

The comparative study of effective use of amniotic membrane dressing vs banana leaves dressing in management of partial thickness burn wounds

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Abstract

Background: Burn injuries are also a leading cause of trauma globally, with 85% of injuries occurring in low- and middle-income countries, where therapeutic options are limited by resource constraints. Up to 17.5 million burns occur in children in sub-Saharan Africa annually. Burn wounds are often classified by depth: superficial, partial-thickness or full thickness. The human amniotic membrane is formed from fetal ectoderm, it therefore behaves like skin. Banana Leaf Dressing (BLD) has been used as alternative since ages. Banana leaves are easily available in most of the cities, towns and villages. (BLD) is non-adherent, protects wounds from trauma, and prevents them from becoming too dry. **Methods:** Randomized controlled Trial of parallel design. patients with partial thickness burns 25 subjects in amniotic dressing intervention group and 25 in BLD dressing intervention group. **Results:** In this study, majority of study subjects belongs to age group 19-36 yrs contributing 40% followed by age group 37-54 yrs 18 cases (36%), age > 54 yrs 7 cases (14%) and age < 18 yrs 05 cases (10%) respectively. Mean age among amniotic group is 36.04 with SD of 14.38 and mean age among BLD group is 36.72 with SD of 14.18. Males contributing 27 cases (54%) and female contributing 23 cases (46%). majority of subjects were educated upto higher secondary level contributing 34% followed by secondary 13 (26%), primary 7 (14%), graduate 6 (12%), postgraduate 4 (8%) and illiterate 3 (6%) respectively. common cause of partial thickness burn was scalds contributing 21 cases (42%) followed by flame burns 13 (26%), flash burns 9 (18%), contact burns 4 (8%) and others like chemical burns 3 (6%) respectively. **Conclusions:** BLD has significant outcome on wound healing process. Patients suffer less discomfort and less pain during dressing removal with BLD than with ordinary dressing. This study proved superiority of amniotic membrane dressing over BLD.

Keywords: Banana leaf dressing and burn wound management.

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Introduction

The major physiological impact of impaired skin integrity occurs in burns.¹ Burn injuries are also a leading cause of trauma globally, with 85% of injuries occurring in low- and middle-income countries, where therapeutic options are limited by resource constraints² Up to 17.5 million burns occur in children in sub-Saharan Africa annually.³

India has an estimated 600,000–700,000 admissions to burn units per year.⁴

Morbidity and mortality are higher for a given injury in low- and middle-income countries. Currently, the burn size associated with a 50% case fatality in high-income countries is between 60% and 70% total body surface area (TBSA).⁵

The World Health Organization in 2008 reported that burden of burn injury is one that falls predominantly on the world's poor. 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.

Whether acute or chronic, wounds can compromise an individual's wellbeing, self image, working capacity, and independence.⁶ Burn wounds are often classified by depth: superficial (first-degree burn), partial-thickness (second-degree burn) or full thickness (third-degree burn)⁷

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.⁷

The aim of treating any wound is to either shorten the time required for healing and or to minimize the undesired consequences. Management of partial-thickness burns requires extensive healthcare resources and is directed towards promoting healing, control pain, avoid infection and minimize disfigurement.⁸

In addition in a developing country, a major factor that must be considered is how to reduce the cost of the therapy and reach a cost-effective management. An ideal burn dressing as one that must: protect the wound from physical damage and micro-organisms; should be comfortable, compliant and durable; 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 process⁹. 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.

