

DIFFERENCE BETWEEN HEALING LEVEL OF FOOT GANGRENE WOUNDS WITH REGULAR AND IRREGULAR ACTIVE PHYSICAL MOBILIZATION IN DIABETES MELLITUS PATIENTS IN PAVILION III Dr. RAMELAN CLINICAL HOSPITAL SURABAYA

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ABSTRACT

Introduction

Patient's gangrene Diabetes Mellitus needs a regular active physical mobility in the hospital for healing of wound, but actually most Patient's gangrene Diabetes Mellitus in the inpatient room is directed toward medical treatment and nursing program such as regular physical mobility , as a result the wound of patient's gangrene Diabetes Mellitus becomes worst. A regular active physical mobility influences the wound healing level. The purpose of this research is to know concerning differently the patient's wound healing level with regular and irregular physical mobility .

Method

This research used experimental design, samples were taken using purposive sampling, obtained 16 respondents of gangrene Diabetes Mellitus who are in hospitalization room in pavilion III Navy Hospital Dr. Ramelan. Data were collected using questionnaire and observation, and then data were analyzed using non-parametric statistics, Wilcoxon Signed rank with significance level of $p \leq 0.05$.

Result

The results of the research denoted that the wound healing level of patients toward regular active physical mobility good 62.5 % , static 37.5%, and bad 0% respectively. and irregular active physical mobility , bad 50%, static 25%, and good 25%. Results showed that a regular active physical mobility influences the wound healing level ($p = 0.02$) .

Conclusion

Based on the results above, so the efforts to increase the wound healing level is needed, a regular active physical mobile is done to arise wound healing gangrene Diabetes Mellitus the toward nursing given so that accelerate wound healing process. Community health information provided by poster mounting and leaflet by medical officers .

INTRODUCTION

According to Bernard, *et al.*, a combination of dietary management and daily physical exercise (walking) for three weeks provided good results in 652 DM/TTI patients with an average age of 59 years. Glucose levels decreased from 180 mg/dl to 154 mg/dl. 71% of 197 patients with oral diabetes medication and 39% of 212 patients with insulin were able to stop their therapy. 76% of 243 patients reported that the medication could lower fasting blood glucose levels to approximately 140 mg/dl (Internal Medicine, FKUI, 1996:75). The number of Diabetes Mellitus patients treated at Pavilion III of Dr. Ramelan Hospital, Surabaya, from October to December 2005 was 30 people, with 90% (27 people) having gangrene complications and 10% (3 people) having complications other than gangrene (*Opname Book* , Pavilion III of Dr. Ramelan Hospital, Surabaya, 2005). According to the researcher's observation of 27 Diabetes Mellitus patients with foot gangrene complications, only 11.11% (3 people) who did regular active physical mobilization accompanied by wound care for 7 days showed better results and as many as 88.88% (24 people) who did irregular active physical mobilization also with gangrene wounds and accompanied by wound care for 7 days showed less than optimal results. With the above data, it means that regular and irregular active physical mobilization have an effect on the healing rate of foot gangrene wounds.

Regular active physical mobilization also increases insulin sensitivity in peripheral tissues and increases glucose uptake, allowing for a lower insulin dose during regular active physical mobilization. This insulin sensitivity will increase especially if performed 1.5 hours after eating for 5–10 minutes. Although regular

active physical mobilization is beneficial for patients with diabetes mellitus, there are conditions that must be met, namely sufficient insulin reserves in the body. If regular active physical mobilization is performed by patients with diabetes mellitus who do not have sufficient insulin reserves, then physical mobilization will worsen the condition of diabetes mellitus (Tjokroprawiro, A., 2001:65). The impact of regular active physical mobilization is that blood glucose becomes controlled, which can affect the response or disruption of leukocyte and fibroblast cell function. Conversely, if active physical mobilization is performed irregularly, it will result in increased blood glucose levels, resulting in cell malnutrition and reducing the effectiveness of neutrophil phagocytosis function and altering collagen deposition by fibroblasts, thereby reducing wound resistance (Sumiatun, 2005:28). This makes gangrenous wounds take longer to heal and allows further complications to occur such as changes in tissue perfusion, circulatory disorders and bone infections, which ultimately require amputation.

