

Research Article

Effect of Diabetes Self-Management Education (DSME) on Glycosylated Hemoglobin in Patients with Gestational Diabetes Mellitus in the Malingping Inpatient Health Center Work Area in 2022

Nurleni¹, Omega DR Tahun²

^{1,2}*Sekolah Tinggi Ilmu Kesehatan Abdi Nusantara, Indonesia*

Email: nurleni1123@gmail.com

Academic Editor: Nguyen Ngoc Anh

Copyright © 2022 Nurleni & Omega DR Tahun. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract. Maternal Mortality Rate (MMR) is an indicator that describes the welfare of society in a country. One of the causes of maternal death is Gestational Diabetes Mellitus. One method that can be used to determine blood glucose control in people with Diabetes Mellitus is the measurement of Glycosylated Hemoglobin (HbA1c) level. Family-based nursing has a positive impact on Diabetes patients, and can significantly reduce glucose and HbA1c levels and Diabetes Self-Management Education is an important component in the care of Diabetes Mellitus patients which is very necessary in an effort to improve the patient's health status. To determine the Effect of Diabetes Self-Management Education (DSME) on Glycosylated Hemoglobin in Gestational Diabetes Mellitus sufferers in the working area of the Malingping Health Center in 2022. Quasy Experimental with Quantitative approach. A sample of 25 Gestational Diabetes Mellitus patient respondents at the Malingping Health Center. As many as 86% of the 25 respondents had an understanding of the importance of DSME and underwent the components of DSME independently at home. And the value of Sig. (2-tailed) = 0.00, which can be concluded that there is an effect of DSME on HbA1c in patients with Gestational Diabetes Mellitus in the working area of the Malingping Health Center in 2022.

Keywords: *Diabetes Self-Management Education, Glycosylated Hemoglobin, Gestational Diabetes Mellitus.*

A. INTRODUCTION

The Maternal Mortality Rate (MMR) is an indicator that describes the welfare of society in a country. Maternal mortality is caused by 2 factors, namely direct and indirect factors. Direct factors are caused by bleeding, hypertension, infection, prolonged labor, diabetes mellitus, abortion and others. One of the indirect factors is the mother's low education level and low socioeconomic level (Fadul, 2019; Chai et al., 2018). According to (Ministry of Health RI, 2017) the main cause of maternal and infant mortality is Gestational Diabetes Mellitus, which causes serious complications in the delivery process.

According to data from the International Diabetes Federation, as of 2017 as many as 199 million women worldwide suffer from diabetes. The number of female deaths due to diabetes is 2.1 million people each year (Ministry of Health RI, 2017). This disease requires ongoing medical care and self-management education and ongoing support (Rondhianto, 2012; Yuan et al., 2014). Atak et al. in (Rondhianto, 2012) suggests that self-management carried out by patients with chronic diseases is the key to comprehensive disease management. Individuals who have the knowledge, skills and Self-Efficacy to carry out the behavior of managing Diabetes Mellitus will be able to carry out effective self-management of Diabetes Mellitus.

Monitoring the metabolic status of patients with Diabetes Mellitus is very important, and controlling Diabetes Mellitus is very necessary, especially by trying to keep blood sugar levels as close to normal as possible, which is one of the best prevention efforts against the possibility of developing complications in the long term (Alam & Hadiyono in Melan et al.,

2017; Adam et al., 2018). One method that can be used to determine blood glucose control in patients with Diabetes Mellitus is the measurement of Glycosylated Hemoglobin (HbA1c) which is a method used to assess blood sugar levels in patients with Diabetes Mellitus in the previous 8-12 weeks, and is checked every 3 months (Mening et al., 2022; Cunningham et al., 2018).

According to Cheragi et. al in (Melan et al., 2017), family-based nursing has a positive impact on diabetes patients, and can significantly reduce glucose and HbA1c levels. The level of satisfaction and quality of patient recovery was found to be better in patients treated at home compared to patients treated in health facilities (Richard et. al in Melan et al., 2017; Chrvala et al., 2016). Therefore education is needed for patients and their families to provide an understanding of the course of the disease, prevention, complications, and management of Diabetes Mellitus. Education that can be given to Diabetes Mellitus patients is Diabetes Self-Management Education (DSME).

