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ORIGINAL ARTICLE

EFFECTIVENESS WOUND CARE USING MODERN DRESSING METHOD TO DIABETIC WOUND HEALING PROCESS OF PATIENT WITH DIABETES MELLITUS IN HOME WOUND CARE

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ABSTRACT

Diabetes mellitus causes a lot of various complaints and complications. One of the most serious and most common complications is diabetic ulcers. Prevention of diabetic ulcer complications can be done with comprehensive wound care. The Appropriate wound care management can prevent amputation. One of a method of wound care that can accelerate the wound healing process is modern dressing wounds. This researched aim to analyze the effectiveness of wound care using modern dressing method to the diabetes mellitus patients. The research design was pre-experimental one group pre-test post-test with 15 samples. The data analyzed using Paired T-test. The result of data analysis used Paired T-test with a significance level of 5% obtained ρ = 0,000. The average value of wound development before and after wound treatment using modern dressing method has decreased from 39,67to 29,93 because wound care with modern dressing method make the environment of the wound is moist so that capitalization and granulation process growth up be faster. So it can be concluded that there is an effect of wound care using modern dressing method to the wound healing process with diabetes mellitus.

Keywords

Diabetes Mellitus, Modern Dressing, Diabetes Ulcers. Wound Healing.

INTRODUCTION

More people in the world are suffering from diabetes mellitus. The increase in the number of people with diabetes mellitus due to the increasing life expectancy (UHH), especially in developed countries so that the number of people with diabetes mellitus was also increasing (Marewa, 2015).

Diabetes mellitus itself many complications cause one of the most serious and most often encountered diabetic foot ulcers (Prasetyono, 2016). This diabetic foot problem is a cause of hospitalization for patients with diabetes mellitus and requires substantial maintenance costs and becomes a burden in health care, although this problem can be prevented (Aini & Aridiana, 2016).

Prevention of diabetic ulcer complications can be done with comprehensive wound care (Prasetyono, 2016). Some hospitals in nursing practice especially wound care in the room, are still limited to changing the wound dressing, wound cleaning and then finished, without any comprehensive action including assessment, selection of dressings, implementation, documentation, and evaluation. Though one that affects wound healing is the technique/wound care management. Appropriate management for people with ulcer disease can prevent amputation (Ekaputra, 2013). Therefore, home wound care of Husada Prima Mandiri prajurit Kulon Mojokerto uses modern dressing technique in performing wound care because wound healing uses modern dressing technique more faster than dry wound healing (Maryunani, Anik, 2013).

Mojokerto regency is ranked to 11 that is 2.3% prevalence (RISKESDAS, 2013). Meanwhile, the prevalence of diabetes mellitus patients in the United States who suffered diabetic injuries is 15-20%. While in Indonesia about 15%((Aftria, 2014). Approximately 40-70%, diabetic foot ulcers cause the amputation of the leg (Tholib, 2016). Even IWGDF (International Working Group on Diabetic Foot) says amputation occurs every 30 seconds globally because of diabetes (Prasetyono, 2016). This diabetic ulcer is also the leading cause of home care for 80% of patients with Diabetes Mellitus (Aftria, 2014).

Preliminary study results on March 20, 2017, at home wound care of Husada Prima Mandiri Prajurit Kulon Mojokerto through interviews with Head of Husada Prima Mandiri's wound care. Obtained data are five patients with diabetic ulcers of the same degree, three female patients with grade 3 and two patients Men with grade 3 wounds. Based on data of registration report of home wound care of Husada Prima Mandiri Prajurit Kulon Mojokerto in 2015 until 2016 there are 80 patients with diabetic ulcers, and in January to February 2017, there are 20 patients with diabetic ulcer.

