

Correlation of Hypernatremia to Success Rate of Skin Graft in Burn Patients Dr. Soetomo Hospital Burn Centre from 2014-2018

Ephora Christina Wulandari ^a, Lynda Hariani ^{a*}, Agus Santoso Budi ^{a*}

^aDepartment of Plastic Reconstructive and Aesthetic Surgery, Faculty of Medicine Universitas Airlangga

*Corresponding author: Agus Santoso Budi - Department of Plastic Reconstructive and Aesthetic Surgery, Faculty of Medicine Universitas Airlangga, Email address: agus_sbeyk@yahoo.com

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ABSTRACT

Background : From collective data from 2014 - 2018 from Burn Centre in Dr. Soetomo Hospital, the rate of failed skin graft was 26%. This high number became a concerned because skin graft was the main procedure to close large burn wound. This event is affected by many problems, one of them is electrolyte imbalance. Hypernatremia was seen in major burn patients that causes the disruption of wound healing process of skin graft.

Methods: A cross sectional study of patients with burns admitted to the Burn Centre of Dr. Soetomo Hospital between January 2014 and December 2018 were evaluated.

Results : 143 subjects were involved in this study. 44 subjects are female (31%) and 99 subjects are male (69%). 66% of the burn injuries are caused by fire (93 subjects), 14% caused by electricity (20 subjects), 8% caused by scald (12 subjects), 6% caused by boiled oil (8 subjects), 4% caused by chemical agent (6 subjects) and 2% caused by blast injury (1 subject). 77% of all subjects (110 subjects) underwent split thickness skin graft less than 10% while 23% (33 subjects) underwent the procedure 10% or more than it. Hypernatremia is found in 16% of all subjects (23 subjects), 19% with hyponatremia (28 subjects) and majority of it, 65%, with normonatremia (92 subjects). From the study, it was found that the risk of failed skin graft was higher on hypernatremia subjects than normonatremia subjects, the relative risk was 6,06 to fail. This number was higher if the skin graft procedure took more than 10%. But, it was found the risk was higher on hyponatremia subjects than the rest of subjects, with the relative risk was 7,75 to fail.

Conclusions: Hypernatremia caused high risk of failed skin graft on major burn patients.

Skin graft remains as main choice to close burn wound especially large burn wound on severe burn patients. This is a routine procedure but there are various risks than can cause the failure. From data from 2014-2018, failure rate of skin graft in RS dr. Soetomo Surabaya reached 26%. This is such a high number that shows the dynamic of

clinical conditions of burn makes it hard to assure the successful of skin graft.

Electrolyte imbalance is one of risk that affects the success rate of skin graft. Hyponatremia is increasing the risk of apoptosis thus can deepen the burn. With that, it is believed that hyponatremia can also influence skin graft healing process.

Hypothesis

Hyponatremia is one of risk factor that can decrease success rate of skin graft to less than 90% on burn patients.

Methods and Design

Study Design

This study used cross-sectional analytic descriptive design with retrospective secondary data.

Variables

Independent variable of this research sodium serum in blood of burn patients. Independent variables are take skin graft (take <90%, dan take >=90%).

Research samples

Samples of this research are all of burn patients that underwent skin graft procedure in RS dr. Soetomo Surabaya on period of time January 2014 to December 2018, which were 143 patients.

The inclusion criterias of the sample are :

- Burn patient that underwent skin graft with hyponatremia
- Skin graft procedure was done by third year of residency or above

The exclusion criterias of the sample are :

- Patients with anemia (Hb < 11 gr/ dL)
- Patients with hypoalbuminemia (Alb < 3 gr/ dL)
- Patients with sepsis

Result

Research data

From research result, most of the patients were male. The number of male patients was 99 patients (69%) and the rest, female patients, are 44 patients (31%).

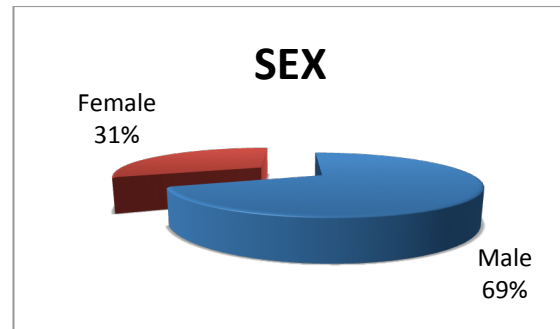


Chart 1. Sex of Patients

The biggest cause of burn patients was fire (93 cases). It was followed by electric burn (20 cases), scald (12 cases), hot oil (8 cases), chemical agent (6 cases), steam (3 cases) and the least blast injury (1 cases).