Soegondo in Kurniawati et al. (2021) explained that DSME is an important component that can provide individuals with the ability to take self-management actions in managing Diabetes Mellitus in dealing with health problems that threaten their health. Good and proper self-care for patients with Diabetes Mellitus is very much needed in self-prevention efforts through promotive, preventive, curative and rehabilitative.

Gestational diabetes mellitus is one of the cases of obstetric complications which is influenced by many factors including obesity, age, family history of DM, and history of giving birth to large babies. The impact of complications arising from gestational diabetes mellitus such as increased CS deliveries, macrosomia, preeclampsia, hypoglycemia, premature birth and others (Funnell et al., 2010). The prevalence of gestational DM is increasing globally, especially in developing countries where the estimated prevalence is between 3.8% and 21%. While the prevalence of DM complications in Indonesia is 2 out of 5 diabetic women who are in the reproductive age range. The prevalence of gestational diabetes in Indonesia is 1.9% - 3.6% in general pregnancies, and the prevalence of pregnant women with a family history of diabetes mellitus is 1.5%, of all pregnancies ranging from 1 - 14% experiencing gestational diabetes (Ministry of Republic of Indonesia Health, 2019).

According to Perkeni (2021) Determining the incidence of Gestational Diabetes Mellitus is still constrained by the absence of uniformity in the diagnostic method for Gestational Diabetes Mellitus. Because of this, the number and prevalence of Gestational Diabetes Mellitus sufferers in Banten Province cannot be known with certainty. In Malingping District itself, Gestational Diabetes Mellitus sufferers reached 35 people, which were divided into health facilities, namely the Malingping Inpatient Health Center and Cipeundeuy Health Center which received health services according to standards, and attended classes for pregnant women. In the working area of the Malingping Inpatient Health Center, there are 25 people with Gestational Diabetes Mellitus in 2022, where there is an increase from the previous year which only amounted to 7 people in 2020, and 8 people in 2021 (Malingping Inpatient Health Center, 2022)

Based on the description above, the authors are interested in researching whether Diabetes Self-Management Education (DSME) affects Glycosylated Hemoglobin in Gestational Diabetes Mellitus sufferers in the working area of the Malingping Inpatient Health Center in 2022.

B. METHOD

This research is a type of Quasy Experimental research using a Quantitative approach. Primary data collection was carried out using a questionnaire research instrument, as well as secondary data in the form of the number of patients with Gestational Diabetes Mellitus. The

sample in this study was the entire population, namely 25 respondents to Gestational Diabetes Mellitus patients in the Working Area of the Malingping Inpatient Health Center in 2022. The analytical method used in this study was the Paired Sample t-Test.

C. RESULT AND DISCUSSION

Respondents' responses to Diabetes Self-Management Education (DSME) are presented in the following figure:

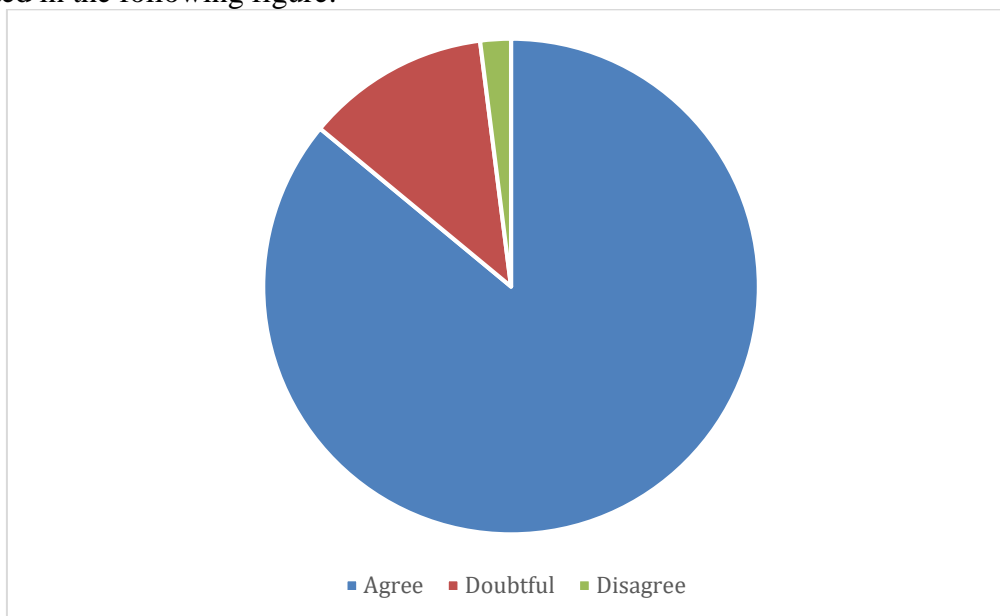


Figure 1. Percentage of Respondents' Responses to Diabetes Self-Management Education (DSME)

