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THE EFFECT OF INFRARED RAY AND COUNSELING ON DIABETIC FOOT ULCER HEALING PROCESS

Mokh Sujarwadi [1*], Mukhammad Toha [1], Nurul Huda [1]

[1] Jember University, Pasuruan Campus

***Correspondence:**
Mokh Sujarwadi
Email: sujarwadi.akper@unej.ac.id
Address: Jember University, Pasuruan Campus, Jl. KH. Mansyur No.207, Tembokrejo, Kec. Purworejo, Pasuruan City, East Java Province 67118

ABSTRACT
Background: Diabetic foot ulcer is one of the chronic complications of diabetes mellitus caused by neuropathy, angiopathy and decreased endurance. The risk of amputation in patient with diabetes mellitus fifteen times greater compared to non-diabetic. Various efforts on diabetic foot wound care have been carried out but the results are still far from satisfactory. Until now, infrared and counseling effect on wound healing in diabetic foot cannot be explained.
Objective: The purpose of this study was to examine the effect of infrared ray and counseling on diabetic foot ulcer healing process.
Method: The research design was quasi-experimental design with posttest control group design, the population in this study were patients with grade 3 diabetic foot wounds, blood sugar 100-200 g/ dl, BMI 18.5 to 24.9, aged 35-55 years. Large sample in this study as many as 20 were divided into two groups, the control random sampling. The collection of data for the dependent variable using the observation sheet after the tenth day of treatment, which consists of the rate of growth of granulation, ankle brachial index and capillary refill time. Furthermore, the data were processed using non-parametric statistical significance level < 0.05.
Result: The results showed that the infrared and counseling effect on the growth of granulation with a significance level (p = 0.0003), infrared and counseling influence ankle brachial index (p = 0.024), infrared and counseling effect on capillary and counseling effect on capillary refill time (p = 0.024).
Conclusion: It can be concluded from this study that applying infrared and counseling has any impact on healing in diabetic foot ulcer, on the growth of granulation and improved blood in diabetic foot ulcers.

Key words: Infrared Ray, Counseling, Foot Ulcer Healing.

INTRODUCTION

Diabetes Mellitus is disease of carbohydrate metabolism disorder signed by increased glucose level in blood. Various complications can happen, one of them is diabetic foot ulcer. It is chronic complication and mostly occurs on foot. According to Brunner and Suddarth (2013), there are three causes triggered diabetic foot ulcer, these are neuropathy, vascular disturbance, and immune decrease. The decreased sensory function on diabetic foot ulcer causes the patient feels no pain despite getting trauma or treatment on periphery tissue. Vascular disturbance disables the nutrition and O2 to go to periphery tissue. It disturbs cellular activity and affect the wound healing process. Any trials in wound healing have been executed, including debridement, dressing, oxygen hyperbaric, antibiotics usage, and cytokines growth (Morison, 2004). Until now the effect of infrared and counseling for

diabetic foot ulcer healing process cannot be described.

Diabetic foot ulcer is the most frightening complication of diabetes mellitus. It is morbidities major cause and disability. The condition of patient having this problem is hopeless, so is the paramedic treating it. Amputation for diabetic patient is fifteen until forty times riskier compared to non-diabetic patient.

METHODS

Study Design

This research used Quasi Experimental design.

Setting

This research was conducted at the dr. R. Soedarsono General Hospital at May to June 2017.

Research Subject

The population for object is clients having foot diabetic ulcer being hospitalized in dr. R. Soedarsono Hospital Pasuruan. Sample is part of affordable population which can be used as research subject through selecting process. The inculsion criterias are as follows: ages between 35-55 years old, 100 g/dl blood sugar level, normal nutritional status (IMT 18.5 – 24.9), grade 3 diabetic foot ulcer or drop out. The possibility of respondent to resign (f) is about 10%, hence the sample load s multiplied with sample load:

1/1-0.1 x R = n

1/0.9 x 9 = 9.9 changed into 10

Therefore the minimum sample needed is 10 people in each group.

Evaluation is executed on the tenth day after applying infrared and counseling. Hopefully there will be granulation and increased blood circulation on foot diabetic ulcer. The first step of this research is determining research subject according to fixed sample. The next step is grouping the sample in the same numbers because they have high possibility of selection. The sample of this research is executed randomly. In data collecting process, the researcher divides into three steps, these are grouping, given intervention, and assessing. The first step is grouping. The sample is divided into two groups (treating group and controlling group). Each group has 10 respondents.