Diabetic ulcers result from several underlying risk factors, including trauma to the legs. Neuropathy is the most common cause of diabetic ulcers (Prasetyono, 2016). Patients with diabetes mellitus will experience the increased risk of infection and poor wound healing due to metabolic disorders, so that cell response and cell growth factors decreased (Aini & Aridiana, 2016). Wound healing is a complex process involving many cells and must go through several phases of inflammation, proliferation, and remodeling phases (Suriadi, 2004). Various techniques of wound care diabetes mellitus currently growing rapidly include conventional and modern techniques (Kristianto, 2010). In wound care techniques with conventional methods of wounds in dry conditions or not moist than on wound care the next day the bandage will be sticky with the wound so that the wound treatment will be elongated. While wound care with modern techniques wounds conditions in a humid state or moist. The wounded environment can accelerate the process of capitalization and facilitate cell growth and collagen proliferation in a healthy non-cellular matrix (Maryunani, Anik, 2013).

The results of Witanto et al. (2009) showed that diabetic ulcer patients treated with modern dressing had a higher percentage of wound repair of 86.67% compared with patients treated with conventional wound dressing of 30.77%. As well as patients treated with modern dressing shorter treatment duration of about 3-7 days

compared with using conventional dressing takes long treatment of > 7 days (Witanto, Gejali, Sandy, Sakti, & Pangayoman, 2009). While the results of research conducted Adriani and Tetimardianti (2016) obtained the result that the average wound healing rate before done with modern dressing is 37.40 and after being given a modern bandage average healing rate of the wound is 33.53 (Adriani & Mardianti, 2016). Research conducted by S.Eko Ch. Purnomo et al 2014 obtained the results that the wound treatment using NaCl 0.9% average wound healing value of 45.08. while the modern bandage of 15.92 which means wound healing using modern dressing 3 times better / more effective than the NaCl 0.9% (Purnomo, Dwinigsih, & Lestari, 2014). From the descriptions that have been described above researchers interested in researching the effectiveness wound care using modern dressing method to diabetic wound healing process of the patient with diabetes mellitus because of various research that says that modern dressing effective to heal wounds.

This researched aim to analyze the effectiveness of wound care using modern dressing method to the diabetes mellitus patients

RESEARCH METHODS

This research uses pre-experimental design with one group pre-test post-test design. The population in this research was all the patients with diabetes mellitus who suffered diabetic ulcer that exists in the home wound care of husada prima Mandiri prajurit Kulon mojokerto who is totaling 20 responded. Sampling technique is using purposive sampling by looking at inclusion criteria as follows:

1. Diabetes mellitus patient who has the diabetic wound with a degree I, II, III based on Wagner's classification.
2. Patients are not getting anti-inflammatory drug therapy either steroid or non-steroid, cytotoxic drugs, immunosuppressive drugs.
3. The patient is not undergoing chemotherapy or radiation.

From the 20 samples after adjusting for the inclusion criteria samples used in this research were some 15 respondents. In this research to observe wound status using BWAT (Bates-Jansen Wound Assessment Tool) wound observation with 13 items/parameters are; wound size, wound depth, wound edge, undermining, necrotic tissue type, necrotic tissue number, exudate type, number exudates, skin color around the wound, peripheral tissue edema, peripheral tissue induration, granulation tissue, epithelization tissue. This research was conducted from April 3 to May 16, 2017. After all, data collected then tested using paired T-test statistic to test whether wound care method using modern effective for diabetic wound healing by using SPSS 17.0.

DISCUSSION RESULT

General Data

a. Sex

Table 1 Distribution of diabetic ulcer patient sex at home wound care of Husada Prima Mandiri Prajurit Kulon Mojokerto

sex	Frequency (people)	Percentage (%)
Male	12	80
Female	3	20
Total	15	100

Based on Table 1 Almost all of the male sex is as many as 12 people or about 80% of the total sample.

b. Age and blood sugar levels

Table 2 Distribution of diabetic ulcer patient age at home wound care of Husada Prima Mandiri Prajurit Kulon Mojokerto

Age	Frequency (people)	Percentage (%)
29-35 years	3	20
36-42 years	9	60
43-49 years	1	6.7
50-55 years	1	6.7
56-61 years	1	6.7
Total	15	100

Source: Primary Data (2017)

Based on table 2 most of the respondents are in the age range 36-42 years that is as much as 60% or amounted to 9 people.