The role of nurses in providing health education to Diabetes Mellitus patients in Pavilion III of Dr. Ramelan Hospital, Surabaya regarding Diabetes Mellitus is very necessary for the treatment of foot gangrene wounds. Motivation needs to be given to patients to undergo treatment, thereby reducing the occurrence of complications. Based on the above background, the researcher wants to know the results of regular and irregular physical active mobilization on the healing rate of foot gangrene wounds in Diabetes Mellitus patients in Pavilion III of Dr. Ramelan Hospital, Surabaya.

The general objective of this study was to analyze the differences in the healing rate of gangrene wounds of the foot with

regular and irregular active physical mobilization in patients with Diabetes Mellitus, while the specific objectives were to identify the healing rate of gangrene wounds of the foot with regular active physical mobilization in patients with Diabetes Mellitus, identify the healing rate of gangrene wounds of the foot with

irregular active physical mobilization in patients with Diabetes Mellitus, and analyze the differences between the healing rate of gangrene wounds of the foot with regular and irregular active physical mobilization in patients with Diabetes Mellitus.

MATERIALS AND METHODS

The research method used was a quasi-experimental design. This design does not have strict restrictions on randomization (Notoatmodjo, S., 2002:157). The main objective of experimental research is to investigate the possibility of a causal relationship by conducting an intervention or administering a treatment to one or more experimental groups, then comparing the results (consequences) of the intervention with the group that was not given the treatment (control group) (Notoatmodjo, S., 2002:156).

The data used as material in this study is primary data. The primary data was obtained from patients with diabetes mellitus who had gangrenous foot wounds.

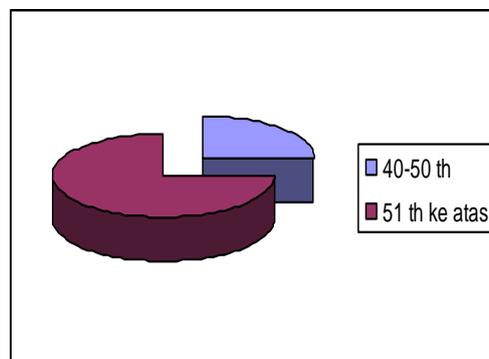
The independent variables in this study were regular and irregular active physical mobilization, while the dependent variable was the healing rate of gangrene wounds on the feet.

Data collection was carried out observationally using observation sheets on 8 Diabetes Mellitus patients with gangrene wounds on their feet who were treated with regular active physical mobilization and 8 Diabetes Mellitus patients with gangrene wounds on their feet who were treated with irregular active physical mobilization from 1 to 30 June 2006 at Pavilion III of Dr. Ramelan Hospital, Surabaya.

Data analysis to test the hypothesis used *non-parametric statistics*, namely *Wilcoxon Signed rank*, with a significance level of $p \leq 0.05$.

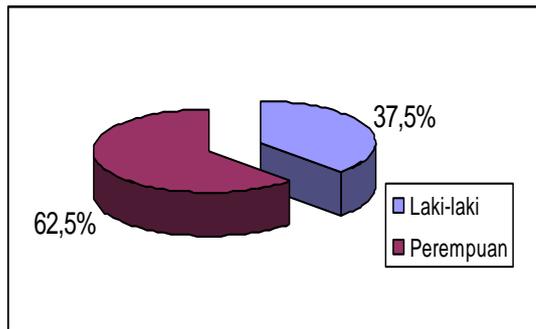
RESULT

1. General Data
 - a. Age



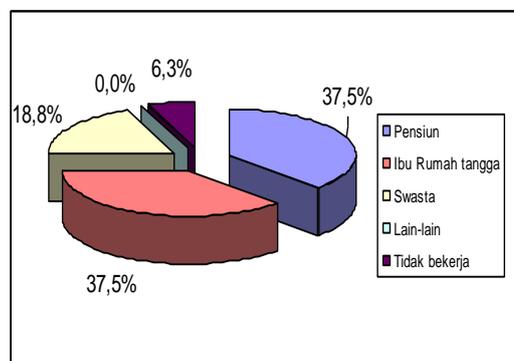
Based on the image above, it can be seen that of the 16 respondents, the majority were over 51 years old, 12 respondents (75%), and 4 respondents (25%) were aged between 41-50 years.

