiness of dressing removal score, and time to complete healing). As shown the average discomfort score with BLD was 2.1±1.3 while that with ordinary was 6 ± 1.5. The average dressing removal pain score was 2.3 ± 1.2 with BLD while that with ordinary it was 5.9±1.2. Ease of dressing removal score average was 3.5 ± 1.9 with BLD while it was 7.4 ± 1.2 with ordinary. In all the above scores the difference observed was statistically significant p values were (.005, .003, and .003) respectively. In addition, parts dressed by BLD healed more rapidly than parts dressed by ordinary dressing (p= .02).

Table 2: Comparison between banana leaves dressing and ordinary dressing in relation to outcome criteria N=38.

Outcome Criteria	Type of Burn Wound Dressing				t- test	P
	BLD		Ordinary Dressing			
	Mean ± SD	Rang	Mean ± SD	Rang		
<b>Discomfort score (0 -10)</b>	2.1 ± 1.3	(1 - 5)	6 ± 1.5	(2 - 9)	-4.021	.005
<b>Dressing removal pain score (0 - 10)</b>	2.3 ± 1.2	(1 - 6)	5.9 ± 1.2	(3 - 9)	-23.379	.003
<b>Ease of dressing removal score (0 - 10)</b>	3.5 ± 1.9	(.00 - 6)	7.4 ± 1.2	(4 - 9)	-15.492	.003
<b>Time to complete healing</b>	8.4 ± 1.4	(8 - 12)	13.4 ± 1.9	(12-15)	-31.696	.02

Table 3: Comparison between banana leaves dressing and ordinary dressing in relation to the evidence of wound infection signs N=38

Outcome Criteria	Type of Burn Wound Dressing		Chi-sq test	P value
	BLD (N & %)	Ordinary Dressing (N & %)		
<b>Evidence of signs of wound infection (bad odor, presence of pus )</b>				
Not present	31 (81.6)	26 (68.4)	3.754	.153
Present	7 (18.4)	12 (31.6)		

**Table 3:** represents the comparison between BLD and ordinary dressing in relation to the evidence of wound infection signs. Despite the emergence of signs of wound infection in 7 parts with the BLD compared with 12 parts with the ordinary dressing, there was no statistically significant difference between two types of dressing in relation to evidence of signs of wound infection (p= .163).

**DISCUSSION**

Burn injuries rank among the most severe types of injuries suffered by human beings with an attendant high mortality and morbidity rate. Majority of the burns patients experience pain and discomfort and many types of burn wound dressings are very difficult to remove and its removal may cause re-injury of the wound which results in pain and delayed wound healing(28). Also burn management entails significant duration of hospital stay, expensive medications, multiple operative procedures and prolonged period of rehabilitation. This makes burn care an expensive proposition and every effort in cost reduction is welcome (29). So burn dressing selection should not be based just on their effect of healing, but also ease of application and removal, change requirements, cost and patient comfort should be considered (30-31).

In addition, an important factor in the healing of superficial and moderate partial thickness burn is early and effective

coverage with a dressing that protects the wound from trauma and desiccation and is non-adherent. Gauze and petroleum jelly impregnated gauze, i.e. Vaseline gauze (VG) are the most commonly used dressings for burn wound. However, Gore&Akoleekar, (2003) reported that gauze was not completely non-adherent and the pain and anxiety experienced by the patients was significant (29). In addition, Baranoski and Ayello 2003, stated that The benefits of gauze dressings are overshadowed by the disadvantages because it impedes healing, increases risk of infection, requires numerous dressing changes and is a substandard of care in today health care environment (16). The recognized “Father of Western Medicine”, Hippocrates says that “Let your food be your medicine and your medicine your food.” The “Father of Modern Pharmacology and Toxicology”, Paracelsus, Wrote “The art of healing comes from nature, not from the physician. Therefore, the physician must start from nature With an open mind. In Well-controlled clinical trials, foods such as potato peel, banana leaf and honey have proven to be equal to or better than current standard-of-care for burns and Wounds (32).