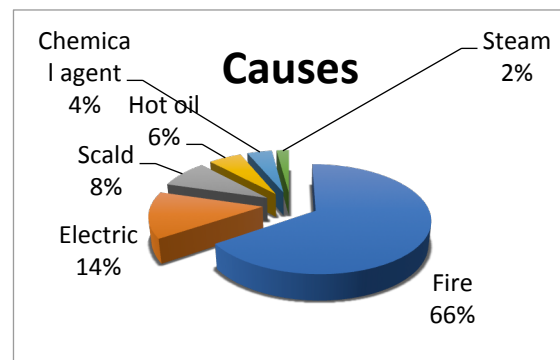


Chart 2. Causes

		Take skin graft	
		<90%	>=90%
Skin graft >=10%	Hypernatremia	3	1
	Normonatremia	1	22
	Hyponatremia	4	2
<10%	Hypernatremia	9	10
	Normonatremia	7	63
	Hyponatremia	14	7

Table 1. Results of Skin Graft

The skin graft procedure mainly did for less than 10%, which were 110 cases. The rest were more than 10% or 33 cases.

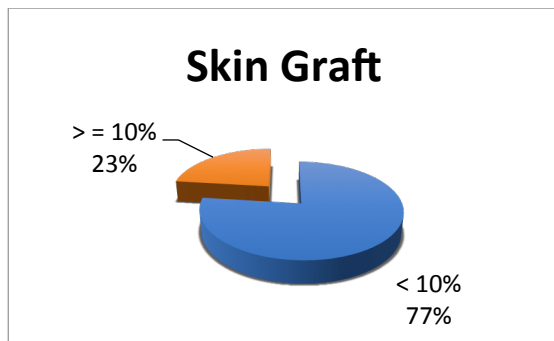


Chart 3. Skin Graft Procedure

Total patients with hypernatremia were 23 patients, mostly were normonatremia, which were 92 patients

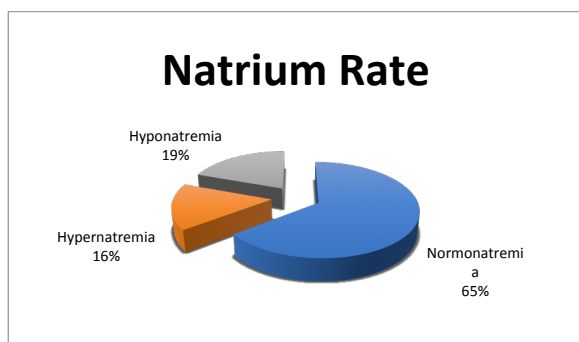


Chart 4. Natrium Rate

From research, there were 23 burn patients with hypernatremia; those 4 patients underwent skin graft procedure for more than 10%, the rest, 19 patients, underwent the procedure for less than 10%.

From analytic, hypernatremia patients have bigger chance to failed skin graft, which is 6.06 times than normonatremia patients. From more than 10% skin graft procedure, hypernatremia patients have bigger chance to failed skin graft, which is 16.5 times than normonatremia patients. From less than 10% skin graft procedure, hypernatremia patients have bigger chance to failed skin graft, which is 6.06 times than normonatremia patients.

Discussion

From this research, it showed that hypernatremia can be one of the risk that decreasing success rate of skin graft on burn patients.

Hypernatremia showed the large movement of fluid through membrane that caused systemic dehydration; this caused decreasing of tissue perfusion. Also because there was a systemic activation of Na-K pumps that used a large amount of energy, this lead to decreasing number of energy for healing process. All of them caused cell apoptosis.

The cell apoptosis also caused by protein that is produced by the heat of burn. Hypernatremia condition is signed of osmotic injury that can accelerate the apoptosis process of cell.

Without sufficient perfusion of recipient bed, revascularization is not achieved thus caused disrupt of healing process of skin graft.

Conclusion

Hypernatremia increased the risk of failed skin graft than normonatremia. The bigger percentage of skin graft, the bigger risk to fail

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