Conventional gauze dressings have been used in wound care since many years. It still remains one of the most widely used dressings. However, it was observed 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. The human amniotic membrane is formed from fetal ectoderm, it therefore behaves like skin.¹⁰ It was first used as a biological burn dressing by Sabella and Stem in 1913.¹¹

The main principles in the treatment of minor burns are control of pain, control of infection, promote healing, and decreasing repeated trauma to the burn surface that may injure the damaged epithelium and convert a superficial burn to a deeper tissue injury. All of these goals can be achieved by using amniotic membrane dressing. It effectively relieves pain, protects from secondary wound infection, promotes healing, adheres well to the wound, is easily applicable and most importantly, is economical.¹²

Banana Leaf Dressing (BLD) has been used as alternative since ages. Banana leaves are easily available in most of the cities, towns and villages.¹³ Banana leaf dressing (BLD) is non-adherent, protects wounds from trauma, and prevents them from becoming too dry.¹⁴ It is 11 times cheaper than BPPB, 160 times cheaper than Soframycin impregnated

gauze, 1750 times cheaper than collagen sheet, and 5200 times cheaper than Skin temp biosynthetic dressing.¹⁵

Methodology

This was an hospital based Randomized controlled Trial (RCT) of parallel design

All the patients with partial thickness burns satisfying inclusion criteria admitted in tertiary care centre. Total sample size was 50, 25 subjects in amniotic dressing intervention group and 25 in BLD dressing intervention group.

Methodology specified for data collection:

Study conducted at Pankaj Hospital and Poly Clinic Udyan Road Paithan Rural Health Training Centre Paithan, Aurangabad. Study duration was of two years from May 2017 to April 2019.

Ethical clearance: Ethical clearance was obtained from institutional ethics committee. Informed consent was obtained from study subjects and were explained study procedure in local language. Permission from OBGY department HOD was obtained for getting amniotic membranes from mothers delivered normally or by LSCS. Also permission from local nursery owner was obtained for getting fresh banana leaves for dressing.

Results And Observations

Table 1: Distribution of study subjects according to age

Sr.No	Age in years	Frequency	Percentage
1	< 18	05	10
2	19 -- 36	20	40
3	37-- 54	18	36
4	> 54	07	14
Total		50	100

Mean age = 36.38 Standard deviation =14.14

As shown in above table, majority of study subjects belongs to age group 19-36 yrs contributing 40% followed by age group 37-54 yrs 18 cases (36%), age > 54 yrs 7 cases (14%) and age < 18 yrs 05 cases (10%) respectively. Mean age among amniotic group is 36.04 with SD of 14.38 and mean age among BLD group is 36.72 with SD of 14.18.

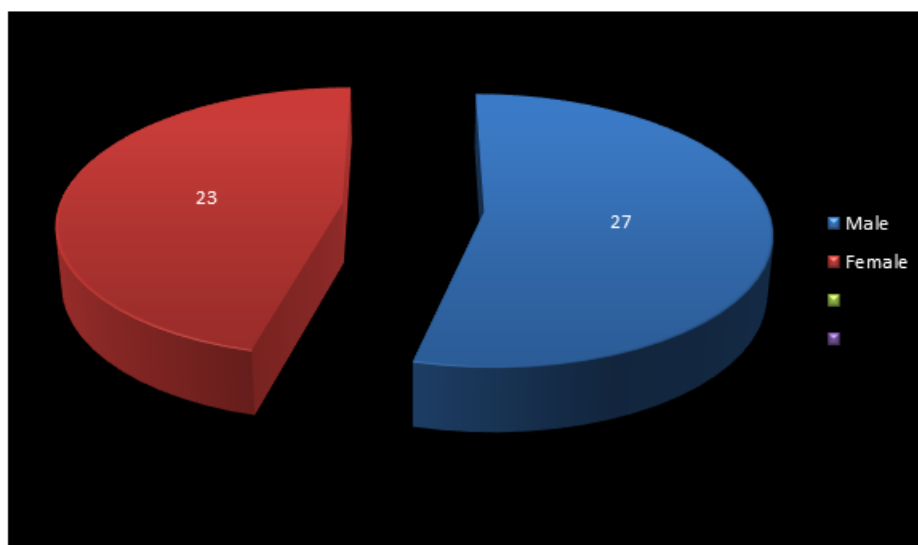


Figure 1: Distribution of study participants as per sex

As shown in above table majority of study participants were males contributing 27 cases (54%) and female contributing 23 cases (46%). Male:Female ratio is 1.17: 1

Table 2: Distribution of study participants as per total body surface area involved (N=50)

Sr.No.	TBSA	Frequency	percentage
1	< 15 %	02	4
2	16%-- 30%	30	60
3	31%-- 45%	18	36
4	> 45 %	00	00

As shown in above table TBSA involved in majority of subjects was 16%-30% contributing 30 cases (60%) followed by 31% - 45 % in 18(36%), < 15% in 02 (2 %) of cases .