b. Respondent Gender



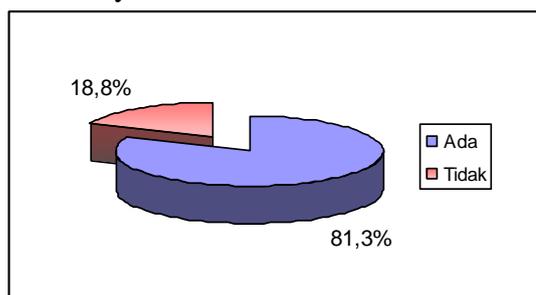
Based on the image above, it can be seen that the average number of respondents is female, namely 10 respondents (62.5%) and male, namely 6 respondents (37.5%).

c. Respondent's Occupation



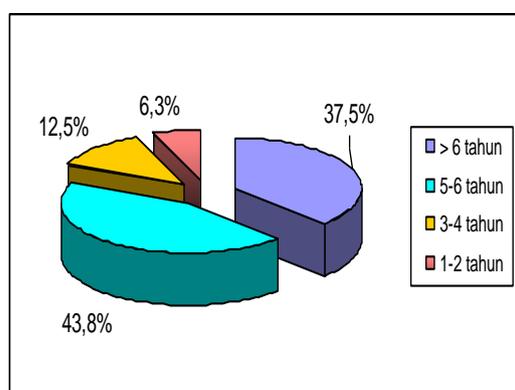
Based on the image above, it can be seen that of the 16 respondents, 6 respondents (37.5%) have retired, 6 respondents (37.5%) are housewives, 3 respondents (18.8%) are private sector and 1 respondent (6.3%) is unemployed.

d. Families with hereditary Diabetes Mellitus



The image above shows that the majority of respondents have families with a history of Diabetes Mellitus, namely 13 respondents (81.3%), while those who do not have families with a history of Diabetes Mellitus are 3 respondents (18.8%).

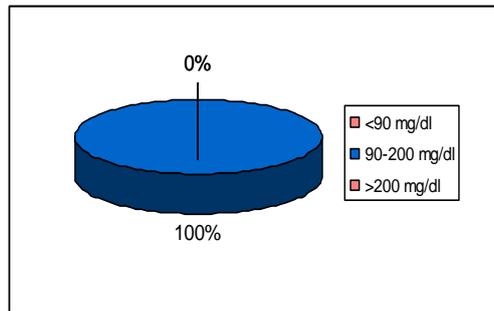
e. Have had diabetes mellitus for a long time



The picture above shows that as many as 7 respondents (43.8%) have had DM between 5-6 years, 6 respondents (37.5%) have had DM > 6 years, 2 respondents (12.5%), have had Diabetes Mellitus between 3-4 years, and 1 respondent (6.3%) has had Diabetes Mellitus between 1-2 years.

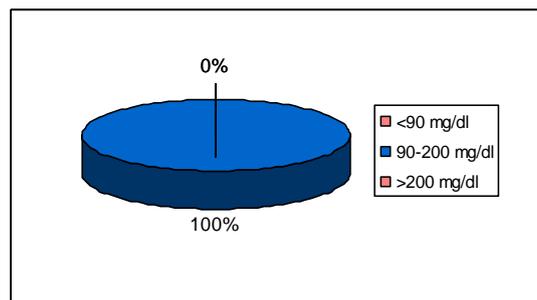
2. Special Data

a. Blood glucose day 1



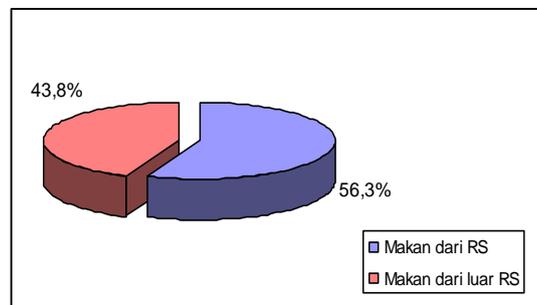
The image above shows that on day 1, all 16 respondents had blood glucose levels between 90-200 mg/dl, namely 16 respondents (100%).

