



SIMULATION OF THE APPLICATION OF RESISTANCE EXERCISE AND WARM WATER SOAKING COMBINATION IN MAINTAINING THE SENSITIVITY OF THE FEET OF DIABETES MELLITUS PATIENTS

Arum Dwi Ningsih

Universitas Bina Sehat PPNI, Mojokerto, Indonesia

Article info	ABSTRACT
<p>Corresponding Author:</p> <p>Arum Dwi Ningsih arumdn87@gmail.com Universitas Bina Sehat PPNI, Mojokerto</p>	<p>Diabetes Mellitus (DM) is a condition where there is a disruption in the body's metabolic processes. One of the most common long-term complications of DM is peripheral neuropathy, especially in the lower extremities, which causes decreased sensitivity in the feet. The purpose of community service activities is to increase public knowledge about Diabetic Neuropathy and skills regarding procedures for performing resistance exercises and warm water immersion. The methods in this activity are socialization, education, simulation, mentoring, evaluation, and program sustainability. The results of community service activities include evaluating the level of knowledge with the Wilcoxon Rank Test statistical test, which shows that the p value = 0.000 ($p < 0.005$). Therefore, it can be concluded that education and simulation can increase public knowledge regarding Diabetic Neuropathy and skills in performing Resistance exercises and warm water immersion.</p> <p>Keywords: <i>Simulation, Resistance Exercise, Warm Water Soak, Foot Sensitivity</i></p>
<p>This article distributed under the terms of the Creative Commons Attribution-Share Alike 4.0 International License (https://creativecommons.org/licenses/by-sa/4.0/)</p>	

INTRODUCTION

Diabetes Mellitus (DM) is a condition characterized by disruption of the body's metabolic processes. This occurs due to a decrease in the pancreas' ability to produce insulin as needed, or the insulin produced is unable to function optimally. This results in increased blood glucose concentrations. One of the most common long-term complications of DM is peripheral neuropathy, particularly in the lower extremities, which causes decreased sensitivity in the feet. This condition increases the risk of injury, infection, and even amputation if left untreated. (Alpian et al., 2022).

The International Diabetes Federation (IDF) predicts that by 2035, there will be an increase of 592 million people suffering from diabetes mellitus. Meanwhile, the annual death rate due to diabetes mellitus is estimated at 3.2 million people. This means that 1

person per 10 seconds, or 6 people per minute, dies from diabetes mellitus or its complications. The 2018 Basic Health Research (Riskesdas) stated that the prevalence of diabetes mellitus based on age classification is 35-44 (1.1%), 45-54 (3.9%), 55-56 (6.3%), and 65-74 (6.0%). Data on prevalence based on gender in patients with female gender has a higher incidence (2.4%) compared to male (1.7%) (Nur et al., 2021).

The Blooto Community Health Center in Mojokerto City, as a primary healthcare facility, serves many patients with diabetes, most of whom exhibit symptoms of decreased foot sensitivity. However, limited access to physiotherapy or rehabilitation therapy results in suboptimal foot care. Therefore, simple yet effective non-pharmacological interventions are urgently needed as part of a strategy to prevent complications.

One form of intervention that can be implemented is resistance exercise simulation and warm water foot immersion. Resistance training has been shown to increase peripheral blood flow, muscle strength, and help maintain peripheral nerve function in DM patients. Meanwhile, warm water immersion can help improve local blood circulation and provide a relaxing effect that is beneficial in maintaining tissue and foot sensitivity. Simulations of these two interventions in community service activities aim to provide practical education to patients and their families about the importance of maintaining foot sensitivity, increase active patient participation in self-care, and encourage the Blooto Community Health Center to adopt a preventive approach in managing chronic disease. Through this activity, it is hoped that there will be an increase in patient knowledge and skills in implementing simple therapies at home routinely, thereby improving the quality of life of DM patients and reducing the incidence of complications.

METHOD

Community service activities are carried out using the following methods:

1. Socialization

Community Service Activities are carried out by signing an MOU with partners, namely the Mojokerto City Health Office. The MOU carried out by Bina Sehat PPNI Mojokerto University is a Tri Dharma Perguruan Tinggi activity, one of which is community service. Blooto Health Center is one of the Health Centers in the Mojokerto city work area that is the target of the Community Service activities to be carried out. Socialization was carried out on the target of service, namely active members of the Jayeng 2 elderly posyandu in the Blooto Health Center work area. This activity was attended by 55 participants.

1. Education “ Neuropati Diabetikum”

Conducting education to a group of Diabetes Mellitus patients in the Blooto Community Health Center working area of Mojokerto City. The education was conducted using lecture and discussion methods. The duration of the education was 90 minutes. The media used was a booklet. To evaluate the participants' knowledge regarding the material that had been presented, a pre- and post-test was conducted containing a questionnaire on the participants' level of knowledge of Diabetic Neuropathy. The data obtained were tabulated and analyzed using the Wilcoxon Rank Test..

