

RESEARCH ARTICLE

EVALUATION OF AMNIOTIC MEMBRANE IN THE DRESSING OF SECOND-DEGREE BURN

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ABSTRACT

Background: Amniotic membrane dressing is the most effective for burn wounds. It was less expensive and reduced the pain and duration of wound healing due to a burning wound.

Objectives: To evaluate an Amniotic Membrane in the dressing of second-degree burn. The main objective of this study is to identify the Amniotic Membrane, mention its medical advantages and clarify the roles and benefits in the management and healing of different kinds and degrees of burn wounds.

Methods: A quasi-experimental study was conducted at the Maternity Teaching Hospital in Sulaimaniyah/ Iraq. Participants were 101 patients with 2nd-degree burns divided purposively into an experimental group that applied Physiological dressing with human amniotic membrane and a control group that followed traditional way or routine hospital care prospectively followed their wound pain level and the number of dressings for both groups, from 3rd April to the end of September 2022. Descriptive and inferential statistics were used for data analysis.

Result: The mean age of the burn case in the control group was 29.7 ± 20.7 years, while the mean age of the study group was 25.6 ± 17.3 years. The study group was composed of 39.6% female patients and 60.4% male patients. There was no significant difference between the two groups regarding gender. 34% of the study group were employed, and 62.0% of the study group were homemakers. The findings show that statistically significant variations are present between the groups regarding the pain score. There was a significant difference regarding the pain without a dressing change.

Conclusion: This quasi-experimental study found a significant effect of the Amniotic Membrane in the Dressing of Second Degree Burn To decrease the pain and healing duration.

Keywords: Burn, superficial Second-degree burn, Amniotic Membrane, wound care.



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INTRODUCTION

Burns are a leading cause of morbidity and mortality worldwide. Burn injuries are the fourth most common type of acute injury worldwide. They are one of the leading causes of injury in the Eastern Mediterranean region, accounting for a significant proportion of trauma-related presentations and admissions to emergency departments. According to the WHO, the global incidence of fire-related injuries is approximately 110 per 100,000 people, and over 300,000 die from fire-related injuries yearly (Sarhazi et al.,2019). According to the most recent WHO report, approximately 6,000 people died in Iraq in 2015 due to fire-related causes, with 18,000 suffering from disability-related burns. Additionally, according to the WHO, 3,390 people died in Iraq in 2004 due to fires, which equates to a death rate of 12.3 per 100,000, greater than the global average (Kadhim and Hamza,2020).

There were 676 burn cases in Baghdad in 2015, and 411 cases were admitted to the burn centre in Erbil in 2019. The leading cause of burn cases in Baghdad was husband and polygamy, accounting for 18.4% of all cases. The age group 21 to 30 years had the highest number of burn cases (44.35%). The prevalence of the burn in the study city, Sulaymaniyah, is one of four provinces in northern Iraq's Kurdish region, with a population of more than 2500,000. There is only one burn centre in Sulaimani Emergency for burn and plastic surgery, and it recorded 335 cases in 2019 and 2020. There were 284 cases in 2019 and 2020, 211 in adults and children from one day to 12 years, and 73 burned. The rate of suicide was 14 cases, and (2021,2022) the rate of burning was 290 cases, 219 of which were in adult wards, and the rate of burning children was 71 cases. The rate of suicide was 10 cases. There were 5 times more inpatients than outpatients in 2019 and 2020.

First-degree burns only affect the outer layer of the skin, while second-degree burns go deeper and affect the dermis. Second-degree burns are superficial and do not usually require treatment, but they can take a few weeks to heal if there is an infection. On the other hand, deep-degree burns involve the deep dermis and can take longer to heal, but they can leave scars (Karim et al.,2020).

Burn management various treatment modalities are available for partial-thickness burns. None of these are generally accepted as standard or optimal care. Silver sulfadiazine (SSD), such as Flamazin, has been used for many years to treat partial thickness burns. The extensive antibacterial action of SSD in vitro may help to explain its widespread use (Rashaan, 2020).