Table 3 Distribution of blood sugar levels of diabetic ulcer patients in home wound care of Husada Prima Mandiri Prajurit Kulon Mojokerto

Check to	Blood Sugar Levels	Frequency (people)	Percentage (%)
1	126-200 mg/dl	10	66.7
	>200 mg/dl	5	33.3
	Total	15	100
2	126-200 mg/dl	10	66.7
	>200 mg/dl	5	33.3
	Total	15	100
3	126-200 mg/dl	9	60
	>200 mg/dl	6	40
	Total	15	100

Source: Primary Data (2017)

Based on table 3 most of the respondents on the examination of blood sugar levels to 1, 2 and 3 are in the range 126-200 mg.

c. Degree of ulcer

Table 4 Distribution of wound degree of diabetic ulcer patients in home wound care of husada prima Mandiri prajurit kulon mojokerto

Level of ulcer	Frequency (people)	Percentage (%)
Level II	11	73.3
Level III	4	26.7
Total	15	100

Source: Primary Data (2017)

Based on Table 4 on the treatment of diabetic wounds using modern dressing method most diabetic ulcers patients are in the second degree, ie there are 11 people or about 73.3%.

Special Data

a. The process of healing diabetic wounds before and after wound care using modern dressing methods in home wound care

Table 5 Distribution of diabetic wound healing process in home wound care of Husada Prima Mandiri Prajurit Kulon Mojokerto

Code of Respondent	Pretest		Posttest		Difference (Δ)
	Score	Category	Score	Category	
1.	38	Tissue Regenaration	27	Tissue Regenaration	-11
2.	42	Tissue Regenaration	34	Tissue Regenaration	-8
3.	51	Tissue Regenaration	43	Tissue Regenaration	-8
4.	47	Tissue Regenaration	37	Tissue Regenaration	-10
5.	37	Tissue Regenaration	33	Tissue Regenaration	-4

6.	33	Tissue Regenaration	29	Tissue Regenaration	-4
7.	40	Tissue Regenaration	23	Tissue Regenaration	-17
8.	38	Tissue Regenaration	31	Tissue Regenaration	-7
9.	32	Tissue Regenaration	22	Tissue Regenaration	-10
10.	41	Tissue Regenaration	23	Tissue Regenaration	-18
11.	44	Tissue Regenaration	28	Tissue Regenaration	-16
12.	35	Tissue Regenaration	20	Tissue Regenaration	-15
13.	48	Tissue Regenaration	39	Tissue Regenaration	-9
14.	32	Tissue Regenaration	28	Tissue Regenaration	-4
15.	37	Tissue Regenaration	32	Tissue Regenaration	-5
Total	595		449		-146
Rerata	39.67		29.93		-9.73

Source: Processed Data (2017)

Based on Table 5 it can be concluded that all diabetic ulcers have decreased normal healing of diabetic ulcer wounds but still in the regeneration criteria, the above table shows a decrease of wound healing rate as much as 9.73 from the pretest average value of 39.67 and the mean posttest score of 29.93.

Having known the average before and after the treatment of diabetic wounds, then to ensure and strengthen the effectiveness or not then performed statistical tests. Because in this research is the interval scale then entered in the parametric test, the requirement before performing the statistical test is the normality test of data and obtained the results of normally distributed data. After that statistical test with the paired t-test.

b. Differences in the process of healing diabetic wounds before and after wound care using modern dressing methods

Table 6 Distribution Differences Healing Process Wounds Diabetic before and after wound care using modern dressing methods in home wound care of husada prima mandiri prajurit kulon mojokerto

Wound healing process (day)	Mean	SD	t	df	P Value
Pre test	39.67	5.864			
Post test	29.93	6.595			
First day-44	9.733	4.818	7.825	14	0.000

Source: Processed Data (2017)

The Result of p-value calculation with Paired T-test got value 0,000 (α <0.05), and t score obtained 7,825. The significance level of p <0.05, which has the meaning H0 is rejected, it can be concluded that the results of this research there is the effectiveness of wound care treatment using modern dressing methods.