Table 3: Comparison of quantitative study variable among study groups (N=50)

Variable	Amniotic membrane group		Banana Leaf group		P value
	Mean	SD	Mean	SD	
Age	36.04	14.38	36.72	14.18	0.86
TBSA	27.80	9.25	26.82	10.27	0.72

Inference: There is no statistical significant difference in two groups for age and TBSA involved when means of two samples were compared with independent samples t test. ($p > 0.05$) for both variables.

Table 4: Comparison of qualitative variable among study groups (N=50)

Sex	No.of subjects	AMD group	BLD group	P value
Male	27	14	13	0.7766
Female	23	11	12	
Total	50	25	25	

Chi square value 0.0805, Df= 1, $p > 0.05$ # Not significant

Inference: There is no statistical significant difference between sex composition of subjects among two groups . $P > 0.05$ # Not significant

Table 5: Comparison between amniotic membrane dressing and banana leaves dressing groups in relation to outcome criteria (N=50)

Outcome criteria	Type of dressing				t statistic	P value
	AM dressing		BLD dressing			
	Mean	SD	Mean	SD		
Pain at dressing removal score	2.2	0.64	4.24	1.26	7.2118	< 0.0001
Discomfort score	2.28	1.24	4.0	1.47	4.472	< 0.001
Ease of dressing removal score	3.56	1.68	5.0	1.76	2.959	0.004
Healing time (Days)	8.48	1.29	9.28	1.20	2.270	0.027

There is significant statistical difference between outcome of AM dressing and BLD dressing in terms of pain during dressing removal ($p < 0.0001$), discomfort score ($p < 0.001$), ease of dressing removal ($p = 0.004$) and complete healing time in days ($p = 0.0270$).

Discussion

This single blinded randomized controlled trial of parallel design was done to compare effectiveness of amniotic membrane dressing over banana leaves dressing among subjects with partial thickness burns in a tertiary care centre. Participants with burns involving 50 % of TBSA were included in study. Total 50 subjects were enrolled and 25 age and sex matched subjects were randomly allocated to each group.

Age distribution of study participants was studied. In present study it was observed that majority of study subjects belongs to age group 19-36 yrs contributing 40% followed by age group 37-54 yrs 18 cases (36%).

Mean age among amniotic group was 36.04 with SD of 14.38 and mean age among BLD group was 36.72 with SD of 14.18.[Table No.1]. A similar study was done by Wafaa Gameel Ali *et al* (2015)¹⁶ in which it was seen that mean age of study participants was 27.6 years with SD of 8.53. Also it was seen that age of subjects was in the range of 18-55 years .

This findings are consistent with present study. A study by Mohamedi AA *et al* concluded that mean age of 23.54 years with SD of 4.9 years. This might be due to higher incidence of burn injuries in working population.

Sex distribution of study subjects in this study revealed that majority of study participants were males contributing 27 cases (54%) and female contributing 23 cases (46%). Male : Female ratio is 1.17: 1[Figure No.1] In study by Bose B (1979)¹⁸ , it was observed that 84.62 % were males and 15.38 % were females.

