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Simple Foot Elevator for Diabetic Ulcer Treatment (SIFOEDT)

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ABSTRACT

In the world, the number of people with diabetes is estimated to 171 million people and is predicted to reach 366 million in 2025. The increase in DM patients, the diabetic ulcer complications have also increased, which is about 15% suffer from ulcers in the legs, and 12-14% including foot ulcers require amputation. The results of field studies showed that treatment of diabetic ulcers in hospitals prior to this innovation is to drape the foot side of the bed; stuck in bed with the coated; placed on crooked, and there are propped up with plastic basin. This causes the treatment time becomes longer, discomfort, fatigue and problems during treatment of diabetic ulcers. Creating a tool that can be used for the treatment of diabetic ulcers to more effectively and efficiently, that is SIFOEDT (Simple Foot Elevator for Diabetic Ulcer Treatment). Methods: Quasi-experimental, with pre and post test without control group design, with a sample size of 30 respondents consisting of 15 respondents in Sleman District Hospital and 15 respondents in hospitals of Panembahan Senopati Bantul. Technique sampling is consecutive sampling. Results: Mean of ulcer treatment before use SIFOEDT 18.09 minutes, and after using SIFOEDT be 12.62 minutes. Comfort patients before using SIFOEDT majority (80%) say less comfortable, while after using SIFOEDT majority (90%) say comfortable. The level of fatigue patients before using SIFOEDT majority (86.7 %) said fatigue, while after using SIFOEDT majority (93.3%) said no fatigue. Conclusions: There are significant differences of diabetic ulcer treatment time before and after using SIFOEDT ($p = 0.000$).

Keywords: SIFOEDT, diabetic ulcers, care, and comfort

INTRODUCTION

Diabetes mellitus is a metabolic disorder clinical syndrome, characterized by the presence of hyperglycemia caused by a defect in insulin secretion, insulin action or both defects. In the world, the number of people with diabetes is estimated as many as 171 million people and this situation will continue to rise is predicted to reach 366 million by the year 2025⁽¹⁾. Diabetes mellitus is often accompanied by a variety of short and long-term complications, these complications led to increased morbidity, mortality, and reduced quality of life⁽²⁾.

According to the American Diabetes Association, an estimated 16 million Americans known to suffer from diabetes, and millions of them are at risk for diabetes. Of the total patients with diabetes, 15% had ulcers on the feet, and 12-14% of which suffer from leg ulcers require amputation. The incidence of diabetic ulcer prevalence of 2-3% and 4-10%, men more often than women. The age distribution is relatively rare in the age of 40-49 years and most over the age of 60 years⁽²⁾.

Along with the increase in the number of people with diabetes, the complications also increased, one of which is ulceration of the lower limbs, with or without infection and causing damage to the underlying tissue, here in after referred to diabetic foot ulcer⁽³⁾.

Diabetic foot ulcer is a complex issue and the main reason why people with diabetes receiving treatment in hospital for treatment costs are very expensive and often unaffordable by most peoples⁽⁴⁾. People with Diabetes mellitus (diabetic) will experience a foot ulcer at approximately 15%. The diabetic incidence of various populations ranging from 2-10%. Neuropathy, foot deformities pressure is too high, poor blood glucose control, long suffering from diabetes are the factors that cause ulcers diabetic⁽⁵⁾.

Distal polyneuropathy is one of the most important predictors of diabetic ulcers and amputations. The development of neuropathy can be delayed significantly by maintaining glycemic levels to near normal and stop smoking to reduce the risk of vascular disease complications⁽¹⁾.

The results of field studies showed that treatment of diabetic ulcers carried out by nurses in several hospitals before any of this innovation include foot ulcers who had attempted to hang beside the bed; or remain stuck in bed with a stick coated Bengals; or placed on crooked, and there are propped up with plastic basin and etc.

According to interviews with nurses working in diabetic ulcer care unit Dr. Sardjito, for the treatment of diabetic ulcers spend a long time is between 20 to 60 minutes for each patient, even in cases where the new diabetic ulcer patients with new infections were first examined, then the diabetic ulcer treatment takes between 60 to 90 minutes. The tools used to assist the treatment of diabetic ulcers as a footrest using inverted basin. One of the actions that can be performed nurses in the field is to take the elevation of the lower extremities in patients with diabetes mellitus with ulcer whenever the patient mobilizes more than 15 minutes. Elevation can be done with a special tool elevation of the lower limb or uses existing resources like a pile of pillows or blankets to prop up the base thigh⁽⁶⁾.

