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THE EFFECT OF TELEMONITORING ON DIABETES DISTRESS IN PATIENTS WITH TYPE II DIABETES MELLITUS IN RI-RDTL BORDER REGION

1st Yane Cristiana Ua Sanan*

2nd Veronika Nitsae

[1]Program Studi Keperawatan, Kefamenanu,NTT, Indonesia

*email: *yanecristiana@unimor.ac.id*

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Abstract

Diabetes mellitus (DM) is associated with various complications, one of which is diabetes distress. Although numerous technology-based interventions have been implemented for patients with DM the impact of these interventions on diabetes distress remains inadequately understood. This study aimed to assess the effect of telemonitoring on diabetes distress among patients with type II DM in border regions. A quasi-experimental pre and post-test research design, without a control group, was utilized for the study. Conducted from July to September 2024, at the Puskesmas in the Belu Regency, the study involved a total sample of 22 respondents, selected through consecutive sampling. The Indonesian version of the Diabetes Distress 17 (DDS17) was used to measure diabetes distress. The telemonitoring intervention consisted of telephone calls lasting approximately 15-20 minutes. Data analysis was performed using the Wilcoxon signed-rank test. Results indicated that the mean value of diabetes distress before the intervention was 2.82, which decreased to 1.86 after the intervention. The difference in the decrease in the average value before and after the intervention was 0.96. Statistical analysis using the Wilcoxon signed rank test revealed a p-value of less than 0.05, indicating a significant difference in diabetes distress before and after the telemonitoring intervention. Therefore, telemonitoring can be considered a viable technology-based intervention through telephone calls to reduce distress in DM patients, particularly in border areas.

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INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a metabolic disorder characterized by hyperglycemia due to impaired insulin secretion, insulin action insulin resistance, or both[1]. his type of diabetes is the most common. The International Diabetes Federation (IDF) in 2025 reported that 11.1% or 1 in 9 of the adult population (20-79 years) live with diabetes. More than 90% of people with diabetes have type 2 diabetes[2]. The International Diabetes Federation (IDF) estimates that by 2050 the number of people with diabetes will increase to 853 million[2]. The IDF Atlas Report (2021) shows that approximately 28.6 million Indonesians aged 20-79 years are affected by type II DM with a prevalence of 10.6%. Indonesia is the 5th country with the highest number of people with diabetes in the world [3]. The increase in the number of people with DM will also increase complications in people with DM.

Type 2 diabetes mellitus can affect many organ systems in the body and over time can cause serious complications. Complications can occur in the heart organ [4], and DM can cause strokes[5] besides that, DM is also at risk of chronic kidney failure [6]. Complications that occur in peripheral blood vessels cause nerve damage so that people with DM are prone to leg wounds that do not heal, leading to amputation[7]. Patients with DM are also prone to psychological problems such as anxiety, depression, and sleep disorders[8] and diabetes distress.

Diabetes distress describes the emotional burden caused by the stress of diabetes self-care and its complications[9].

Patients with DM must control blood glucose levels, regulate diet, and do regular physical activity to avoid complications. Strict lifestyle arrangements and for a long period make people with DM fall into a state of stress. Research shows that most people with DM experience emotional distress, treatment distress, distress from health workers, and interpersonal distress[9]. In research conducted on 55 people with DM, 40% of them experienced distress in the high category. In addition, research shows that people with DM who are in the community have a three times higher risk compared to hospitalized patients[10]. Therefore, people with DM need good self-management support to control diabetes distress.

Telemonitoring is a form of self-management support from health workers that facilitates the self-care ability of people with DM [11]. Telemonitoring is the practice of using technology to provide remote health services. Research shows that telemonitoring is very beneficial for people who are located far from health facilities, reducing costs, and controlling blood glucose levels and emotional status in people with DM [12]. Various methods of support for DM patients based on technology have been carried out such as Bluetooth technology, self-monitoring, DVD and mail messages, videotapes, electronic supplementary materials, mobile health, and handbooks[13]. Telehealth and telemonitoring interventions[14]. However, technology-based interventions related to diabetes distress have not fully provided clear results. Therefore, this study aims to determine the effect of telemonitoring on diabetes distress in patients with DM in border areas.

METHODS

The design of this study was quasi-experimental pre and post-test without control. This research was conducted in the working area of UPTD Puskesmas Haliwen and UPTD Puskesmas Umanen. Both health centers are located in Belu Regency. Belu Regency borders the Republic of Indonesia and the Democratic Republic of Timor-Leste (RDTL). The research was conducted in August-October 2024. The total number of samples was 22 respondents. The sampling technique used was consecutive sampling. Diabetes Distress Scale Indonesian version (DDS 17)[15] was used to measure diabetes distress in DM type II patients. In this instrument, there are 17 question items. The diabetes distress scale has a scale of 1-6. Scale 6: a severe problem, 5: serious problem, 4: somewhat serious problem, 3: a moderate problem, 2: a slight problem, and 1: no problem. The highest score is 102. To determine the average score, all scores were divided by 17. Diabetes distress was split into 3 categories: high distress: ≥ 3, moderate distress: 2-2.9, no distress: < This study uses instruments tested for reliability in previous studies. The reliability test of the Indonesian DDS17 showed that the Cronbach's alpha value of the Indonesian version was 0.83[15].