Total body surface area involved in partial thickness burn was estimated with the help of Wallace's Rule of Nine in this trial. The study concluded that TBSA involved in majority of subjects was 16%-30% contributing 30 cases (60%) followed by 31% - 45 % in 18(36%), < 15% in 02 (2 %) of cases .[Table No.2] In low-resource settings, oral rehydration therapy is routinely used for burns of less than 20% TBSA and has been successful in treating burns up to 40% TBSA.^{19,20,21} This single blinded RCT was done at burn unit of tertiary care centre. All the patients were assessed for eligibility as per inclusion criteria. All 50 eligible subjects were allocated in two intervention groups, AM dressing group and BLD group. Comparison was done between the groups for quantitative variables like age and TBSA of subjects.

In present study it was seen that there was no statistical significant difference in two groups for age and TBSA involved when means of two samples were compared with independent samples t test. ($p > 0.05$) for both variables. P values for mean age and mean TBSA involved were 0.86 and 0.74 respectively.

This indicated that two groups were alike and comparable for study after minimal selection bias.[Table No.3] Similarly comparison for qualitative variables like number of subjects and sex was done between two groups. It was seen that there was no statistical significant difference between sex composition of subjects among two groups ($P > 0.05$ # Not significant) Chi square test was used for analysis.[Table No.4] This indicated similarity of two groups for comparison.

Outcome of this RCT was measured in relation to variables like pain during removal of dressing, discomfort felt by patients, ease of dressing removal with respect to adherence of dressing and mean healing time in days. A horizontal 10 cm Visual analogue scale was used to estimate scores.[Tab.5] Mean scores for pain during dressing removal in AM dressing group and BLD groups were 2.2 and 4.24 with SD of 0.64 and 1.26 respectively. Independent sample t test was used to study difference between two means. It was seen that mean pain score for BLD (4.24) was higher than AM dressing. This difference was statistically significant ($p < 0.0001$). This proves superiority of amniotic membrane dressing over BLD. A study by Wafa Gameel *et al* (2015)¹⁷ shown that The average dressing removal pain score was 2.3 ± 1.2 with BLD while that with ordinary it was 5.9 ± 1.2 .

The findings of the present study were also supported by the findings of Gore & Akoleekar, (2003)¹⁶, 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. Amnion dressing was accompanied by much less pain in burn patients. One reason is less frequent dressing change because patients experience more intensive pain after dressing change. Another cause is less inflammatory response to amniotic membrane. Human amniotic epithelial cells do not express HLA-A, B, C and DR or beta2 microglobulin on their surface.²² This could contribute to the lower inflammatory responses and less inflammatory mediators in the burn area and less pain sensation. Saraswathy et al. (2004)²³ reported in their study that amniotic membrane was superior, from the standpoint of pain reduction during dressing changes, over the Tegaderm. Pain was described as a primary endpoint and a visual pain analog scale was used for quantification. The majority of the patients tolerated the procedure very well. Mean scores for discomfort between AM dressing and BLD were 2.28 and 4.0 with SD of 1.24 and 1.47 respectively. In present study it was seen that mean discomfort score for BLD group was higher as compared to AM dressing group. This difference was statistically significant as $p < 0.001$. This indicates superiority of AM dressing. A study by Wafa Gameel et al (2015)¹⁷ stated that average discomfort score with BLD was 2.1 ± 1.3 while that with ordinary was 6 ± 1.5 .

Ease of dressing removal mean scores for both groups were estimated. Mean scores for AM group and BLD groups were 3.56 and 5.0 with SD of 1.68 and 1.76 respectively. This difference was statistically significant ($p=0.004$). BLD groups shown more adherence of dressing to burn wound as compared to AM dressing group. A similar findings were seen in study by Wafa Gameel et al (2015)¹⁷ in which it was observed that ease of dressing removal score average was 3.5 ± 1.9 with BLD while it was 7.4 ± 1.2 with ordinary.

Conclusion

BLD has significant outcome on wound healing process. Amniotic membrane dressing was found to be cost effective as it accelerates wound healing, decreased pain and usage of analgesia, has less frequent dressing change and decreased liability to infections as compared with BLD dressing. This study proved superiority of amniotic membrane dressing over BLD

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