Source: Analysis Results, 2022

Based on the results of the questionnaire calculation, there were 431 agreed answers out of a total of 25 respondents who responded to 20 statements, of which 500 agreed answers were required for Diabetes Self-Management Education (DSME) to be delivered perfectly, namely 100%. In the results of this research questionnaire, at least 86% of respondents agreed with the statement regarding Diabetes Self-Management Education (DSME) given.

Table 1. Results of Pre-Test and Post-Test Measurements Levels HbA1c

Respondent	HbA1c (%)	
	Pre Test	Post Test
1	6.8	5.9
2	7.3	4.7
3	6.5	4.2
4	7.6	6.3
5	7.2	4.6
6	6.7	6.5
7	7.4	5.0
8	6.5	6.8
9	7.0	5.8
10	6.6	4.7
11	6.9	5.5
12	7.3	4.9

Respondent	HbA1c (%)	
	Pre Test	Post Test
13	7.4	5.2
14	8.2	5.1
15	6.8	6.0
16	7.2	6.0
17	6.7	6.3
18	8.0	5.1
19	6.8	6.8
20	7.3	5.2
21	6.5	4.8
22	7.5	5.5
23	6.9	6.2
24	6.6	5.0
25	7.5	4.3

Source: Analysis Results, 2022

Based on the table above, it can be seen that there was a decrease in HbA1c levels from what was originally categorized as Diabetes during the Pre-Test to normal during the Post-Test.

Table 2. Normality Test Results

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre Test	,137	25	,200(*)	,933	25	,101
Post Test	,152	25	,142	,955	25	,328

Source: Analysis Results, 2022

Based on the results of the Normality Test, it can be seen that the Significance value obtained for the Pre-Test is 0.101 and the Post-Test is 0.328, where the value is > 0.05 (5%), it can be concluded that H_0 is accepted, which means that the data is normally distributed. From the normally distributed data, the Paired Sample T-Test can then be carried out (Hildebrand et al., 2020).

A paired t-test is used when we are interested in the difference between two variables for the same subject. Often the two variables are separated by time. For example, in the Dixon and Massey data set we have cholesterol levels in 1952 and cholesterol levels in 1962 for each subject.

Table 3. Paired Sample t-Test Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-Test	7.0880	25	.46397	.09279
	Post-Test	5.4560	25	.76162	.15232

Source: Analysis Results, 2022

Paired T-Test is a parametric test that can be used on two paired data. The purpose of this test is to see if there is an average difference between two paired or related samples

Table 4. Correlation Test Paired Sample t-Test

		N	Correlation	Sig.
Pair 1	Pre Test & Post Test	25	-.235	.258

Source: Analysis Results, 2022

Paired sample t-Test is a different test of two paired samples. Paired samples are the same subject, but experience different treatment. This different test model is used to analyze the research model before and after. The results of the paired sample t-test are presented in the following table:

Table 5. Paired Sample t-Test Results

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Upper				Lower
Pair 1	Pre Test - Post Test	1,63200	,98053	,19611	1,22726	2,03674	8,322	24	,000

Source: Analysis Results, 2022

Based on the results of the analysis and referring to the table above, a significance value or Sig is obtained. (2-tailed) = 0.00, which means the value of t count ≤ 0.05 . So, it can be concluded that H_a is accepted and H_0 is rejected, that is, the two population means are not identical, or the results of the pre-test and post-test have differences.

Responses of Gestational Diabetes Mellitus Patients to Diabetes Self-Management Education (DSME)

In the aspect of treatment, 81% of respondents answered that they agreed, which means that the majority of respondents adhered to treatment by taking diabetes medication or injecting insulin according to the doctor's recommended dose in a timely manner, as well as conducting consultations when controlling a doctor or health worker, but still as many as 15% of them answered they were unsure, which indicated that there were still some Gestational Diabetes Mellitus patients who were not compliant with treatment and rarely consulted when controlling a doctor or health worker.