The objective of the study was making innovation a tool that can be used for the treatment of diabetic ulcers to more effectively and efficiently, named SIFOEDT (Simple Elevator for Diabetic Foot Ulcer Treatment).

METHODS

This research was a quasi-experimental, with the Pre and Post Test Without Control Design. The sample size of 30 respondents to the inclusion criteria, namely DM patients with diabetic ulcer complications in the area of lower extremity diabetic ulcer care do better in the surgical Polyclinic consisting of 15 respondents in Sleman District Hospital and 15 respondents in hospitals Panembahan Senopati Bantul. sampling technique with consecutive sampling technique. The numeric data presented in the form of mean and standard deviation⁽⁷⁾, then analyzed using paired t-test and Wilcoxon signed rank test.

RESULTS

Table 1. The average length of time the treatment of diabetic foot ulcers before and after using SIFOEDT

Variable	Mean	Std. Deviation	Std. Error	P value	Min.	Max.
Duration of treatment before using SIFOEDT	18.09	3.43	0.63	0.000	25	15
Duration of treatment after using SIFOEDT	12.62	2.87	0.52		20	10

Table 2. The comfort level of the patient in the treatment of diabetic foot ulcers before and after using SIFOEDT

The comfort level	Before using SIFOEDT		After using SIFOEDT		P value
	f	%	f	%	
Comfortable	2	6.7	27	90	0.000
Quite comfortable	4	13.3	2	6.7	
Less comfortable	24	80	1	3.3	
Amount	30	100	30	100	

Based on Table 2, before using SIFOEDT, most say less comfortable as much as 80%. Meanwhile, after using SIFOEDT comfortable majority of respondents said that 90%. Statistical test results obtained by value $p = 0.000$, which means a significant influence SIFOEDT use before and after treatment of diabetic foot ulcers. Respondents comfortable appears their fore this instrument is ergonomic and smooth surface, making it comfortable to use. In addition, this convenience is also influenced by the treatment time where the average treatment of diabetic ulcers before using SIFOEDT was 18.07 minutes and after using SIFOEDT quite takes 12.63 minutes.

Table 3. The fatigue levels of the patients in treatment of diabetic foot ulcer before and after using SIFOEDT

The fatigue levels	Before using SIFOEDT		After using SIFOEDT		P value
	f	%	f	%	
Not Tired	3	10	28	93.3	0.000
Tired enough	1	3.3	1	3.3	
Tired	26	86.7	1	3.3	
Amount	30	100	30	100	

The level of Respondent fatigue is influenced by the length of time. The treatment time is influenced by the level of difficulty and the condition of the wound. The results showed that 86.7% of respondents experiencing fatigue during treatment performed before use and after use SIFOEDT while most said did not experience of fatigue (93.3%). This fatigue is acute with the type of mental fatigue that occurs in the body, especially the many activities using the muscles. This is because when patients do ulcer treatment, an organ or the whole body of work continuously and excessively because monotonous activity by sleeping on your back with your feet The level of

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Table 4. The level of easy of nurses in the treatment of diabetic foot ulcers before and after using SIFOEDT

The level of easy of nurses in the treatment of diabetic foot ulcers	Before using SIFOEDT		After using SIFOEDT	
	f	%	f	%
Easy	0	0	6	100
Not easy	6	100	0	0
Amount	6	100	6	100

Based on the results of research on nurse treatment of diabetic ulcers, from 6 nurses after treatment of diabetic ulcers on 26 patients, say, before using SIFOEDT many as 6 people (100%), is not easy, and after using SIFOEDT. as many as 6 people (100%) say diabetic ulcer treatment becomes easy. Ease arises because, SIFOEDT designed to support the foot, so the foot ulcers who undergo treatment are easy to do, especially ulcers on the lower legs, which previously stuck to the bed, bent or otherwise cause fewer ulcers less exposed. This condition requires moving the position of ulcer or by term reversal foot flick, to more easily treated.

DISCUSSION

This is consistent with the theory of Seeley⁽⁶⁾, that exalts (elevation) feet slightly higher than the heart can increase blood flow and reverse so there is no edema. Ulcer treatment time faster can reduce fatigue patients, so that patients feel comfortable. Fatigue causes the sensation of pain intensity and decrease coping abilities thus enhancing the pain perception⁽⁸⁾.

Other treatment that can support that should be the elevation of the lower limb. Lower extremity elevation is one diabetic ulcer care management actions. Lower extremity elevation aiming blood flow that can lead to peripheral diabetic ulcer area and to avoid piling on the distal region ulcer. Maximum peripheral tissue perfusion will accelerate diabetic foot ulcer healing.