2. Simulation of a Combination of Resistance Exercise and Warm Water Immersion Exercises The simulation was conducted by guiding the counseling participants to perform Resistance Exercise Therapy and Warm Water Immersion directly. The community members participating in the counseling session were given a booklet containing the counseling materials and SOP.
3. Mentoring and Evaluation
Mentoring is provided by the head of the community service program during community service activities, including for cadres, the Nurse in Charge of the Program, and community service members. This includes student participation in providing nursing care, from assessment, diagnosis, planning, implementation, and evaluation.
4. Program Evaluation and Sustainability
The sustainability of this program involves monitoring the implementation of the combination of resistance exercises and warm water immersion among cadres and program managers. It is hoped that this exercise will become a regular part of the management of diabetes mellitus patients.

RESULT AND DISCUSSION

RESULT

1. Univariate analysis

Table 1 Frequency Distribution of Respondent Characteristics

No.	Respondent Characteristics	F	%
1	Age		
	Middle Age	6	10.9
	Elderly	34	61.8
	Young Old	15	27.3
	Total	55	100
2	Gender		
	Male	11	20
	Female	44	80
	Total	55	100
3	Duration of DM Suffering		
	< 5 years	31	56.4
	> 5 years	24	43.6
	Total	55	100
4	Comorbidities		
	There are comorbidities	38	69.1
	No comorbidities	17	30.9
	Total	55	100
5	level of education		
	SD	0	0
	SMP	17	30.9

SMA	37	67.3
PT	1	1.8
Total	55	100
6	type of work	
Private employment	37	67.3
Farmer	4	7.3
unemployed or retired	5	9.1
Housewife	9	16.4
Total	55	100

Primary data source 2025

Based on table 1 regarding the general characteristics of respondents, most respondents are in the Elderly age group as many as 33 respondents (61.8%). Based on gender, the majority of respondents are female, namely as many as 44 respondents (80%). Information on the duration of suffering from DM, Most respondents suffer from DM <5 years as many as 31 respondents (56.4%). Based on the history of comorbidities, it is known that most respondents have comorbidities as many as 38 respondents (69.1%). Most respondents have a high school education background as many as 37 respondents (67.3%). The largest number of respondents' work history is as entrepreneurs as many as 37 respondents (67.3%).

2. Bivariate Analisis

Table 2 Respondents' Knowledge Level before and after providing Education about Diabetic Neuropathy and Simulation

No.	level of knowledge	Pre test		Post test		Hasil Uji Statistik p-value = 0,000 z = -6, 928
		F	%	F	%	
1	Poor	26	47.3	0	0	
2	sufficient	29	52.7	33	60	
3	Good	0	0	22	40	
	Total	55	100	32	100	

Primary data source 2025

Based on table 2, it is known that before the education about Diabetic Neuropathy and the simulation of the combination of resistance exercise and warm water soak, most of the respondents' knowledge was in the category of insufficient knowledge as many as 26 respondents (47.3%). After the educational activity, most of the respondents had a sufficient level of knowledge as many as 33 (60.5%). Based on the results of the Wilcoxon Rank Test statistical analysis, it is known that the calculated Z is -6.928 and the p value = 0.000 ($p < 0.005$), it can be concluded that there is an effect of education about Diabetic Neuropathy and the simulation of the combination of resistance exercise and warm water soak on the level of respondents' knowledge. Educational activities have a positive impact on respondents, namely increasing knowledge and skills in doing resistance exercises and soaking feet using warm water.

DISCUSSION

Based on the results of the descriptive statistical test listed in Table 4.2, it is known that the majority of respondents' knowledge levels before the education were in the poor category (26 respondents (47.3%), and after the education, the majority of respondents had sufficient knowledge (33 respondents (60%). This indicates that there was an increase in knowledge among the majority of respondents after the health education. Health education is an act of transferring a number of information to a group of people, thus impacting the level of knowledge. The increased level of knowledge can result in changes in thinking patterns and attitudes in maintaining body condition and preventing disease. (Salamah et al., 2024). Pendidikan kesehatan tentang Neuropati Diabetik serta simulasi kombinasi resistensi exercise dan rendam air hangat bertujuan untuk meningkatkan pengetahuan pasien tentang konsep DM, komplikasi DM, Neuropati Diabetikum serta jenis Latihan yang dapat mencegah komplikasi DM lebih lanjut yaitu ulkus diabetikum.

The results of the statistical test using the Wilcoxon Rank Test showed a p value <0.000 and a Z value of -6.928. This indicates that there is an influence on the level of respondents' knowledge after health education about diabetic neuropathy and a simulation of a combination of resistance exercise and warm water immersion. Health education has an impact on increasing the level of respondents' knowledge, changing attitudes and leading to more positive behavioral improvements. By providing clear and directed information, it will help counseling participants to remember the information so that their knowledge will increase (Enarga et al., 2023). The results of this study are in line with research conducted by Tjahjono in 2013 which showed that after education was carried out in the intervention group, there was a much higher increase in knowledge score compared to the knowledge score in the control group (Tjahjono, 2013). This demonstrates that education has a positive impact on increasing a person's knowledge and insight, thus changing their mindset to become more aware of their health. Patients with diabetes mellitus who already have knowledge about diabetes and how to maintain their health are expected to be able to control their blood glucose levels, thus improving their quality of life.