b. Blood glucose day 4



The image above shows that on day 1, all 16 respondents had blood glucose levels between 90-200 mg/dl, namely 16 respondents (100%).

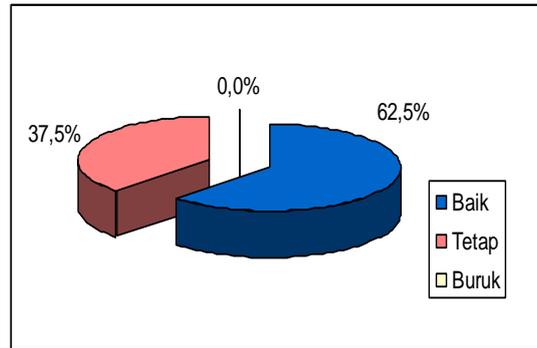
c. Diet Compliance



The image above shows that of the 16 respondents, 9 respondents (56.3%) complied with the hospital diet and 7 respondents (43.8%) did not comply with the hospital diet (eating from outside the hospital).

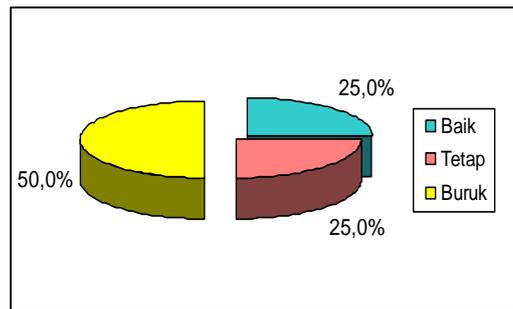
d. Healing Rate of Gangrene Foot Wounds

1). Healing Rate of Gangrene Foot Wounds with Regular Active Physical Mobilization



Based on the image above, it can be seen that of the 8 respondents who participated in regular active physical mobilization, on average, 5 respondents (62.5%) experienced good changes in their wounds, and a small proportion experienced permanent changes in their wounds, 3 respondents (37.5%) and none experienced bad changes in their wounds (0%).

2). Healing Rate of Gangrenous Wounds with Irregular Active Physical Mobilization



The image above shows that of the 8 respondents with irregular active physical mobilization, the average number of wounds experiencing bad changes was 4 respondents (50%), 2 respondents (25%) remained the same and 2 respondents (25%) experienced good changes.

3) Differences between the Healing Rate of Gangrene Foot Wounds with Regular and Irregular Active Physical Mobilization

Keter rule	Healing						Total	
	gangrene foot wound							
	Good		Still		Bad			
	F	%	F	%	F	%	F	%
Regular	5	62,5	3	37,5	-	-	8	100
Irregular	2	25	2	25	4	50	8	100

Total	7	87.	5	62.	4	50	1	10
		5		5			6	0
Wilcoxon test (Z): 2 ρ = 0.020								

Based on the table above, it can be concluded that there is a difference between the healing rate of gangrene wounds on the feet with regular and irregular active physical mobilization for 7 days in Diabetes Mellitus patients.

DISCUSSION

1. Healing Rate of Gangrene Foot Wounds with Regular Active Physical Mobilization

The results of the study showed that of the 8 respondents who participated in regular active physical mobilization, on average, 5 respondents (62.5%) experienced good changes in their wounds, and a small proportion experienced permanent changes in their wounds, 3 respondents (37.5%) and none experienced bad changes in their wounds (0%).

These results are supported by (Johnson M., 1998: 24). The benefits of regular active physical mobilization include changes in insulin sensitivity when done daily, preventing obesity when combined with morning and evening exercise, improving peripheral blood flow and increasing oxygen supply, increasing HDL cholesterol levels, forming new glycogen, lowering cholesterol, and making diabetes regulation easier.