In the Monitoring aspect, 83% of respondents answered yes, which means that the majority of respondents are aware of the importance of conducting Diabetes Self-Management Education (DSME), and that patients with Gestational Diabetes Mellitus are given support and motivation by their family or those closest to them. However, there are still 14% who respond doubtfully and 3% do not agree, which indicates there is still a lack or even no awareness and motivation or support from family/close people.

In the nutritional aspect, as many as 88% of respondents answered that they agreed, which means that patients with Gestational Diabetes Mellitus are obedient in following meal plans according to dietary rules for people with DM, where respondents always pay attention to calorie needs and meal schedules, as well as control their weight, and during control see a doctor, and consult a doctor / health worker about the diet pattern that is being undertaken (Brunisholz et al., 2014; Savira, 2018).

In the Activity and Sport aspect, 88% of respondents answered yes, which means that Gestational Diabetes Mellitus patients always do sports activities 3-4 times a week using footwear when doing sports activities outside the home. In the Stress and Psychosocial aspects, as many as 92% of respondents agreed, which means that the majority of Gestational Diabetes Mellitus patients pay attention to their daily living conditions and understand how to deal with them when they feel stressed.

In the aspect of foot care, 79% of respondents answered that they agreed, which means that the majority of Gestational Diabetes Mellitus patients had compliance in examining the condition of their feet and carrying out treatment and consulting doctors, but

there were also 19% of respondents who answered in doubt and 2% did not agree, which indicates that you are lacking or even negligent in checking the condition of your feet and not carrying out treatment or consultation.

In the aspect of the Health Service System and Resources, 100% of respondents answered that they agreed, which means that all respondents considered that the Malingping Health Center along with the health workers on duty were very helpful in providing information about health workers and the health service system regarding Gestational Diabetes Mellitus, as well as having services very good.

Effect of Diabetes Self-Management Education (DSME) on Glycosylated Hemoglobin (HbA1c)

Based on the responses of Gestational Diabetes Mellitus Patients to providing education regarding Diabetes Self-Management Education (DSME) which showed positive results, that the majority of respondents responded by agreeing to each statement given, which is in line with the changing results of the Pre-Test with Post-Test levels Glycosylated Hemoglobin (HbA1c) becomes towards normal from what was previously categorized as Diabetes. Based on this, it can be seen that by providing counseling about Diabetes Self-Management Education (DSME), it can have an effect on reducing Glycosylated Hemoglobin levels (HbA1c).

This research is not in line with Yusnita & Tuharea (2021) and Hunt (2015) with the results of the study showing a sig (2 tailed) value of $0.439 > 0.05$, it can be concluded that H_0 is accepted H_a is rejected meaning there is no difference before and after being given self-management training on checking sugar levels blood in diabetics. And this study is in line with Ismansyah et.al (2020), with the results of the research p value (intervention group) = $0.001 < \alpha = 0.05$, which means there is a significant difference between the average pre-test and post-test HbA1C (H_0 =rejected) and P value (control group) = $0.002 < \alpha = 0.05$ which means there is a difference between the pre-test and post-test HbA1C values (H_0 =rejected).

In the book "Diabetes Self-Management Education (DSME): Emotional Demonstration Approach" written by Nugroho & Budiana (2021), Badrudin et al's (2002) research in (Kusniawati, 2011; He et al., 2017; Haas et al., 2014) reveals that clients who are given education with the DSME method will set patterns life that can control blood sugar well. In addition, health education will be more effective if health workers know the level of knowledge, attitudes and habits of Diabetes Mellitus patients.

Ferawati et al (2020) in the book "Healthy & Happy Living with Diabetes (Recognize, Prevent and Treat) explains that for people with DM, checking blood sugar regularly is an obligation to prevent further complications.

D. CONCLUSION

This research was conducted to determine the effect of Diabetes Self-Management Education (DSME) on Glycosylated Hemoglobin in Gestational Diabetes Mellitus sufferers in the working area of the Malingping Inpatient Health Center in 2022. Based on the results of the research and analysis that has been carried out, it can be concluded that as many as 86% of the 25 respondents have an understanding of the importance of Diabetes Self-Management Education (DSME) and carry out DSME components independently at home.