The telemonitoring model used was telephone calls. Telemonitoring was conducted on respondents for 8x sessions (2x sessions/week) conducted by Haliwen Health Centre and Umanen Health Centre health workers. The duration of telemonitoring was 15-20 minutes. Telemonitoring is carried out by monitoring DM patients' self-management, including blood glucose control, medication, nutrition, and physical activity. The data analysis used was the Wilcoxon signed-rank test. This study has obtained a research permit from the research ethics committee of Muhamadyah Pekajangan University with No.117/KEP UMPP/VIII/2024.

RESULTS AND DISCUSSION

In this study, there were 22 respondents. As can be seen in Table 1 shows that most of the DM patients were female (90.9%), with most of them being adults (19-59 years old) (63.6%). Most respondents have a primary school education (59.1%). respondents are mostly elementary school educated (77.3%). Most of the respondents had DM <5 years (72.7%). Diabetes distress before the intervention most respondents experienced high distress (59.1%), some respondents experienced moderate distress (36.8%), and only 1

respondent was not distressed (4.5%). After the intervention, most respondents did not experience diabetes distress (40.9%), and a small proportion of respondents experienced moderate distress (31.8%) and high distress (27.3%).

Table 1 Frequency of Respondent Characteristics

Variable	Kategori	Frequency (n)	Percentage (%)
Gender	Female	20	90,9
	male	2	9,1
Age	Adults	14	63,6
	Elderly	8	36,4
Education	Primary school	13	59,1
	Secondary school	7	31,8
	Higher education	2	9,1
Employment	Civil servants	2	9,1
	Retired	1	4,5
	Self-employed	1	4,5
	Farmer	1	4,5
	Housewife	1	4,5
Duration of DM	< 5 years	16	72,7
	5-10 years	5	22,7
	>10 years	1	4,5
Diabetes Distress (pre test)	High distress	13	59,1
	Moderate distress	8	36,4
	No distress	1	4,5
Diabetes Distress (post test)	High distress	6	27,3
	Moderate distress	7	31,8
	No distress	9	40,9

Table 2 Diabetes Distress Before and After Telemonitoring

	Mean	SD	*p* value
Pre	2.82	0.95	0.006
Post	1.86	0.83	

Table 2 shows the results, the mean value of diabetes distress before the intervention was 2.82 after the intervention the mean value of diabetes distress was reduced to 1.86. This result shows a difference in the decrease in the average value before and after by 0.96. Statistical tests using the Wilcoxon signed rank test showed p value <0.05, meaning there is a significant difference in diabetes distress before and after the telemonitoring intervention.

Telemonitoring is the practice of using technology to provide remote health services. In the field of services to patients with type II DM, telemonitoring facilitates the efforts of health workers to assist patients in carrying out diabetes self-management. This study shows that there is a statistical effect of telemonitoring on diabetes distress in type II DM.

The results of this study are by previous studies which state that internet-based self-management interventions have the potential to decrease diabetes pressure in patients with DM[16]. Another study conducted previously stated that the Dia-care telemonitoring intervention can reduce the level of depression in DM patients [17]. Another intervention namely the mHealth (mobile Health) program, can support changes in psychological distress in DM patients[18]. The study using mobile phone support intervention showed there was a change in emotional distress in patients with type 1 and type 2 diabetes [19].

Telemonitoring intervention can provide support to patients with type II DM who experience diabetes distress due to strict self-management.. Diabetes distress includes emotional burden, physical stress, regimen stress, and interpersonal stress [15]. Telephone coaching can help patients perform diabetes self-management and reduce diabetes distress[20]. Previous research shows that there is a relationship between diabetic distress and medication non-adherence in patients with type II DM[21]. Thus, using technology in rural areas can provide behavioral and psychosocial improvements for patients. The use of technology can be an appropriate option for rural communities that experience health worker shortages to increase empowerment, and self-care (diet adherence and monitoring), and reduce diabetes distress in DM patients.[22].

CONCLUSION

Based on the results of this study, it was concluded that telemonitoring could be considered as one of the technology-based interventions through telephone calls to reduce the level of distress in DM type II patients.

Suggestions for future research can include adding research samples and comparison groups to examine the

effectiveness of telemonitoring on mental health in DM type II patients.

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