METHODOLOGY

Study Design:

A quasi-experimental design was employed in this study to assess the effectiveness of amniotic membrane dressing on superficial second-degree burns. The patients were prospectively followed to monitor their wound healing progress.

Sampling Method:

A non-probability purposive sampling method was used to select the study participants. The experimental group, comprising 50 patients, received amniotic membrane dressing and was selected from the Emergency Hospital for Burn and Plastic Surgery. The control group, consisting of 51 patients, underwent traditional dressing and was matched closely to the experimental group regarding age and other characteristics.

Inclusion Criteria:

Patients with superficial second-degree burns, both male and female, who visited the Suleimani Emergency Hospital for Burn and Plastic Surgery and were over 2 years old were included in the study.

Exclusion Criteria:

Patients with first-degree and third-degree or more severe burns, those below 2 years old, and individuals with medical conditions such as diabetes, immune diseases, or any blood disorders were excluded from the study.

Collection and Preparation of Amniotic Membrane:

Fresh human amniotic membrane was obtained from the placenta of healthy mothers at the time of delivery, specifically during cesarean sections. Donor mothers were preoperatively tested negative for HCV, HBV, and HIV. The amnion was carefully separated from the chorion and cleaned of blood by thorough washing with tap water. The amniotic membrane was washed with 0.9% sodium chloride solution using aseptic procedures. Afterwards, it was stored in a sterile container with 100cc of NaCl containing crystalline penicillin and Gentamycin in a refrigerator. Before usage, the amniotic membrane was tested for contamination; if found negative, it was stored in the refrigerator at 4°C for up to 15 days. If unused for 7 days, 5 cc of the prepared NaCl and antibiotic solution was added to the container.

Data Collection and Assessment:

Patients were closely monitored from the start of their treatment until wound healing. Assessment of wound healing, pain severity, dressing change frequency, epithelialization rate, length of hospitalization, and other relevant information was documented using pen and paper checklists and charts. Pain severity was assessed using visual analogue scales for children (1 day to 12 years old) and verbal or numerical rating scales for adult patients (12 years and older). The rate of wound

healing (epithelialization) was evaluated through observation. Follow-up evaluations were conducted monthly for up to six months after complete healing.

Study Instruments:

The study utilized a checklist to collect demographic information (age, sex, level of education, occupation, height, weight, BMI, address, residence, and marital status) and assessed pain severity using visual analogue scales for children and verbal or numerical rating scales for adults. Data on dressing change frequency, epithelialization rate, length of hospitalization, and severity of pain were collected through the checklist during and after hospitalization.

Data Analysis:

Descriptive and inferential statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) version 21. The significance of the tests was determined based on probability levels, with highly significant at $p \leq 0.001$, significant at $p \leq 0.05$, and not significant at $p > 0.05$.

Ethical Approval and Permissions:

The study was approved by the scientific committees of the College of Nursing and the ethical committees of the College of Medicine, University of Sulaimani. Additionally, permission to conduct the study was obtained from the Sulaimani Directorate of Health, and inquiries were made at Sulaimani Maternity Teaching Hospital and Sulaimani Emergency Hospital.

RESULTS

The study found that the average age of the burn case in the control group was 29.7 ± 20.7 years, while the average age of the study group was 25.6 ± 17.3 years. There was a significant difference in age between the two groups ($P = 0.29$). Additionally, the study found that more than half of the patients in the study group were female (32%), while more than half of the patients in the control group were male (29%). There was no significant difference between the groups regarding educational level ($P = 0.47$). The study found that more than half of the patients in the study group were students (38%), while more than half of the patients in the control group were unemployed (15.7%).

Furthermore, more than half of the patients in the study group were housewives only (18%), while more than half of the patients in the control group were employed (23.5%). There was no significant difference between the groups regarding marital status ($P = 0.04$). As presented in Table (1).