After counseling related to Diabetes Self-Management Education (DSME), it was found that there was a change in Glycosylated Hemoglobin levels in the Pre-test and Post-test results, that a significance value or Sig was obtained. (2-tailed) = 0.00, which means the value of t count ≤ 0.05 . So it can be concluded that there is an effect of Diabetes Self-

Management Education (DSME) on Glycosylated Hemoglobin in Gestational Diabetes Mellitus sufferers in the working area of the Malingping Inpatient Health Center in 2022.

REFERENCES

1. Adam, L., O'Connor, C., & Garcia, A. C. (2018). Evaluating the Impact of Diabetes Self-Management Education Methods on Knowledge, Attitudes and Behaviours of Adult Patients with Type 2 Diabetes Mellitus. *Canadian Journal of Diabetes*, 42(5), 470-477.
2. Brunisholz, K. D., Briot, P., Hamilton, S., Joy, E. A., Lomax, M., Barton, N., ... & Cannon, W. (2014). Diabetes Self-Management Education Improves Quality of Care and Clinical Outcomes Determined by a Diabetes Bundle Measure. *Journal of multidisciplinary healthcare*, 7, 533.
3. Chai, S., Yao, B., Xu, L., Wang, D., Sun, J., Yuan, N., ... & Ji, L. (2018). The Effect of Diabetes Self-Management Education on Psychological Status and Blood Glucose in Newly Diagnosed Patients with Diabetes Type 2. *Patient Education and Counseling*, 101(8), 1427-1432.
4. Chiptarini, I. F. D. (2014). Gambaran Pengetahuan dan Perilaku tentang Penatalaksanaan DM pada Pasien DM di Puskesmas Ciputat Timur.
5. Chrvala, C. A., Sherr, D., & Lipman, R. D. (2016). Diabetes Self-Management Education for Adults with Type 2 Diabetes Mellitus: A Systematic Review of the Effect on Glycemic Control. *Patient Education and Counseling*, 99(6), 926-943.
6. Cook, T. D., Campbell, D. T., & Day, A. (1979). *Quasi-Experimentation: Design & Analysis Issues for Field Settings* (Vol. 351). Boston: Houghton Mifflin.
7. Cunningham, A. T., Crittendon, D. R., White, N., Mills, G. D., Diaz, V., & LaNoue, M. D. (2018). The Effect of Diabetes Self-Management Education on HbA1c and Quality of life in African-Americans: A Systematic Review and Meta-Analysis. *BMC Health Services Research*, 18(1), 1-13.
8. Dalimunthe, D. Y., Nasution, J. D., & Harahap, S. (2020). Pengaruh Diabetes Self-Management Education (DSME) sebagai Model Keperawatan Berbasis Keluarga terhadap Pengendalian Glukosa pada Penderitadiabetes Melitus. *Jurnal Mutiara Kesehatan Masyarakat*, 1(1).
9. Funnell, M. M., Brown, T. L., Childs, B. P., Haas, L. B., Hosey, G. M., Jensen, B., ... & Weiss, M. A. (2010). National Standards for Diabetes Self-Management Education. *Diabetes Care*, 33(Supplement_1), S89-S96.
10. Haas, L., Maryniuk, M., Beck, J., Cox, C. E., Duker, P., Edwards, L., & Youssef, G. (2014). National standards for diabetes self-management education and support. *Diabetes care*, 37(Supplement_1), S144-S153.
11. He, X., Li, J., Wang, B., Yao, Q., Li, L., Song, R., & Zhang, J. A. (2017). Diabetes Self-Management Education Reduces Risk of All-Cause Mortality in Type 2 Diabetes Patients: A Systematic Review and Meta-Analysis. *Endocrine*, 55(3), 712-731.
12. Hildebrand, J. A., Billimek, J., Lee, J. A., Sorkin, D. H., Olshansky, E. F., Clancy, S. L., & Evangelista, L. S. (2020). Effect of Diabetes Self-Management Education on Glycemic Control in Latino Adults with Type 2 Diabetes: A Systematic Review and Meta-Analysis. *Patient education and Counseling*, 103(2), 266-275.
13. Hunt, C. W. (2015). Technology and diabetes self-management: an integrative review. *World journal of diabetes*, 6(2), 225.
14. Ismansyah, I., Nulhakim, L., Firdaus, R., Imamah, I. N., Banu, R. Z. Z. S., & Anjani, T. P. (2020). Pengaruh Diabetes Self-Management Education (DSME) terhadap Kadar HbA1C. *MNJ (Mahakam Nursing Journal)*, 2(7), 311-316.

