

THE DIFFERENCE OF GRANULATION TISSUE, ANGIOGENESIS, AND FIBROBLAS ON 2ND DEGREE BURN WOUND BETWEEN THE TOPICAL ADMINISTRATION OF HUMAN UMBILICAL CORD MESENCHYMAL STEM CELLS AND SILVER SULFADIAZINE IN WHITE RATS (*RATTUS NORVEGICUS*)



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Abstract

Burns are thermal injuries caused by biological, chemical, physical and electrical agents with local or systemic impacts. In Indonesia, burns cause about 195,000 deaths annually. Burns cause physical, psychological and economic harm. Management of burn wound may require surgical intervention, prolonged hospitalization and rehabilitation, as well as high health care costs. The goal of burn treatment is wound healing as soon as possible to prevent infection, reduce pain, and minimize long-term negative effects such as scarring and functional disturbances. Silver sulfadiazine is the gold standard of burn topical treatment with their antibacterial properties. However, there are some disadvantages of this drug. Therapies to treat skin diseases continue to develop for many years, for example using stem cells. Stem cell that usually used for treatment is mesenchymal stem cells, especially those derived from the human umbilical cord (WJMSC). These stem cells are known to have unique properties that can improve and accelerate wound healing. This was an experimental study using 27 Sprague dawley white male rats, grouped into nine different treatments. Group K: negative control, P1: mesenchymal stem cell, and P2: Silver Sulfadiazine. Each group was terminated on day 4, 14, and 28 to see the granulation tissue, angiogenesis, and fibroblasts on microscopic observations. The average score of granulation tissue on the 14th day was group K: 1.1, P1: 1.4, and P2: 1.4. Mean score of angiogenesis on day 14 of group K: 2.1, P1: 3.8, and P2: 3.4. Mean score of fibroblasts on the 14th day of group K: 2.1, P1: 3.8, and P2: 3.4. There were significant differences in granulation tissue, angiogenesis, and fibroblasts on day 14. Nevertheless, there was no significant difference on day 4 and 28.

Keywords: Silver Sulfadiazine, human umbilical cord mesenchymal stem cells, WJMSC, burn wound, wound healing

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INTRODUCTION

Burns are thermal wounds caused by biological, chemical, physical, and electrical agents with local and systemic impacts (Garcia- Espinoza et al., 2017). Development of therapies to treat skin diseases has been done for years, one of them with stem cells. In addition, easily obtained stem cells have been widely proven to be therapeutic to the skin.

RESULT

Table 1. Microscopic images of fibroblasts, angiogenesis and fibroblasts on the 4 day

Treatment	Enlargement 100x	Enlargement 400x
Control 4		
Stem cell 4		
silver sulfadiazine 4		

Description: a: granulation tissue; b: angiogenesis; c: fibroblasts

Table 2. Microscopic images of fibroblasts, angiogenesis and fibroblasts on the 14 day

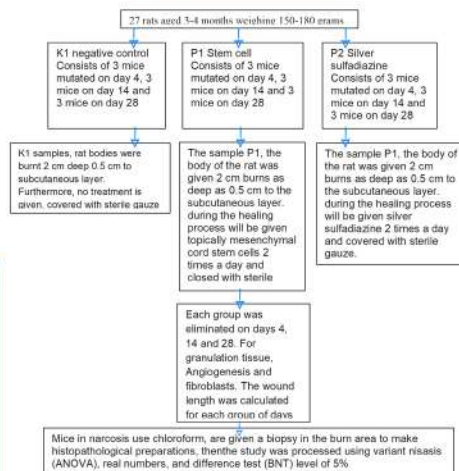
Treatment	Enlargement 100x	Enlargement 400x
Control 14		
Stem cell 14		
silver sulfadiazine 14		

Description: a: granulation tissue; b: angiogenesis; c: fibroblasts

Table 4. Differences in the Kruskal-Wallis test for fibroblast, angiogenesis and granulation tissue scores on days 4, 14 and 28.

Day	Fibroblas			Angiogenesis			Granulasi		
	K1	P1	P2	K1	P1	P2	K1	P1	P2
4	0,7	0,9	0,8	0,7	1,2	0,9	1,1	1,4	1,4
14	1,4	2,6	2,2	2,1	3,8	3,4	1,1	1,4	1,4
28	1,3	0,8	1,1	1,3	0,8	1,1	1,6	1,2	1,2

RESEARCH METHODS



Mice in narcosis use chloroform, are given a biopsy in the burn area to make histopathological preparations, then the study was processed using variant riasis (ANOVA), real numbers, and difference test (BNT) level of 5%.

Table 3. Microscopic images of fibroblasts, angiogenesis and fibroblasts on the 28 day

Treatment	Enlargement 100x	Enlargement 400x
Control 28		
Stem cell 28		
silver sulfadiazine 28		

Description: a: granulation tissue; b: angiogenesis; c: fibroblasts

Table 5. Differences in the Kruskal-Wallis test for fibroblast, angiogenesis and granulation tissue scores on days 4, 14 and 28

Day	Fibroblas	Angiogenesis	Granulasi
4	0,564	0,097	0,135
14	0,046	0,034	0,046
28	0,756	0,660	0,135

Description: a: granulation tissue; b: angiogenesis; c: fibroblasts

CONCLUSION

There were significant differences in granulation tissue, angiogenesis, and fibroblasts and in second-degree burns between topical human cord mesenchymal stem cells and silver sulfadiazine cream in white rats (*Rattus norvegicus*) on day 14; there was no significant difference on day 4 and 28.