DISCUSSION

Based on the results of the research in Table 4.1 it is known that almost all or (12) diabetic ulcer patients are male. Similar research results by al fady (2015) found that 70% of diabetic ulcer patients are male (Al fady, 2015). One of the factors of wound

healing is pressure and friction. Pressure and friction caused by foreign objects can affect blood flow to the peripheral blood vessels will be impaired and lead to tissue hypoxia even to the death/necrosis of tissue (Aristanty, 2013).

Researchers argue that it is because most men are hardworking which is very easy and very often the pressure and friction caused by his work.

Age is a risk factor for the occurrence of diabetic ulcer and one of the factors that affect wound healing. Based on the results of the above research in Table 4.2, most of the diabetic ulcer respondents were aged between 36-42 years. The increasing of people age hence the body function will decrease so that it can slow wound healing due to a decline in growth factor response (Ekaputra, 2013). Also after the age of 40 years dramatically humans will experience physiological decline drastically. Such a decrease risks the decrease in pancreatic endocrine to produce insulin (Aini & Aridiana, 2016). From the description above researchers argue with age above 40 years can occur sugar levels are not controlled due to the decline of the pancreas to produce insulin and that trigger the onset of diabetes mellitus with hyperglycemia which will lead to ulcers of diabetic and will undergo wound healing time due to sugar level Which is not controlled.

In this research blood, sugar levels were measured three times in the first week, second week and third week. Based on table 4.3 on the first measurement, the second and third of the average blood sugar levels of respondents is between 126-200 mg/dl. The highest blood sugar level is 250 mg/dl. Blood sugar levels are poorly controlled and affected the number of macrophages is reduced, and if the blood sugar levels persist above 200 mg/dl then wound would not follow the phases of wound healing (Aristanty, 2013). The above theory agrees with the Handayani (2010) which says that the increase in blood sugar causes the erythrocytes, platelets, and leukocytes are more adhesive and tend to be sticky in the lumen vascular resulting in decreased process angiogenesis, synthesis as well as the number of immune response needed for wound healing such as neutrophils and macrophages. It also affects the ability of fibroblasts to proliferate (Handayani, 2010).

Researchers believe the stickiness of erythrocytes in the blood vessel lumen indicate high blood viscosity so that the supply of oxygen and nutrients do not run smoothly cause tissue oxygen deficiency and can affect a decrease in sensitivity to stimuli and can occur as diabetic neuropathy and diabetic ulcers arise. Also, the condition of diabetic ulcers with high blood sugar levels cause the wound to heal for a long time due to wounds lack oxygen and nutrients. Just as Aristanty (2013) says that oxygen and nutrients are needed during the wound healing process (Aristanty, 2013).

The classification of diabetic ulcer is very important to help the planning of therapy. The classification of Wagner classifies the wound based on the extent and depth of the wound. Researchers used Wagner's classification to classify the degree of ulcer respondents. Most respondents or about 73.3% are in the second degree where the deep ulcers, extending to ligaments, tendons, joint capsules, or deep fascia without abscess or osteomyelitis. Purnomo, Dwiningsih, and Lestari (2014) said that injury would affect the development of wounds (Purnomo, Dwinigsih, & Lestari, 2014). Meanwhile, according to W. Suryani

et al. (2012) the size of the wound, deep wound and degree of injury are also important factors in the process of wound healing. The smaller wound, the shallower wound and the smaller degree of wound the wound will quickly heal ((W, Suryani, & Supriyono, 2012).

