

ORIGINAL ARTICLE

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# RELATIONSHIP BETWEEN NUTRITIONAL STATUS, BURN DEGREE, AND TREATMENT WITH BURN INJURY HEALING PROCESS IN PATIENTS AT HOSPITAL IN MEDAN CITY, INDONESIA

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## Abstract

The burn is a type of tissue damage or injury caused by contact with very high-temperature substances (for instance: fire, hot water, chemical element, electricity, and radiation) or deficient substances. Burn healing can be done by giving proper burn treatment and observing patient nutritional status. The study aimed to examine the relationship between nutritional status, burn degree, and wound treatment towards burn healing process in patients with burn injury at two public hospitals in Medan City. It was a quantitative study with correlational design. The research samples comprised of patients with second-degree burn (Grade II) and third-degree burn (Grade III), with the total number of participants was 45 who were selected through accidental sampling technique. By employing Pearson statistical calculation, it was obtained that the p-value was <0.005 on nutritional status, burn degree, and burn to heal. Based on logistic regression analysis, it was obtained that the order of factors that affected the burn healing process from the most to the least dominant one was nutritional status, burn treatment, and burn degree. This study also found that there was a significant correlation between nutritional status, burn degree, and burn treatment toward burn healing. Therefore, it is suggested that health practitioners could be mindful of patients' nutritional status, burn degree, and burn treatment to accelerate the burn healing process.

**Keywords:** burn, nutritional status, burn degree, burn treatment, and burn healing process

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International Journal of Nursing and Health Services (IJNHS), September 2019, Volume 2, Issue 4; Page 389-396

Received: 01 August 2019; Revised: 15 August 2019; Accepted: 30 August 2019

DOI 10.35654/ijnhs.v2i4.268

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## Introduction

The burn is a type of tissue damage or injury caused by contact with very high-temperature substances (for instance: fire, hot water, chemical substance, electricity, and radiation) or deficient substances (1). The burn is a typical traumatic case in which the contribution to global morbidity, mortality, and disability rate is relatively equal to other kinds of injury (2).

Burns is still a global issue. The prevalence of burns in the world in 2007 – 2009 was 100.000 cases, where Singapore was the country with the lowest prevalence percentage (0.05%), and Finland was the country with the highest prevalence percentage (1.98%). The World Fire Data Statistic Center, 2012. It was predicted that burns caused approximately

195.000 death cases and mostly occurred in low- and middle-income countries, such as Southeast Asian countries (3).

Burn injury cases in Indonesia are still relatively high, with more than 250 cases per year. Large population and child-elderly dependency contribute to a high death rate of child and elderly caused by burns in Indonesia. The prevalence of burns in Indonesia in 2008 was 2.2% (4). Mortality date due to burns in Indonesia was reported high, with 27.6% cases in RSCM and 26.41% in RS Dr. Soetomo, in 2012 (5). Epidemiological data from the burn department of RSCM reported that the number of patients suffering from burn-in 2011 – 2012 was 257. Burn caused by fire had the highest etiology percentage (54.9%), followed by injury by hot water (29.250, then burn by electricity (12.8%) and by chemical substances (3.1%). It was also reported that the mortality rate among patients with 44.5% burn area was 36.6%, while patients with >60% burn area mostly died.

Furthermore, in North Sumatera Province itself, it was reported that the total number of patients suffering from burn-in Hj. Adam Malik Central Hospital was 72 people (Medical Record of Hj. Adam Malik Central Hospital, 2015). On the other hand, data from Pirngadi Hospital reported that as of December 2015, the total number of patients with burn injuries was 69.

Burn healing can be done by providing precise wound treatment to patients. Burn injury treatment aims to prevent patients from infection, accelerate collagen formation, and promote the growth of remaining epithelial cells to rapid damage skin regeneration (1). If proper treatment is not given, various complications will likely occur. Burn does not only cause damaged skin but might also affect the overall human body system. In patients with significant injuries, the body is no longer able to compensate for the damage, so that this failure brings complications that need intensive and special care (1). Other research also reported that one of the factors that increased mortality was extensive burns (6).