Table (2) The study found that 82% of the study group was burned by scald and that there were no significant differences between the causes of burns between the two study groups. The majority

of the study group, 52%, were burned at the lower limb site, which was significantly higher than the proportion, 35.3%, among the control group. Face (neck, head) and trunk burns were represented at 11.8% of the study group, significantly higher than the proportion of 4.6% among the control group. However, there were no significant differences between the management of the patients in the control group and the study group.

Shows that about half of the sample (59.4%) were dressings $>_5$ in the control group, while the lowest dressing (5.9%) of them were dressing between 1-5 in the control group compared with (76% of the patients of the study group). The number of Dressing changes (40.6%) is a correct percentage of those who have Daily dressing, while the lowest percentage (5.9%) was Twice a day. The findings show that statistically significant variations are present between the groups regarding the dressings change ($P < 0.001$).

The majority of the study group (38%) was daily dressing, significantly higher than the proportion (5.9%) among the control group. The second-day change dressing was significantly higher in the control group (49%) compared to the study group (24%). At the same time, the lowest percentage (5.9%) was Twice a day. The findings show that statistically significant variations are present between the groups regarding the pain score ($P < 0.001$), introduced by Table (3).

This table is about the pain score during the first dressing time in the Study participants in both groups (Amniotic and Traditional groups) during and without dressing. The highest proportion of the samples in both groups had Severe pain during dressing change, 70.6% and 68% in the Traditional group compared to the Amniotic group. Mild pain has the lowest proportion (2%) in the Traditional group, while 0% in the Amniotic group, no statistical differences have been found ($P = 0.31$).

The highest proportion of the samples in both groups had Mild pain without dressing change 50.1% and 37.3% in the Amniotic group compared to the Traditional group, with severe pain the lowest proportion (4.1%) in the Amniotic group, while 13.7% in the Traditional group. Significant differences were found between both groups ($p=0.02$). As presented in table (5).

The highest proportion of the samples in both groups had Severe pain without dressing change 58.8% and 24% in the Traditional group compared to the Amniotic group, the No pain has the lowest proportion (1%) in the Amniotic group, while 0% in the Traditional group. The findings show that statistically significant variations are present between the groups regarding the pain score ($P < 0.001$). As presented in table (4). Of these, the pain score during the second dressing time in the Study participant in both groups (Amniotic and Traditional groups) during and without dressing. The highest proportion of the samples in both

groups had Severe pain during dressing change, 70.6% and 10.2% in the Traditional group compared to the Amniotic group. The No pain has the lowest proportion (2%) in the Traditional group, while 28.6% in the Amniotic group. The findings show that statistically significant variations are present between the groups regarding the pain score ($P < 0.001$).

Table 1. Distribution of the study samples according to socio-demographic characteristics.

Socio-demographic Variables		Study participant		Total	P value
		Amniotic group	Traditional group		
Age	2 - 17 Years	18 (36%)	18 (35.3%)	36 (35.6%)	0.88
	18 - 44 Years	25 (50%)	24 (47.1%)	49 (48.5%)	
	> 44 Years	7 (14%)	9 (17.6%)	16 (15.9%)	
	Mean \pm SD	25.6 \pm 17.3	29.7 \pm 20.7	27.7 \pm 19.1	0.29
Gender	Male	18 (36%)	22 (43.1%)	40 (39.6%)	0.46
	Female	32 (64%)	29 (56.9%)	61 (60.4%)	
Level of education	Educated	42 (84%)	40 (78.4%)	82 (81.2%)	0.47
	uneducated	8 (16%)	11 (21.6%)	19 (18.8%)	
Occupation	Student	19 (38%)	8 (15.7%)	27 (26.7%)	0.048
	Housewife	9 (18%)	12 (23.5%)	21 (20.8%)	
	Employed	17 (34%)	19 (37.3%)	36 (35.6%)	
Residency	Unemployed	5 (10%)	12 (23.5%)	17 (16.8%)	0.09
	Urban	39 (78%)	46 (90.2%)	85 (84.2%)	
	Rural	11 (22%)	5 (9.8%)	16 (15.8%)	
Marital status	Single	32 (64%)	26 (51.0%)	58 (57.4%)	0.19
	Married	18 (36%)	25 (49.0%)	43 (42.6%)	
Total		50 (100%)	51 (100%)	101 (100%)	

Table 2. Distribution of the study samples according to Cause and main site of Burn.