Researchers think the degree of ulcer plays a role in the process of healing. The wound deeper in a degree of ulcer then the healing takes a long time of course balanced with comprehensive care and blood sugar control.

Based on Table 5 the average wound care before being treated using modern dressing method the average healing wound is 39.67. While after the treatment by using the modern dressing method of average decreased that is 29.93. Indeed all the criteria in the regeneration range but the scoring scores decreased.

Respondents number 7, 9, 10, 11, and 12 have experienced a significant reduction score in injury compared with other respondents who were over 10 for 18, 17, 16, 15, and ten because they had blood sugar levels <200 mg/dl. So that their wound healing process can take place better and faster. Because if the blood sugar level persists> 200 mg/dl, then the wound healing process will not be able to follow the wound healing phases (Aristanty, 2013). Based on the degree of injury they all have the two-degree category of injuries that are not too deep so that the wound can quickly heal. The smaller wound, the shallower wound, and the less the degree of the wound the wound will quickly heal (W, Suryani, & Supriyono, 2012). Four respondents aged less than 40 years so still have not experienced the process of physiological decline of the body dramatically. Humans will experience a dramatic decrease in physics quickly after the age of 40 years (Aini & Aridiana, 2016). Also, increasing age will slow wound healing by decreasing the number and size of fibroblasts so that proliferative ability decreases and leads to the decreased response to growth factors and hormones produced during wound healing. So the wound healing respondents Numbers 9,10,11, and 12 faster with a significant reduction in scores.

Respondent number 7 with blood sugar <200 mg/dl and degree of wound 2 decreased the score of the wound is big enough that 17 with age 50 years. According to researchers, it could happen because many factors that affect wound healing such as nutritional status, disease, psychological, and so on. Researchers do not include general data so that researchers cannot observe it. So, the conclusion even though the age of 50 years but if the wound healing factor which I mentioned above in good condition can be a decline in the score of wound healing is large enough. Then, for respondent numbers 5 and six, there was a very slight decrease in the sores of 4 due to blood sugar levels> 200 mg/dl. These data and facts are reinforced by the theory that if the blood sugar level persists> 200 mg/dl, the wound will not pass through the wound healing phases. Also, hyperglycaemic conditions can lead to hypercoagulability and impact on atherosclerosis (Aini & Aridiana, 2016). According to researchers, the condition of atherosclerosis causes blood to flow, and oxygen cannot run smoothly when healing the wound was influenced by oxygen supply. Because when the oxygen supply is reduced then the Phagocytic activity is inhibited and wound healing is inhibited.

The score on 13 items has changed due to wound care using modern dressing method.

The modern dressing is a method of wound care by maintaining wound moisture so that wound healing and tissue growth can occur naturally (Hartoyo, 2012). Humidity or environment will accelerate the process of wound healing and reduce pain (Maryunani, Anik, 2013). The wound covered with a moist bandage has an epithelization rate two times faster than the wound left dry. According to peter Shehan 2003 in purnomo, Twinings & Lestari (2014) said that the humid environment increases the migration of epithelial cells to the wound center so that the wound heals faster (Purnomo, Dwinigsih, & Lestari, 2014).

The above opinion is reinforced by Kartika (2015) and Maryunani (2013) that the treatment of fresh dressing wounds is based on theories that the first humid wound environment can accelerate fibrinolysis. Fibrin formed in chronic wounds can be removed more quickly by neutrophils and endothelial cells in a humid atmosphere. Both can accelerate angiogenesis. Circumstances in the treatment of closed wounds will stimulate the formation of blood vessels more quickly. The third can reduce the risk of infection, the incidence of infection was relatively lower when compared with dry treatment. Fourth can accelerate the formation of growth factor. Growth factor plays a role in wound healing process to form stratum corneum and angiogenesis. The fifth can accelerate the formation of active cells. In humid conditions, neutrophil invasion followed by macrophages, monocytes, and lymphocytes to the wound area takes place early has many advantages (Maryunani, Anik, 2013).