Sulistiyowati research results (2015), shows the lower extremity elevation is more effective against diabetic ulcer healing compared with not doing the extremities elevation.

Patient comfortable when treatment of diabetic foot ulcers can be caused by the characteristic of the ergonomics of SIFOEDT, which can reduce the workload and fatigue. By using ergonomic principles, can play a role in maximizing comfort, safety, and efficiency in works⁽⁹⁾.

Ergonomic foot long position in question is where SIFOEDT designed or designed to adjust to the high position of the feet and the surface of the body, so that the legs can be stretched out a little elevation with a height of 10 cm surface rises to a height of 15 cm rear surface. Thus, can provide footwear that serves as a cushion or barrier. Ergonomics as a science which studies human behavior in relation to employment and can be regarded as ergonomic adjustments that work tasks with the body to reduce stress conditions that will be encountered. Her efforts have included work such as adjusting the size to the dimensions of the body to avoid tiring and in accordance with human needs. Ergonomics is a practice in the design of equipment and details of the work in accordance with the ability of workers aimed at preventing injuries to workers or patient⁽¹⁰⁾.

The elevation of the lower limb peripheral circulation intended that does not accumulate in the area of the ulcer distal circulation can be maintained⁽⁵⁾. The elevation of the lower limb is done after the patient move or get out of bed. When getting out of bed, even if the foot is not used as a stool, but due to the effects of gravity causes blood flow will tend towards the peripheral especially suffered leg ulcers. Lower extremity elevation did overcome these effects⁽⁵⁾.

The results showed that 86.7% of respondents experiencing fatigue during the treatment performed before use and after use SIFOEDT while most said did not experience fatigue (93.3%). This fatigue is acute with the type of mental fatigue that occurs in the body, especially the many activities using the muscles. This is because when patients do ulcer treatment, an organ or the whole body of work continuously and excessively because monotonous activity by sleeping on your back with your feet horizontal⁽¹¹⁾.

Based on the results of the study, the average treatment of diabetic ulcers before using SIFOEDT was 18.07 minutes and after using SIFOEDT quite takes 12.63 minutes, so it is relatively faster using SIFOEDT. Moreover, there are 40% of respondents aged 60 years or more. According Muchinsky⁽⁹⁾. Besides being a longer time, cause fatigue is a factor of age, where demand for energy substances continue to increase until eventually decline at the age of 40 years. The reduced need for energy substances due to having declining physical strength so that activities can be carried out usually also reduced and slower^{(12),(13)}.

Fatigue can be caused by many factors, one of which is the ergonomic factor. In doing the work required position right work to reduce fatigue and prevent injuries at work. One of the fatigues that can occur is muscle fatigue, in which muscle fatigue is fatigue caused due to prolonged physical activity and many⁽⁹⁾.

Foot position before using SIFOEDT, where to position the patient lie down with your legs straight, propped up with bent edges or washbasins behind an ulcer care positions that are less precise and increase the risk

of injury. According to Wijaya, attitude or position of employment is less precise, awkward and out of the ordinary will increase the risk of injury to the musculoskeletal. Working attitude is often done by humans to do the job, among others, standing, sitting, bending, squatting, walking and others. If conditions are unhealthy, system works will cause workplace accidents, because employees do work that is unsafe. Wrong work attitude, awkward and out of the ordinary will increase the risk of injury to the musculoskeletal's⁽¹¹⁾.

Therefore, the treatment of diabetic foot ulcers by using SIFOEDT as an effort to apply the principles of ergonomics in work that aims and benefits of applying ergonomics is an attempt to prevent occupational injuries, reduce the workload of the physical and mental, reduce fatigue after work.

CONCLUSION

SIFOEDT can be used for treatment of patients with diabetes mellitus with diabetic ulcer complications effectively and efficiently. SIFOEDT is proven to speed up treatment of diabetic ulcers. SIFOEDT proven to provide patient comfort when carried diabetic foot ulcer treatment. SIFOEDT can reduce or eliminate the fatigue of patients when performed diabetic foot ulcer treatment. SIFOEDT can provide convenience when doing the treatment of diabetic foot ulcers.

For nurses or medical personnel are expected to use SIFOEDT as a tool to complete at the time of treatment of diabetes mellitus patients with diabetic foot ulcer complications. SIFOEDT can be used for a treatment of diabetic foot ulcers in hospitals, health centers, and other healthcare centers and can be used at the time of treatment at home (home care).

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