Cause and main site of Burn variable		Participants		Total	P value
		Amniotic group	Traditional group		
Cause OF Burn	Scald	41 (82%)	36 (70.6%)	77 (76.2%)	0.18
	Flam	8 (16%)	15 (29.4%)	23 (22.8%)	
	Other	1 (2%)	0 (0%)	1 (1%)	
Site of burn (Main site)	Face (Neck, Head)	5 (10%)	6 (11.8%)	11 (10.9%)	0.39
	Upper limb	14 (28%)	21 (41.2%)	35 (34.7%)	
	Lower limb	26 (52%)	18 (35.3%)	44 (43.6%)	
Management	Trunk	5 (10%)	6 (11.8%)	11 (10.9%)	0.16
	Inpatient	4 (8%)	1 (2%)	5 (5%)	
	Outpatient	46 (92%)	50 (98%)	96 (95%)	

Total	50 (100%)	51 (100%)	101 (100%)
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Table 3. Distribution of the study samples according to Dressing change

Dressing change variable		Study participant		Total	P value
		Amniotic group	Traditional group		
Number of dressings	1 - 5 dressings	38 (76%)	3 (5.9%)	41 (40.6%)	< 0.001
	> 5 dressings	12 (24%)	48 (94.1%)	60 (59.4%)	
Dressing change	Daily	1 (2%)	16(31.37%)	17 (16.69%)	< 0.001
	Every second day	41 (82%)	26 (50.98%)	67 (66.49%)	
	Every third day	8(16%)	1 (1.96%)	9 (8.98%)	
	Twice a day	0 (0%)	8 (15.68%)	8(7.84%)	
Total		50 (100%)	51 (100%)	101 (100%)	

Table 4. Association between level of pain with the first dressing time among study groups.

Pain in the first dressing time		Study participant		Total	P value
		Amniotic group	Traditional group		
Pain score during dressing change	Mild pain	0 (0%)	2 (3.9%)	2 (2.0%)	0.31
	Moderate pain	16 (32%)	13 (25.5%)	29 (28.7%)	
	Severe pain	34 (68%)	36 (70.6%)	70 (69.3%)	
Pain score without dressing change	No pain	1 (2%)	0 (0%)	1 (1.0%)	< 0.001
	Mild pain	15 (30%)	0 (0%)	15 (14.9%)	
	Moderate pain	22 (44%)	21(41.2%)	43 (42.6%)	
	Severe pain	12 (24%)	30(58.8%)	42 (41.6%)	
Total		50 (100%)	51 (100%)	101 (100%)	

Table 5. Association between level of pain with the second dressing time among study groups.

Pain in the second dressing time		Study participant		Total	P value
		Amniotic group	Traditional group		
Pain score during dressing change	No pain	14 (28.6%)	1 (2%)	15 (15.0%)	< 0.001
	Mild pain	26 (53.1%)	3 (5.9%)	29 (29.0%)	
	Moderate pain	4 (8.2%)	11 (21.6%)	15 (15%)	
	Severe pain	5 (10.2%)	36 (70.6%)	41 (41%)	
Pain score without dressing change	No pain	11 (22.4%)	4 (7.8 %)	15 (15.0%)	0.02
	Mild pain	25 (51.0%)	19 (37.3%)	44 (44.0%)	
	Moderate pain	11 (22.4%)	21(41.2%)	32 (32.0%)	
	Severe pain	2 (4.1%)	7 (13.7%)	9 (9.0%)	
Total		49 (100 %)	51 (100%)	100 (100%)	

DISCUSSION

In general, the present study evaluates the effect of the Amniotic Membrane in the Dressing of Second Degree Burn at Sulaimani Burn, Plastic and Reconstructive Surgery Hospital.