According to Ahmad H (1998: 642), active mobilization is a sports exercise that is very helpful in curing Diabetes Mellitus, where exercise can regulate blood glucose and insulin levels to keep them balanced.

The benefits of regular active physical mobilization include changes in insulin sensitivity, if done regularly, for example after eating, because at that time the blood glucose balancing mechanism occurs, so

that the peripheral blood vessels experience vasodilation which allows for greater oxygen intake, and makes the healing process of gangrene wounds in the feet better.

2. Healing Rate of Gangrenous Wounds with Irregular Active Physical Mobilization

The results of the study showed that of the 8 respondents with irregular active physical mobilization, the average number of bad changes in wounds was 4 respondents (50%), constant for 2 respondents (25%) and good for 2 respondents (25%).

According to David (2005:9), wound healing is a complex and dynamic process because it involves a continuous interaction of biocellular and biochemical processes. With each injury, the body's mechanisms attempt to restore the damaged tissue components by forming new, functional structures similar to those previously present.

Diabetes sufferers benefit from mobilization or exercise according to the doctor's instructions and with the help of nurses. The level of wound healing can be seen from the regularity of mobilization or exercise carried out by Diabetes Mellitus patients.

Regular mobilization or exercise by patients with unhealthy lifestyles can significantly impact the wound healing process. Individuals who exercise regularly will experience faster wound healing. Diabetes mellitus patients who lack knowledge about diabetes mellitus

treatment may be unaware of the benefits of regular active physical mobilization, ultimately leading to laziness and non-adherence to mobilization exercise therapy, leading to irregular exercise, which ultimately hinders wound healing.

3. Differences between the Healing Rate of Gangrene Foot Wounds with Regular and Irregular Active Physical Mobilization

Based on the research results, it can be seen that there is a difference between the healing rate of gangrene wounds on the feet with regular and irregular active physical mobilization for 7 days in Diabetes Mellitus patients.

This can be explained that according to Johnson, M (1998: 24), physical mobilization by means of regular walking exercise, will increase insulin sensitivity (glucose uptake) if done for 5-10 minutes 1.5 hours after eating, also means reducing insulin *resistance* in obese patients or increasing the number of insulin receptors and increasing insulin sensitivity with its receptors, preventing obesity if combined with morning and evening exercise, improving peripheral blood flow and increasing oxygen supply, increasing HDL

CONCLUSION

The healing rate of gangrene wounds of the foot with regular active physical mobilization in patients with Diabetes Mellitus in Pavilion III of the Dr. Ramelan Hospital, Surabaya is on average good. The healing rate of gangrene wounds of the foot with irregular active physical mobilization in patients with Diabetes Mellitus in Pavilion III of the Dr. Ramelan Hospital, Surabaya is on average poor. There is a difference between the healing rate of gangrene wounds of the foot with regular and irregular active physical mobilization.

cholesterol levels (protective factors for coronary heart disease), because muscle and liver glycogen become less, then during mobilization will be stimulated the formation of new glycogen, reducing cholesterol (total) and triglycerides in the blood, because the burning of fatty acids becomes better, due to these factors, diabetes regulation will be easier.

The problem of healing gangrene wounds in the feet of patients with Diabetes Mellitus is the high risk of infection, slow epithelialization, slow collagen synthesis and slow wound contraction and closure, all of which originate from the irregular mobilization of the patient himself (Sumiatun, 2005:28).

The results of the study showed that there was a difference between the healing rate of gangrene wounds in the feet with regular and irregular active physical mobilization which resulted in insulin sensitivity in peripheral tissues and increased oxygen intake in diseased tissues, thus determining how slow or fast the healing rate of gangrene wounds was.

This study provides information to respondents to regularly engage in active physical mobilization exercises, as they are highly beneficial for the healing process of gangrene wounds in the foot. Families should provide support to patients, especially in physical mobilization. Hospitals should be able to improve the quality of hospital services, especially in terms of increasing the compliance behavior of Diabetes Mellitus patients, both through counseling (health education) and guidance to carry out active physical mobilization.