In addition to the use of modern dressing methods also occurs the process of autolysis debridement is the removal of tissue necrosis by the body's enzymes because of the atmosphere of a moist wound. Debridement is an absolute requirement that must be met for successful wound management (Ekaputra, 2013). According to the researchers if the wound in humid conditions at the time of dressing, the next day bandage will not stick with the wound. So it will be protected from the inflammatory process which is different with the case of dry bandage then the bandage will be sticky with the wound and when the replacement of the bandage there will be new injuries and the healthy wound tissue can also be wasted so that the wound back to the inflammatory phase. In moist conditions, the environment of the necrotic tissue will list by the body itself so that the process of capitalization and granulation can running fast because the humid atmosphere can accelerate the process of capitalization.

In this research, the data tested by using Paired T-test previously been done the first test of normality data use Shapiro Wilk test and the result data is the normal distribution with the p value> 0,05. From result of SPSS test very 17.00 with paired T-test got result p-value = 0.000 <α (α = 0,05). Statistically, it can be concluded that there is the effectiveness of wound care using modern dressing method to diabetic wound healing process in patients diabetes mellitus This is evidenced by the decreasing wound score. Wound care with modern dressing obtained the average score of the development of the wound was 29.93 while wound treatment with conventional method obtained the average scores of the development of the wound was 35.25. These results also prove that indeed wound care with modern methods of dressing is effective for healing diabetic wounds.

CONCLUSION

The average value of wound healing before treatment with modern dressing method was 39.67

The average value of wound healing after treatment with modern dressing method was 29.93

There is the effectiveness of wound care using modern dressing method to diabetic wound healing process in the diabetes Mellitus patient at home wound care of husada prima Mandiri prajurit Kulon mojokerto with (p-value = 0.000 <α).

SUGGESTION

For Health Service Agencies

It is hoped that the health-care agency, whether private or government-owned, can apply modern dressing methods in treating wounds, especially diabetic ulcer.

For Respondents

It is expected that respondents with diabetic ulcer choose wound care using modern dressing methods to treat the wound. In addition, respondents should also consider the status of nutrition, blood sugar control, and psychological conditions.

PREFERENCES

Adriani, & Mardianti, T. (2016). Penggunaan Balutan Modern (Hidrocoloid) Untuk Penyembuhan Luka Diabetes Melitus Tipe II. *Jurna IPTEKS Terapan*, vol (10):20.http://ejournal.kopertis10.or.id/index.php/jit/article/download/392-711/367.[08 Maret 2017].

Aftria, M. P. (2014). "Honey As ATratment For Diabeteic Foot Ulcer". *Medical Journal of Lampung University*, vol (3) 81.http://juke.kedokteran.unila.ac.id/index.php/majority/article/view/482/483.[16 November 2016].

Aini, N., & Aridiana, L. M. (2016). *Asuhan Keperawatan Pada Sistem Endokrin dengan Pendekatan NANDA NIC NOC.* Jakarta: Salemba Medika.

Al fady, M. F. (2015). *Madu dan Luka Diabetik.* Yogyakarta: Gosyen Publishing.

Aristanty, I. P. (2013). *Konsep Dasar Menejemen Perawatan Luka.* Jakarta: EGC.

Ekaputra, E. (2013). *Evolusi Manajemen Luka Menguak 5 Keajaiban Moist Dressing.* Jakarta: CV.Trans Info Media.

Handayani, T. N. (2010). Pengaruh Pengelolaan Depresi Ringandengan Latihan Pernapasan Yoga (Pranayama) Terhadap Perkembangan Proses Penyembuhan Ulkus Diabetikum Di Rumah Sakit Pemerintah Aceh.Tidak diterbitkan. *Tesis FIK UI Program Magister Keperawatan*, 134.