This study indicates no significant difference between the two groups regarding age, education, occupation, and marital status among the experimental and control groups. In contrast, a significant difference was observed regarding dressing change between the study group and a control group, which means the experimental group and significant variations in the groups regarding the pain score ($P < 0.001$)—significantly experienced a decreased number of dressings and daily changes by the study group. At the same time, there was a difference at the edge of significance between both groups' pain in the first dressing change and a significant difference in activity status between participants. Also, no difference was found regarding body mass index and main site of burn between the experimental group and control group.

Like the study of Eskandarlou et al. (2016). This study was a clinical trial performed on 32 patients. Individuals aged 18-88 years were enrolled, while 18 patients (56%) were male. The study results in contrast with This cross-sectional study based on burn case reports ($n = 1915$) from eight emergency centres in Western Cape, South Africa (June 2012–May 2013). Children 0–4 years in urban areas had the highest burn incidence, but only among adults did male rates surpass females, with fire burns more common among men 20–39 years and hot liquid burns among men 55+ years. Men had a higher proportion of burns during weekends from interpersonal violence and suspected use of

alcohol/other substances (Blom et al., (2016). In addition, the study sample participants were contrasted by Ghalambor et al. (2000). Among 200 cases recruited for the study, (76%) were males and the remaining (24%) were females. The highest prevalence was in the age group below 10 years, comprising 48% of all the cases, and 5% in the above 40-year-old group. In contrast with the present study findings, Salehi et al. (2015), A total of 42 patients were allocated in their randomized clinical trial research revealed that the most frequent sex of participants was 30 were male (71.43 %) and 12 were female (28.57 %). The mean \pm SD age was 31.17 ± 13.72 years.

Findings of another study conducted in Iran 2021 systematic search identified seventeen studies containing epidemiological characteristics of burn injuries in 61662 patients. Results revealed that The urban residents and the person under the diploma have experienced more burns; married and single people were equally burned; burns caused by flame occurred more than the other cause of burn; males and females were burned almost equally by flame Contact and electrical burns in men were more than women; most burn accidents. Occurred at home and in winter; 14/23 % of patients expired, and men were discharged more than women, but the death rate was higher in women (Mobayen et al.,2021).

In contrast with the present study findings, Heydarikhayat et al. (2018). A total of 117 participants were randomized clinical trials carried out in Kermanshah (Iran) from July 2016 to September 2017, Research revealed that the most frequent of participants was moreover 48% of the patients who lived in rural areas Mean \pm SD 1.27 ± 1 .

A retrospective cohort study by Rajha et al., (2018), in Beirut, Lebanon, between 2009 and 2013. A total of 366 patients had their charts

queried. scalding being the most common mechanism of burn (53.9%), followed by contact with a hot object (16.8%) and flame (11.9%).

In contrast with the present study findings, Salehi et al., (2015) a total of 42 patients were allocated in our randomized clinical trial during the study period. Of these, 30 were male (71.43 %) and 12 were female (28.57 %). the mean \pm SD age was 31.17 ± 13.72 years. Flame was the most common cause (92.86 %) of burn injuries.

Overall, about 95% of cases were treated in outpatient clinics, and the difference in the management site between the two groups was insignificant (P value = 0.16).

The study results of Wang et al. (2017). All 499 patients injured in the event were included for the 138 patients transferred to other hospitals after primary distribution, we evaluated whether the transfers were associated with patient severity. Furthermore, we used multinomial logistic regression to investigate the association of patient transfer with patient outcomes after controlling for age, gender, total burn surface area (TBSA), final hospital level, wound infection, and patient pneumonia. We determined on-site triage differed significantly from hospital triage ($p < 0.001$).

