

CORRELATION OF HYPERNATREMIA TO SUCCESS RATE OF SKIN GRAFT IN BURN PATIENTS DR. SOETOMO GENERAL ACADEMIC HOSPITAL BURN CENTER FROM 2014-2018

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ABSTRACT

Introduction: From collective data from 2014 – 2018 from Burn Center in Dr. Soetomo General Academic Hospital, the rate of failed skin graft was 26%. This high number became a concern 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.

Highlights:

1. Patients with hypernatremia had a relative risk of experiencing graft failure, especially if the graft involved more than 10% of the affected area.
2. The importance of managing electrolyte imbalances to enhance the success of skin graft procedures.

INTRODUCTION

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 Dr. Soetomo General Academic 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. Hypernatremia is increasing the risk of apoptosis thus can deepen the burn. With that, it is believed that hypernatremia can also influence skin graft healing process. Hypernatremia is one of risk factor that can decrease success rate of skin graft to less than 90% on burn patients. This study aim to find correlation of hypernatremia to success rate of skin graft in burn patients Dr. Soetomo general academic hospital burn center from 2014-2018.

METHODS

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 Dr. Soetomo General Academic Surabaya on period from January 2014 to December 2018, which were 143 patients. The inclusion criterias of the sample are burn patient that underwent skin graft with hypernatremia and skin graft procedure was done by third year of residency or above. The exclusion criterias of the sample are patients with anemia (Hb <11gr/ dL), patients with hypoalbuminemia (Alb < 3gr/ dL), and patients with sepsis.

RESULTS

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%).

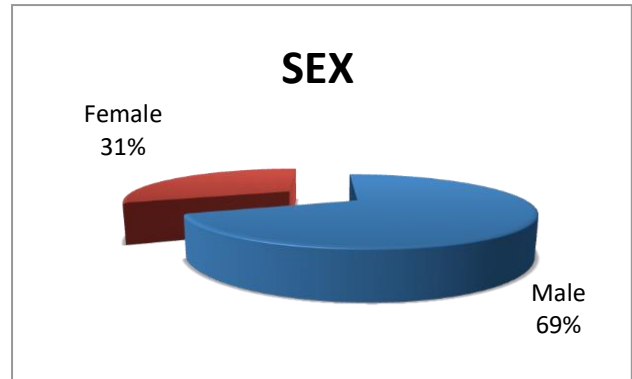


Figure 1. Sex of Patients

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).

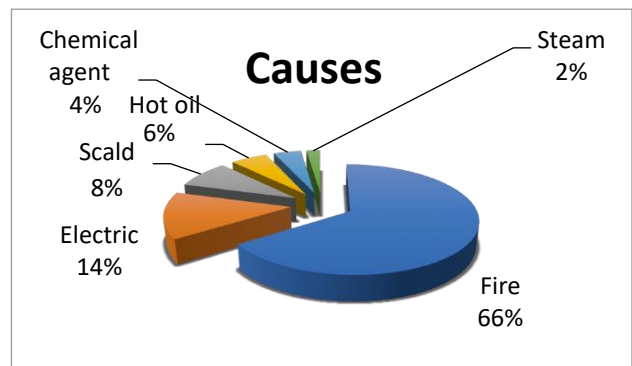


Figure 2. Causes of Burn Patients

Table 1. Results of Skin Graft

		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

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



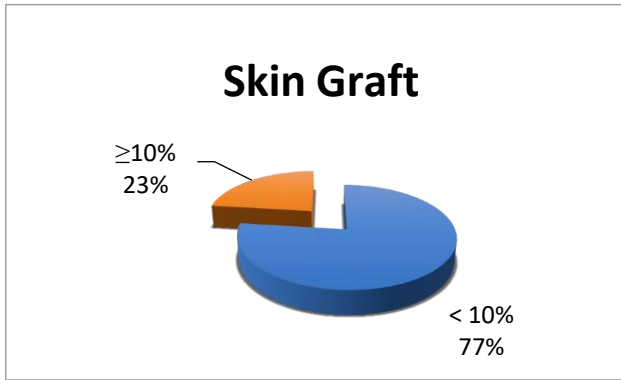


Figure 3. Skin Graft Procedure

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

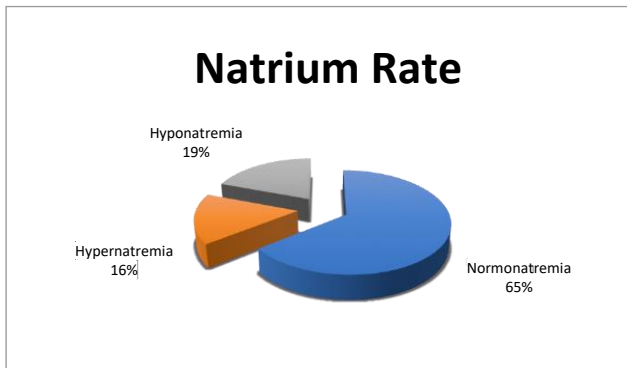


Figure 4. Natrium Rate

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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CONFLICT OF INTEREST

The author declare that there is no conflict of interest in this study.

FUNDING DISCLOSURE

None.

AUTHORS CONTRIBUTION

All authors contributed to the conceptualization, study design, data curation, formal analysis, data interpretation, methodology, manuscript writing, conceptualization, investigation, project administration, and content revision.

REFERENCES

1. Adrogué, H. Hyponatremia. *The New England Journal of Medicine*. 2006. 342 (20) : 1493-1499.
2. Harada, T. Apoptosis of Hair Follicle Cells in The Second-degree Burn Wound Unders Hyponatremic Conditions. *Burns*. 1998. 24:464-469.
3. Liamis, G. Evaluation and Treatment of Hyponatremia: A Practical Guide for Physicians. *Postgraduate Medicine*. 2016. 128 (3): 299-306
4. Madieto, R. Applying skin graft sheets transversely to manage burn patients. *Plast Aesthet Res*. 2018. 5(40):1-7
5. Namdar, T. Impact of Hyponatremia on Burn Wound Healing: Results of an Exploratory, Retrospective Study. *Ostomy Wound Management*. 2011. 57(3):30-34.
6. Nielson, et al. Burns: Pathophysiology of Systemic Complications and Current Management. *J Burn Care Res*. 2017. 38: 469 – 481
7. Noer, et al. (2006). *Penanganan Luka Bakar*. Surabaya : Airlangga University Press. 1-118.
8. Perdanakusuma, David. (1998). *Skin Grafting*. Surabaya : Airlangga University Press.
9. Sen, S. (2017). Sodium Variability is Associated with Increased Mortality in Severe Burn Injury. *Burns & Trauma*. 5(34): 1-6
10. Grabb and Smith's *Plastic Surgery* 6th ed. Philadelphia: Lippincott Williams & Wilkins. (2007).