BIBLIOGRAPHY

- Adi, Soebagyo. (2001). Seminar Ilmiah Populer “ Reducing the Burden : Diabetes and Cardiovascular Disease “, Surabaya : FK. Unair.
- Arikunto, Suharsimi. (1998). Prosedur Penelitian Suatu Pendekatan Praktek, Jakarta : Rineka Cipta.
- Baharestani, M. (1999). The Clinical Relevance of Debridement, Berlin : Springer Verlag.
- Carpenito, L.J. (2001). Alih Bahasa oleh Monica Ester, S.Kp., Diagnosa Keperawatan, Edisi 8, Jakarta : EGC.
- David. (1998). Buku Ajar Ilmu Penyakit Dalam, Jilid I, Edisi Ketiga, Jakarta : FK UI.
- Falanga,V. (2001). “Introducing the Concept of wound bed preparation”, Int. Forum Wound Care.
- Henderson. (1997). Alih Bahasa Dr. Andri Hartono, Ilmu Bedah Untuk Perawat, Yayasan Essentia Medica.
- Husain, A. (1998). Buku Ajar Ilmu Penyakit Dalam, Jilid I, Edisi Ketiga, Jakarta : FK UI.
- Johnson, Marylin. (2001). Alih Bahasa P.A. Soboro, Diabetes, Terapi dan Pencegahannya, Jakarta : Indonesia Publisher.
- Lanywati, Endang. (2001). Diabetes Melitus Penyakit Kencing Manis, Jogjakarta : Kanisius.
- Mansjoer, et al. (1996). Ilmu Penyakit Dalam, FKUI Jakarta : Bunga Rampai.
- Margatan, A. (1997). Kiat Sehat Bagi Diabetisi, Solo : Aneka.
- Notoatmodjo, Soekidjo. (2002). Metodologi Penelitian Kesehatan, Jakarta : Rineka Cipta.
- Nursalam. (2003). Konsep dan Penerapan Metodologi penelitian Riset Keperawatan, Jakarta : Salemba Medika.
- Nursalam dan Siti Pariani. (2001). Metodologi Riset Keperawatan, Jakarta : Sagung Seto. ”Pedoman Diagnosis & terapi, Lab/UPF Ilmu penyakit dalam” (1996) Surabaya RSUD Dr Soetomo.
- Perdanakusuma, DS. (2002). “Enzymatic Debridement”, Jurnal Bedah Plastik Indonesia.
- Riyono. (2000). “Kedokteran Hiperbarik”, Edisi pertama, Jakarta : Senter Hiperbarik RSAL Dr. Mintohardjo.
- Soegondo. (2002). Penatalaksanaan Diabetes Melitus Terpadu, Jakarta : FKUI.
- Sumiatun. (2005). “Seminar Lokakarya Keperawatan Pamekasan”, Surabaya: RSU Dr. Soetomo.
- Suriadi. (2004). Perawatan Luka, Edisi I, Jakarta : Sagung Seto.
- Sussman and Bates. (1998). Wound Care A Collaborative Practice Manual for Physical Theraphist and Nurses, Maryland : Aspen Publisher, Inc.
- Sugiono. (2002). Statistika untuk Penelitian, Bandung : Alfabeta.
- Tjokroprawiro, Askandar. (1998). Hidup Sehat dan Bahagia Bersama Diabetes, Jakarta : Gramedia Pustaka Utama.
- Tjokroprawiro, Askandar. (2001). diabetes Melitus, Klasifikasi Diagnosa, dan Terapi, Jakarta : Gramedia Pustaka Utama.

Vowden,K. (2002). Wound Bed Preparation, Available from : URL : www.worldwidewound.com. dibaca pada tanggal 15 Februari 2006.

Wahyuni, Fida Dwi. (2001). Seminar Ilmiah Populer “Reducing the Burden : Diabetes and Cardiovascular Disease “, Surabaya : FK. Unair.