In general, factors that inhibit the burn healing process can be categorized into intrinsic and extrinsic factors. The essential elements include cardiovascular disorders, malnutrition, endocrine, and metabolic disorders, immunodeficiency to infection, dehydration, wound infection, trauma relapse, wound temperature decrease, inadequate blood supply, edema, local hypoxia, necrotic tissue, deep tissue exfoliation, excessive metabolic products, and foreign substances. On the other hand, the external factors inhibiting wound healing process include misdiagnosis or incorrect assessment, inappropriate use of wound primary care materials, and improper wound dressing change technique (7).

Also, extrinsic factors that affect wound healing are wound care techniques. Currently, wound care is increasing. The latest wound care techniques in the world of nursing care using the moist and closed principle. The humid atmosphere when supporting the wound recovery process (8). In the other researchers said that case studies had been conducted to prove wounds in moist environments better than the treatment of dry and open injuries (9).

Burn depth may also cause skin integrity damage and tissue cell death. The deeper and broader the damaged tissue is, the more severe the condition of the burns, and the worse the prognosis will be.<sup>1</sup>The selection of therapy and healing treatment is also determined by burn depth. A deep burn wound generally needs surgical intervention to be rapid in the healing process (10).

Based on the pilot survey at the two hospitals of the present study location, it was found that the average size of the patient burn was 30%, while the average burn degrees were grade II and III. Fast and precise handling of wounds will not cause harmful effects on the body. However, if the burn is not treated as soon as possible and not in the right way, it will cause various complications such as infection, shock, and fluid and electrolyte imbalances. Apart from physical difficulties, burns can also cause severe emotional (trauma) and psychological distress due to disability due to burns and scars (11).

### **Objective**

The study aimed to examine the relationship between nutritional status, burn degree and wound treatment with the burn healing process

### **Method**

The cross-sectional study design was applied in this study. Forty-five samples were selected by using accidental sampling technique. The study was conducted in 2 public hospitals in Medan.

The data was collected through interviews using standardized instruments, namely Bate Jansen Wound Assessment Tools and Subjective Global Assessment. The validity of the instruments was assessed by employing the Content Validity Index (CVI) so that the relevancy of each test item to the studied variables could be measured. However, the researcher did not measure the reliability of the instruments because they were standardized instruments, and there were no changes made on the instruments. The observation sheet was employed to assess nutritional status, burn degree, burn treatment, and burn healing process. To be more specific, the Global Subjective Assessment was used to measure the nutritional status of the respondents

In this study, the researcher instructed the clinical assessor to account for the results of patient weight loss, inadequate nutrient intake, loss of subcutaneous tissue, and muscle atrophy. Ranking method was employed in SGA, namely 1) Load A was added if patient did not experience weight loss, indications of fluid deficiency, and subcutaneous tissue loss; 2) Load B was added if at least there was 5% weight loss within several weeks before admission without stabilization; and 3) Load C was given if patients indicated obvious physical malnutrition (weight loss on subcutaneous tissue, muscle, and some edema downsizing). For burn treatment, the assessment was conducted by observing burn treatment in which the procedure was based on the Standard Operational Procedure (SOP) of each research location.

The burn treatment was categorized as useful if the procedure was following the SOP and vice versa. Also, a burning degree was assessed based on the physical appearance of the burn. The area around the second-degree burn (II) would be red/ pink and blistered, painful, bullae (+), and CRT <2. On the other hand, the skin around the wound of third-degree burn (III) would be red/ white, perceptive pain only if there was pressure, bullae (+/-), CRT >2, and skin graft needed. The assessment of burn healing was conducted by applying Bate Jansen Wound Assessment Tools.

Ethical feasibility was approved by the Research Ethical Committee of Faculty of Nursing Sciences of the University of Sumatera Utara then after research permission permit received from Research Directorate of Hj. Adam Malik Central Hospital and Pirngadi Medan Hospital.