The study results disagree with the results of Wanis et al., (2016) Ross Tilley Burn Centre at Sunnybrook Health Sciences Centre with clinical cultures yielding seven hundred and eighty-nine patients were admitted to the (Tilley Burn Centre) during the study period of March 12, 2010, and July 17, 2013. Of these (70%) were burn admissions and (30%) were admitted for other reasons (reconstruction, toxic epidermal necrolysis, and other non-burns).

A similar study done by Rajha et al., (2018) The total body surface area affected was mostly $<5\%$ and accounted for 84.4% of all injuries in this study.

In contrast with the results of the study by Pauzenberger et al., (2020) related to BMI in 460 Patients admitted to the General Hospital Vienna between 1994 and 2014 BMI was used to divide patients into five groups: BMI and the the study period. Of these, 30 were male (71.43 %) and 12 were female (28.57 %). the mean \pm SD age was 31.17 ± 13.72 years. Flame was the most common cause (92.86 %) of burn injuries.

Overall, about 95% of cases were treated in outpatient clinics and the difference in the management site between the two groups was not significant as well (P value = 0.16).

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In contrast with the results of the study by Pauzenberger et al., (2020) related to BMI in 460 Patients admitted to the General Hospital Vienna between 1994 and 2014, BMI was used to divide patients into five groups: BMI and the pain score in the intervention area was less than the control area. In addition, in this randomized clinical trial conducted in Motahari Burn Hospital. Our results showed that the pain score was greater in the control group than in the intervention group (Salehi et al.,2015).

Kazemzadeh et al. (2021) their present randomized clinical trial, carried out in a burn centre in Urmia, Iran, between December 2017 and September 2019, whose results on day 1, pain severity reported using VAS was 3.02 ± 0.70 and 3.33 ± 1.29 in the amniotic membrane and nitrofurazone groups, respectively ($P = .27$). On day 2, pain severity was 2.11 ± 0.19 and 2.65 ± 1.2 in the amniotic membrane and nitrofurazone groups, respectively, indicating a significant difference between the 2 groups ($P = .02$).

Similar to our result found by Pandey et al. (2020) in India, the pain score of the case and control group at follow-up periods of 7 days, 30 days, and 90 days. We observed that the pain score declined rapidly in the case group compared to the control group. The results of the comparison were found to be statistically significant. The current study showed that it was done as a clinical trial over 32 admitted patients in the burn department of Beasat Hospital. The movement condition in the intervention limbs till the fifth day of hospitalization compared to the control limb exhibited a significant difference ($p=0.01$), showing that the intervention cases dressed by the amniotic membrane had a better movement status than the routine dressing. From the 6th day to the 14th day, there was no significant difference between the movement of limbs on both sides,

although 'in most cases, the intervention patients had a better movement status concerning the control organ. The dressing separation time in the intervention (Eskandarlou et al.,2016

CONCLUSIONS

Amniotic membrane as an alternative dressing for burn wounds provides significant benefits by increasing patients' comfort by decreasing the pain sensation and improving the wound healing process.

Ethical Approval Statement

This research study, titled " **Evaluation of Amniotic Membrane in The Dressing of Second-Degree Burn** " conducted by [*Srwa Rasul Ahmed¹, Atiya Kareem Mohammed², and Mezjda Ismail Mohammed Rashaan³*], has received ethical approval from the [The Ethics Committees of College of medicine] at [the University of Sulaimani].

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AUTHOR'S CONTRIBUTIONS

All authors contributed equally to the conception and design of the study, data collection, and analysis, and drafted the initial manuscript. All authors critically reviewed and edited the manuscript. All authors approved the final version of the manuscript for submission.

DISCLOSURE STATEMENT:

The authors report no conflict of interest.

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