15. Junaedi, E. (2013). *Pengaruh Modul Elektronik Berbasis Mobile Learning terhadap Peningkatan Hasil Belajar Siswa pada Mata Pelajaran Teknologi Informasi dan Komunikasi: Kuasi Eksperimen terhadap Siswa Kelas X SMA Laboratorium Percontohan UPI, Bandung* (Doctoral dissertation, Universitas Pendidikan Indonesia).
16. Korry, D. I. (2017). *Pengaruh Status Kerja Ibu Rumah Tangga terhadap Coping Stress*. Repository Unika Sogijapranata, 36–44.
17. Kurniawati, T., Huriah, T., & Primanda, Y. (2019). Pengaruh Diabetes Self-Management Education (DSME) terhadap Self-Management pada Pasien Diabetes Mellitus. *Jurnal Ilmiah Kesehatan*, 12(2).
18. Mensing, C., Boucher, J., Cypress, M., Weinger, K., Mulcahy, K., Barta, P., ... & Adams, C. (2002). National Standards for Diabetes Self-Management Education. *Diabetes care*, 25(suppl_1), s140-s147.
19. Ningsih, N., & Thahura, F. (2022). Kesehatan Mental Pasien Diabetes Melitus di Puskesmas Langsa Baro. *Jurnal Kebidanan, Keperawatan dan Kesehatan (BIKES)*, 2(1), 7-14.
20. Nugroho, F. C., & Budiana, I. (2021). *Diabetes Self-Management Education (DSME) Pendekatan Emotional Demonstration*. Media Sains Indonesia.
21. Rahman, R. (2018). Gambaran Hasil Pemeriksaan HbA1c pada Penderita Diabetes Mellitus Tipe II di RSUD Labuang Baji Makassar. *Jurnal Media Analis Kesehatan*, 9(2), 149-155.
22. Rondhianto, R. Keterkaitan Diabetes Self-Management Education terhadap Self Efficacy Pasien Diabetes Mellitus. *Jurnal Keperawatan*, 3(2), 138130.
23. Savira, M., & Amelia, R. (2018). The Effect of Diabetes Self-Management Education on HbA1c Level and Fasting Blood Sugar in Type 2 Diabetes Mellitus Patients in Primary Health Care in Binjai City of North Sumatera, Indonesia. *Open access Macedonian journal of medical sciences*, 6(4), 715.
24. Sugiyono, (2018). *Metode Penelitian Kuantitatif*. Alfabeta, Bandung
25. Sukendra, I. K., & Atmaja, I. K. (2020). *Instrumen Penelitian*. Pontianak: Mahameru Press.
26. Umaroh, L. (2018). *Pengaruh Diabetes Self-Management Education (DSME) Melalui Media Kalender terhadap Kepatuhan Perawatan Kaki Klien Diabetes Mellitus Tipe 2 di Balai Pengobatan Muhammadiyah Lamongan* (Doctoral dissertation, Universitas Airlangga).
27. Wibawa, W. D. (2019). Kompetensi Penilaian Dupak. *Jurnal AgroSainTa: Widyaiswara Mandiri Membangun Bangsa*, 3(2), 126-135.
28. Yuan, C., Lai, C. W., Chan, L. W., Chow, M., Law, H. K., & Ying, M. (2014). The Effect of Diabetes Self-Management Education on Body Weight, Glycemic Control, and Other Metabolic Markers in Patients with Type 2 Diabetes Mellitus. *Journal of Diabetes Research*, 2014.
29. Yusnita, Y., & Tuharea, R. (2021). Pengaruh Self Manajement terhadap Pengendalian Kadar Gula Darah pada Penderita Diabetes Mellitus Tipe II di UPTD Diabetes Center Kota Ternate. *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, 4(3), 383-391.