## Result

### Characteristics of respondents

Table 1 described the personality of the respondents. The majority of respondents were male (60%); only 40% of them were female. Most of them had graduated from high school. More than half of them were 30 to 40 years old (55.6%).

Regarding nutritional status, 57.8% of them have mild malnutrition, and only 33.3% of them were normal nutritional status. The majority of patients have grade III of burn degree (60%). About 82.2% of them provided the treatment of burn based on the standard operational procedure.

**Table 1. Characteristics of respondents**

Characteristics	F	%
Sex		
Male	27	60.00
Female	18	40.00
Education		
Primary	-	-
Junior High	2	4.40
Senior High	28	62.20
College	15	33.30
Age		
20-30 years	12	26.70
> 30-40 years	25	55.60
Nutritional Status		
SGA A (normal)	15	33.30
SGA B ( mild malnutrition)	26	57.80
SGA C (malnutrition)	4	8.90
Burn Degree		
Grade II	18	40.00
Grade III	27	60.00
Burn Treatment		
Based on SOP	37	82.20
Not based on SOP	8	17.80
Burn Healing		
Healthy tissue	19	42.20
Wound regeneration	19	42.20
Wound degeneration	7	15.60

### Relationship between nutritional status and burn healing process before and after receiving intervention

Table 2 showed the relationship between nutritional status and burn healing process before and after receiving the intervention. The findings explained that there was a significant correlation between nutritional status and burn healing process. The statistic showed that  $r = 0.839$ , it was indicated that there was a strong correlation between nutritional status. After receiving the intervention, the spearman rank test correlation value ( $r$ ) 0.84 showed there is a strong correlation strength of the nutritional status of the patient with the healing process of burns and vice versa.

Table 2. Relationship between nutritional status and burn healing process before and after receiving intervention

Variable	r	p	n
Relationship between nutritional status and burn healing process	0.839	0.000	45
Association between nutritional status and burn healing process after receiving the intervention	0.84	0.000	45

### Relationship between the grade of initial injuries with the treatment of burns healing process

Table 3 showed the relationship between the category of initial injuries with the treatment of wounds healing process. The findings explained that there was a significant correlation between burn degree and burn healing process. The statistic showed that  $r = 0.889$ , it was indicated that there was a strong correlation among them. After receiving the intervention, the spearman rank test correlation value ( $r$ ) 0.55 showed there is a moderate correlation between burn degree and burn healing process.

Table 3. Relationship between the grade of initial injuries with the treatment of burns healing process

Variable	r	p	n
Relationship between burn degree and burn healing process	0.889	0.000	45
Relationship between burn degree and ignite the healing process	0.55	0.000	45

### Dominant relationship between nutrition status wound grade and wound care with the burns healing process

Table 4 showed the predominant variable related to the healing process of healthy tissue burns in comparison to hurt degeneration burns healing process was nutritional status. The statistic showed an OR value was 9.93. While the less correlation was burn degree with OR was 0.35

Table 4. Dominant relationship between nutrition status wound grade and wound care with the burns healing process

	Burn Healing Process	
	Healthy tissue	Wound Degeneration
Odds Ratio (OR)	9.93	0.35

Nutritional Status	9.935	2.855	
Burn Degree	3.046	0.353	denominator
Burn Treatment	5.097	2.667	

## Discussion

Mild malnutrition in patients with burns might be caused by loss of appetite (anorexia) during treatment. The reasons underlying this loss can come from the food, such as the food served, cannot arouse desire, and it has a terrible aroma. The status of patient mild malnutrition might also be a result of a burn pathological or physiological healing process, which leads to disruption of the body in fulfilling the nutrition needed. Besides, the lack of knowledge of patients about the importance of sufficient nutrient intake to support the burn healing process can also be one reason for the mild malnutrition in patients with burn injury.