Hartoyo, D. (2012). "Perbedaan Efektivitas Perawatan Luka Modern Dressing dengan Konventional Dressing Terhadap Percepatan Penyembuhan Luka Gangren Pada Pasien Diabetes Mellitus". *Tidak diterbotkan.Skripsi.Mojokerto:Program Studi Ilmu Keperawatan STIKES Bina Sehat PPNI Mojokerto*, 68-70.

Herlina, E. (2013). *Diabetes Kandas Berkat Herbal.* Jakarta: FMedia.

Kristianto, H. (2010). *Perbandingan Perawatan Luka Tehnik Modern dan Konvensional Terhadap Transforming Growth Factor Beta.Tidak diterbitkan.Tesis: FIK Proram Magister Ilmu Keperawatan.* Retrieved 01 8, 2017, from

http://www.lib.ui.ac.id/hasilcari_jsp?lokasi=luka&query=perbandingan+perawatan+luka+tehnik+modern+denga konvensional

Marewa, L. W. (2015). *Kencing Manis (Diabetes Mellitus) di Sulawesi Selatan.* Jakarta: Yayasan Pustaka Obor Indonesia.

Maryunani, Anik. (2013). *Perwatan Luka Modern (Modern Woundcare) Terkini dan Terlengkap Sebagai Bentuk Tindakan Keperawatan Mandiri.* Jakarta: In Media.

Maryunani, Anik. (2016). *Perawatan Luka Modern Pada Anak.* Jakarta: CV.Sagung Seto.

Prasetyono, T. O. (2016). *Panduan Klinis Manajemen Luka.* Jakarta: EGC.

Purnomo, S. E., Dwinigsih, S. U., & Lestari, K. P. (2014). Efektivitas Penyembuhan Luka Menggunakan NaCl 0,9% dan Hidrogel Pada Ulkus Diabetes Melitus di RSU Kota Semarang. *Prosiding Konferensi Nasional II PPNI Jawa Tengah*, 151.http://jurnal.unimus.ac.id/index.php/psn12012010/article/view/1136 [10 Februari 2017].

RISKESDAS. (2013). *Laporan Hasil Riset Kesehatann Dasar (RISKESDAS) Nasional.* Jakarta: Badan Penelitian Dan Pengembangan Kesehatan Departemen Kesehatan RI.

Shinta, T. (2012, 01 12). Efektivitas Perawatan Luka Kaki Diabetik Menggunakan Balutan Modern Di RSUP Sanglah Denpasar dan Klinik Dahlia Care. *Program Studi Ilmu Keperawatan Fakultas Kedokteran Universitas Udayana*, 4.http://download.portalgaruda.org/article.php?article=195794&val=956&title=The%20Effectiveness%20Diabetic%20Foot%20Care%20by%20Modern%20Dressing%20in%20Sanglah%20Hospital%20and%20Dhalia%20Care%20Clinic.[08 April 2017].

Suriadi. (2004). *Perawatan Luka.* Jakrta: CV.Sagung Seto.

Tholib, A. M. (2016). *Buku Pintar Perawatan Luka Diabetik.* Jakarta: Salemba Medika.

W, R. E., Suryani, M., & Supriyono, M. (2012). Efektivitas Pengobatan Madu Alami Terhadap penyembuhan Luka Infeksi Kaki Diabetik (IKD) (Study Kasus Di Puskesmas Bangetayu dan Puskesmas Genuk Semarang). *journal STIKES Telogorejo*, 5.

Witanto, D., Gejali, Y. H., Sandy, Sakti, L. H., & Pangayoman, R. (2009). Gambaran Umum Perawatan Ulkus Diabetikum Pada Pasien Rawat Inap di Rumah Sakit Immanuel Bandung Periode juli 2007-Agustus 2008. *Jurnal Kedokteran Marantha*, Vol (9) No.1:143-49.http://majour.marantha.edu/index.php/jurnal-kedokteran/article/view/147.[22 Maret 2017].