Instruments

The second step is treating. The objected respondent is prepared according to the procedures of each hospital. The treating group is treated by infrared ray and counseling. Meanwhile the controlling group is treated conventionally. Applying infrared ray for treating group is done every day (in the morning and afternoon). Counseling is given twice a week according to available Counseling Program Unity. The procedure of giving infrared ray is based on the available applying technics, these are: 15-30 minutes for duration, setting the lamp 45-60 cm by the wound edges, and applying on proximal wound about 10 cm by wound edge. The third step is assessment. It is assessment of wound healing process using observational sheet on the tenth day. After the tenth day, observing wound condition is started, it concludes: cellular granulation level and blood circulation increase in both groups, these are capillary refill time and *Ankle Brachial Index.*

Data Analysis

Data analysis is crucial part in aiming the primary research goal. It concludes answering research questions revealing the phenomena. The unclear data obtained cannot draw the information for answering the question (Nursalam, 2016). Therefore, the data needs grouping according to each criterion. To know the level of significance on both groups, the researcher uses statistic test Mann Whitney U-Test with $\alpha \leq 0.05$. The software statistical Product and Service Solution 17 for Windows Vista (SPSS 17).

Ethical Consideration

This research has gone obtained permission from the director of the dr. R. Soedarsono General Hospital, Pasuruan with ethical clearance Number: 800/1031/423.212/2017.

RESULTS

Examination of the Effect of Infrared Ray and Counseling on Diabetic Foot Ulcer Healing Process on Diabetes Mellitus Patients with 10th Days Care in the dr. R. Soedarsono General Hospital, Pasuruan

Table 1. Examination of the Effect of Infrared Ray and Counseling on Diabetic Ulcer Healing Process on Diabetes Mellitus Patients with 10th Days Care in the dr. R. Soedarsono General Hospital, Pasuruan by using Mann Whitney U-Test (n = 20).

Component of Diabetic Foot Ulcer Healing Process	Group				Asymp. Sig.
	Control		Treatment		
	N	%	N	%	
Granulation Development					0.003
Nothing	0	0	0	0	
Some	7	70	3	30	
Entire	3	30	7	70	
Total	10	100	10	100	
Capillary Refill Time Levels					0.024
Normal	4	40	5	50	
Mild Ischemia	6	60	5	50	
Severe Ischemia	0	0	0	0	
Total	10	100	100	100	
Ankle Brachial Index Level					0.024
Less	0	0	0	0	
Sufficient	6	60	5	50	
Good	4	40	5	50	
Total	10	100	10	100	

Source: Primary data of questionnaire, 2017

Based on the research data in Table 1, it is found that the use of Infrared Ray and Counseling in 10 days of treatment has a significant effect on the Diabetic Ulcer Healing Process, both in the components of granulation development, capillary refill time level, and ankle brachial index level (p = 0.003, p = 0.024, p = 0.024, respectively).

DISCUSSION

The results showed that the use of infrared ray and counseling within 10 days of treatment has a significant effect on the Diabetic Ulcer Healing Process, both in the components of granulation development, capillary refill time level, and ankle brachial index level (p = 0.003, p = 0.024, p = 0.024, respectively).

Granulation growth is affected by respondent's age factor, blood sugar stability, respondent's nutrition status, the length of period of getting diabetes, and control of the disease. It happens to the respondent who has experienced entirely granulation on the ulcer's surface applied infrared and counseling. Meanwhile in controlling group, granulation growth happens to the younger respondents. They have the less severe and more controlled diabetes.

The treatment process on diabetic foot ulcer using infrared and counseling is better that using conventional method. Applying infrared ray and counseling is able to raise blood circulation, so that oxygen and nutrition are transferred adequately. Applying infrared ray and counseling increases dilatation of blood vessel, thus blood circulates well. Moreover, oxygen and nutrition are supplied adequately into the ulcer.

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According to the researcher, increase of ankle brachial index and capillary refill time can occur along with routine infrared application and stable blood sugar level of patient. Consequently, the foot diabetic

ulcer healing process runs well in treating group. Stressful condition can increase blood sugar level and press body's immunity.

The result of this research proves that applying infrared and counseling has important roles in diabetic foot ulcer healing process. Therefore, the application can be complementary action in treating diabetic ulcer.

CONCLUSION

Treatment of diabetic foot ulcer using infrared and counseling affects granulation growth in dr. R. Soedarsono General Hospital, Pasuruan. Treatment of diabetic foot ulcer using infrared and counseling affects blood circulation in dr. R. Soedarsono General Hospital, Pasuruan. Applying infrared ray and counseling affects the ulcer's development in dr. R. Soedarsono Genaral Hospital, Pasuruan.

SUGGESTIONS

Based on these results, it can be concluded from this study that applying infrared and counseling has any impact on healing in diabetic foot ulcer, on the growth of granulation and improved blood in diabetic foot ulcers. It is advisable to provide infrared rays and counseling in the treatment of diabetic foot wounds in accelerating the healing process.

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DECLARATION OF CONFLICTING INTEREST

None.

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AUTHOR CONTRIBUTION

Mokh Sujarwadi: Conduct research as the research leader and compile manuscripts.

Mukhammad Toha: Assist in the research process.

Nurul Huda: Assist in the research process.

ORCID

Mokh Sujarwadi
https://orcid.org/0000-0002-3818-0671

Mukhammad Toha
https://orcid.org/0000-0002-2648-0626

Nurul Huda
https://orcid.org/0000-0003-0734-5098

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