During the data collection process, it was found that the majority of the respondents suffering from the third-degree burn (grade III), which might be the reason for the long healing process of the respondents in the study. The long burn healing process could also be caused by the physiological burn treatment that was not by the standard procedure. Besides, the poor nutritional status of the respondents could also influence the length of the healing process.

Even though nurses had performed the treatment by the SOP, the malnutrition status of patients could not support the healing process. Therefore, the burn healing process is influenced by the condition of the burn and the nutritional status of patients. The category of the burn healing process in the present study was wound regeneration. It is because of the relatively weak nutritional status (mild malnourished) and the third-degree burn of patients that slower the process of burn healing. Even though the operational procedure standard has provided the treatment, nurses need to be mindful of patients' nutritional status and burn degree, so that the healing process will be good.

Good nutritional status of patients can rapid the healing process of patient's burn injuries and help to get good health outcomes. This study found that there was a significant correlation between patient nutritional status and burn healing process at two public hospitals in Medan in the year 2017 with p-value was 0.00 or  $p < 0.05$ , and the r-value was 0.839, indicating that there was a strong positive correlation between the two variables. This strong positive correlate illustrates that the better the nutritional status, the faster the burn healing process and vice versa. It is because the mild malnutrition status of the patients inhibits the healing process of the burns physiological, i.e., wound regeneration.

The results obtained in the study is in line with Susman (2012) that intrinsic factor that nurses need to be aware in the process of patient burn healing is patient nutritional status. In burns, the energy required by the human body will increase 100% of the natural energy needed when people rest. The increase will also depend on the size and depth of the burns. Within this process, the human body experiences hypermetabolism, i.e., excessive protein catabolism and urinal nitrogen excretion increase in particular. Negative nitrogen balance will occur in patients with burn injury because the body uses protein to produce more energy. The protein will be released through solid exudate.

Minor burn degree will rapid the healing process or result in good skin regeneration. This study found that there was a significant correlation between burn

degree and burn healing process with p-value was 0.000 or  $p < 0.05$  with r value was 0.889, indicating that there was a strong positive correlation between burn degree and burn healing process. This strong positive correlation also suggests that the lower the burn degree, the better the healing process.

This result is in line with Moenadjat (2009) that patients with extensive burn size (primary) will likely experience complications due to the inability of the body to compensate for the damage so that special and precise treatments are necessary (1). Proper burn treatment can accelerate the healing process of burn injuries in patients. It can also lead to good healing outcomes. However, this study obtained that there was no significant correlation between burn treatment and burn healing process at two public hospitals in Medan in the year 2017 with p-value 0.00 or  $p < 0.05$ , and the r-value was 0.550, indicating that there was a moderate positive correlation between the two variables.<sup>16</sup> Even though the correlation strength is moderate, it is still indicated that the better the burn treatment, the better the healing process. The present study found that even though the burn treatment of the respondents was by the SOP, the category of burn healing was relatively low (wound regeneration) (17)

The result of this study is in line with Moenadjat (2009) that the burn healing process can be done by facilitating the patients with proper burn treatment. Burn treatment is conducted to prevent infection, stimulate collagen formation, and support the growth of remaining epithelial cells to help damaged skin regeneration. Inappropriate burn treatment will bring patients to have various complications. Burns does not only cause skin damage but also affect the whole body system of patients (18)

In the process of burn treatment data collection, the researcher observed the standard operational procedure (SOP) at the hospitals. It was found that the SOP did not update the procedure by the development of technology used in burn treatment. However, the researcher could not interfere with the procedure at the hospitals (19)

From the data analysis, it was found that there was a significant correlation between nutritional status, burn degree, and burn treatment with the burn healing process. When the correlation strength of the three variables and burn healing variable compared, it was found that nutritional status variable was the most dominant variable, followed by burn treatment and burn degree (20)

## Conclusion

Based on data analysis, it was found that there was a correlation between nutritional status, burn degree, and burn treatment with the burn healing process in patients with burn injury at two public hospitals in Medan in the year 2017. This study was conducted in 3 months. This study was conducted step by step, while the measurement was done one time.

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