This support the finding of the present study, which done to investigate the following hypothesis "if using banana leaves dressing for partial thickness burn wound will reduce patient pain and discomfort, make dressing easy to remove, and enhance wound healing. The findings of the present study actually approved the hypothesis as follow; in relation to

level of patient' discomfort and pain level during dressing change, they were significantly lesser in the parts dressed with BLD than in parts dressed by ordinary dressing as reported by the patients participated in the study. Also the findings confirmed that BLD was easily removed than ordinary dressing as reported by health care professions who change dressing. In addition, parts dressed by BLD healed more rapidly than parts dressed by ordinary dressing. This may be because banana leaves has waxy non adherent surface, which make the removal of dressing easy and not painful. In addition removal of BLD not causes trauma to the wound tissue and so enhance wound healing (23).

The findings of the present study were also supported by the findings of Gore & Akoleekar, (2003), who conducted a trial to compare efficacy of BLD with Vaseline gauze (VG) dressing for dressing skin graft donor areas. Thirty patients undergoing skin grafting were included in the study. BLD was applied on one half and VG on the other half of the donor area. Dressing change was done on the eighth day. They showed that areas with BLD were almost pain-free and the dressing removal from the areas with BLD was also equally painless and easy. VG dressing did nothing to reduce donor area pain and dressing removal was so painful and difficult that majority of the patients were reluctant to accept VG after the first dressing change. Patients demanded BLD as it gave a soft, smooth cover and cool comfort which was highly appreciated (33). Also Gore & Akoleekar, (2003) (33) reported that the mean complete epithelisation day was 8.67 in the BLD covered areas as compared to 11.73 in the VG covered areas. This observation was highly significant with  $P < 0.001$ . Again this support our study result which approved that healing process was more rapidly with BLD than with ordinary dressing. In addition, in three areas with VG dressing, evidence of infection was seen on eighth day but the areas healed eventually. This observation however was not of any statistical significance.

Also Gore & Akoleekar, (2003) (29) conducted another study to compare banana leaves with a traditional boiled potato peel bandage, and showed that the banana leaf dressings were equivalent in healing rates, but had the advantage of much lower cost and was easy to use. In this study most patients feel more comfortable when treated with the banana leaves because of the ease of dressing changes and the absence of pain. Finally we can say that BLD provides a protective barrier from further irritation and insult to the Wound, are easy to use or apply, control pain Without the adverse effects associated With analgesic drugs, and has no added risk for infection. Also the advantages of using BLD in the management of partial thickness burn wound in terms of saved materials, time and anxiety are obvious.

#### **Limitations of the study:**

A convenience sample was used in the study and sample is relatively small therefore the results are not necessarily representative of the wider population with partial thickness burn also the researchers did not use wound culture to detect or exclude the presence of wound infection and rely only on the clinical presentation of wound infection.

## **CONCLUSIONS AND RECOMMENDATION**

The findings of the present study found that BLD has significant outcome on wound healing process. In other words the patient suffer less discomfort and less pain during dressing removal with BLD than with ordinary dressing. Also with BLD the removal of dressing was easier than ordinary dressing as reported by the health care staff members who perform dressing. In addition, time to complete healing was significantly less with BLD than ordinary dressing. It is clear that BLD is a completely non-adherent, nearly painless, and cheaper dressing. Based on the previous conclusion the researchers made the following recommendations;

- a. It is hoped that the findings of the present study encourage nurses and motivate them to use BLD for partial thickness burn wound because it will faster healing, decrease patient suffering and less expensive.
- b. Replication of this study in another setting on large random sample using control group is highly recommended.
- c. Raising the awareness of the health care professionals regarding the benefits of using BLD and how to prepare it is very important
- d. Encouraging the presence of banana farm nearby each hospital with burn department is highly recommended.

## **CONFLICTS OF INTEREST**

The authors declared no conflict of interest.

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