The health education conducted in this community service activity used a direct lecture method. Furthermore, the instructor provided a simulation after the training on the Resistance Exercise and Warm Water Soak procedures, and provided a booklet containing the training materials and the exercise SOP, which had been demonstrated together. This aligns with the results of a 2022 study by Sabila, Rizka Nur et al., which showed an increase in knowledge after education using the lecture and interactive discussion methods, along with the distribution of leaflets to participants (Sabila et al., 2022). The lecture and direct discussion educational method will make it easier for counseling participants to conduct interactive questions and answers between the presenter and the counseling participants. In addition, participants can listen to the counseling while reading the provided booklet so that if there is material that is not clear, they can ask directly. In the community service activities carried out by the counseling team, in addition to providing knowledge transfer activities, guidance on the implementation of the Resistance exercise and warm water

immersion procedures is carried out with great patience. The counseling includes a facilitator whose task is to provide guidance to participants throughout the activity.

The increased knowledge of respondents after receiving health education during this community service activity was also supported by their educational level. The results of the study, as shown in Table 4.1, show that the majority (37 respondents, 67.3%) had a high school education. A person's educational level significantly influences their knowledge. Those who have completed a higher level of education tend to have broader and more in-depth knowledge on various topics (Hartono, Ediyono, 2024). This was seen when Health Education activities were carried out, participants appeared to be paying attention, following the simulation and were interactive in the question and answer process..

The increase in respondents' knowledge after health education has an impact on changes in patient attitudes and behavior. This is in line with the results of research conducted by Yunitasari, Tya in 2019, where the statistical test results showed a p-value of 0.000, which means there was an increase in knowledge, changes in attitudes, and behavior after health education activities. (Yunitasari et al., 2019). Changes in attitudes and behavior are expected to improve the health condition of Diabetes Mellitus patients.

CONCLUSION

Community service activities were carried out according to the previously prepared plans. The education session was attended by 55 participants, or >90%. Statistical tests showed a p-value of <0.000. This indicates that education about Diabetic Neuropathy, along with the Resistance Exercise and Warm Water Immersion (RESAH) simulations, had a positive impact on patient knowledge.

BIBLIOGRAPHY

- Alpian, M., Alfarizi, L. M., & Almahera. (2022). Diabetes Mellitus Tipe 2 dan Pengobatannya: Suatu Tinjauan Literatur. *Journal of Public Health and Medical Studies*, 1(1), 13–23.
- Enarga, A. B. P., Megasari, P. O. D., Novitasari, D., & Pranadipta, A. R. (2023). Pengaruh Pemberian Edukasi terhadap tingkat Pengetahuan, Self Management, dan Kadar Glukosa Dasar Pasien DM Tipe 2. *Pharmacy Genius*, 02(03), 145–162.
- Hartono, Ediyono, S. (2024). Hubungan Tingkat Pendidikan, Lama Menderita Sakit dengan Tingkat Pengetahuan 5 Pilar Penatalaksanaan Diabetes Mellitus di wilayah Kerja Sungai Durian Kabupaten KBU Raya Kalimantan barat. *Journal of TSCSIKep*, 9(1), 49–58.
- Nur, C., Hasrul, & Tahir, M. (2021). Efektifitas Senam Terhadap Sensitivitas Kaki Pada Pasien Diabetes Mellitus Tipe 2 Wilayah Kerja Puskesmas Pangkajene Kabupaten Sidenreng Rappang. *Jurnal Inonasi Pengabdian Masyarakat*, 01(1), 1–7.
- Sabila, R. N., Permadi, Y. W., Muthoharoh, A., & Agustin, W. (2022). Pengaruh edukasi metode cbia terhadap tingkat pengetahuan swamedikasi penyakit jamur kulit. *Jurnal Ilmiah Jophus: Journal of Pharmacy UMUS*, 3(02), 128–137.
- Salamah, A. R., Haqqi, S. D., & Rolekta, S. (2024). Pengaruh Edukasi Terhadap Tingkat Pengetahuan Mahasiswa Tentang Tanaman Obat Keluarga (TOGA) ¹Abidah Roja

- Salamah, ²Salma Dinil Haqqi, ³Sheila Rolekta. *Jurnal Ilmiah Sain Dan Teknologi*, 2(1), 289–295.
- Tjahjono, Y. (2013). Pengaruh Edukasi melalui Media Visual Buku Ilustrasi terhadap Pengetahuan dan Kepatuhan Pasien Diabetes Mellitus Tipe 2 Yosephin Puteri Tjahjono. *Jurnal Ilmiah Mahasiswa Universitas Surabaya*, 2(1), 1–10.
- Yunitasari, T., Yuniarti, & Mintarsih, S. N. (2019). Efektivitas Edukasi Empat Pilar Penatalaksanaan Diabetes Mellitus terhadap Pengetahuan, Sikap dan Perilaku Pasien PROLANIS. *Jurnal Riset Gizi*, 7(2), 131–134.