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THE EFFECT OF A COMBINATION OF HYDROTHERAPY DRINKING WATER AND ACUPRESSURE ON THE KGDS OF DM PATIENTS

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ABSTRACT

Diabetes Mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from abnormalities in insulin secretion, insulin action, or both. Diabetes Mellitus remains a significant health problem and a priority target for global follow-up due to its dangerous impacts and increasing prevalence annually. Complementary therapy, a combination of hydrotherapy, drinking water, and acupressure, is a non-pharmacological therapy that can be administered to control blood sugar levels in diabetes mellitus patients. This combination of therapies has been proven to be more effective in controlling blood glucose levels in diabetes mellitus patients because it can impact the excretion of excess sugar in the body while simultaneously affecting the hypothalamus by activating one of the carbohydrate metabolism enzymes (glucose-6-phosphate). In the pancreas, it increases insulin synthesis, increases receptors on target cells, and accelerates glucose utilization in cells. The purpose of this study was to analyze the effect of the combination of drinking water hydrotherapy and acupressure therapy on blood glucose levels during Type II DM patients in Ilir Village, Gunungsitoli District Health Center Working Area in 2024. This type of research is quasi-experimental with a nonequivalent control group design approach. The study population was all Type 2 DM patients in Ilir Village, Gunungsitoli District Health Center Working Area with a sample size of 32 respondents. The sampling technique was purposive sampling. The sample was selected according to the researcher's wishes with inclusion criteria: age 30-70 years, type 2 diabetes mellitus diagnosed by a doctor, stable drug therapy ≥ 4 weeks (no change in dose/type of insulin), random blood sugar 140-300 mg/dl, good hydration status, adequate kidney function and no fluid restrictions, controlled blood pressure; exclusion criteria: type 1 DM, gestational DM, changes in antihyperglycemic therapy < the last 4 weeks, suffering from kidney failure, heart failure, experiencing acute infections, uncontrolled blood pressure, skin disorders/wounds. Researchers used repeated ANOVA tests if the data were normally distributed or Friedman Tests if the data were not normally distributed. For comparison of the intervention and control groups, researchers used t-tests if they were normally distributed or Mann Whitney if they were not normally distributed. From the results of the repeated ANOVA test, it was known that the Greenhouse-Geisser significance value was 0.001 ($p = <0.05$), which means there was a significant difference between blood sugar levels before and after the intervention in the intervention group. From the results of the independent t-test, it is known that the two-sided significant value is 0.001 ($p < 0.05$), which means there is a significant difference between random blood sugar levels in the intervention group and the control group after intervention 3. The conclusion of this study is that the combination of drinking water hydrotherapy and acupressure has an effect on the KGDS of diabetes mellitus patients.

Keywords: acupressure; diabetics; drink; temporary blood sugar levels; water

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INTRODUCTION

Non-communicable diseases (NCDs) are a significant public health problem today. This is marked by a shift in epidemiological patterns from a declining trend in infectious diseases to a global increase in non-communicable diseases (Syahid, 2021). This is evident in the high death rate caused by NCDs in 2014, reaching 41 million people, equivalent to 71% of all deaths worldwide each year. Data also shows that more than 15 million people aged 30 to 69 die from NCDs, 85% of whom are from low- and middle-income countries. Among several

NCDs, diabetes mellitus is one of the diseases that contributes significantly to NCD deaths, claiming 1.5 million lives annually (Widiasari, 2021).

Diabetes Mellitus is a disease with a chronic disruption of the blood sugar metabolism process characterized by high blood sugar levels caused by impaired insulin secretion, insulin resistance, or both(Lutfiani, 2020). Diabetes Mellitus is a metabolic disorder characterized by hyperglycemia associated with abnormalities in carbohydrate, fat, and protein metabolism caused by decreased insulin secretion or decreased insulin sensitivity or both and causing chronic microvascular, macrovascular, and neuropathic complications (Nanda, 2015). Diabetes mellitus is also a collection of symptoms that arise in a person caused by increased blood glucose levels due to insulin deficiency, either absolute or relative (Suyono, 2017). Diabetes mellitus is a metabolic disorder characterized by hyperglycemia that occurs due to abnormalities in insulin secretion, insulin action, or both (Fitriani, Pristianty, & Hermansyah, 2019) (Gayatri, Kistianita, Virrizqi, & Sima, 2019). Diabetes remains a significant health issue and a priority target for global action due to its potentially devastating impact as a non-communicable disease (Afrianti, 2021). Diabetes mellitus is also a significant health issue, as data shows that its prevalence increases annually, both nationally and globally.

Based on data from the International Diabetes Federation (IDF), it is estimated that at least 463 million people aged 20-79 years in the world suffered from Diabetes Mellitus in 2019. Based on gender, the IDF estimates the prevalence of Diabetes Mellitus in 2019 was 9% in women and 9.65% in men. The prevalence of Diabetes Mellitus is estimated to increase with increasing population age to 19.9% or 111.2 million people aged 65-79 years. The number is predicted to continue to increase to reach 578 million in 2030 and 700 million in 2045. Countries in the Arab-North African and Western Pacific regions are ranked first and second with the prevalence of Diabetes Mellitus in the population aged 20-79 years, namely 12.2% and 11.4%. The Southeast Asian region where Indonesia is located is ranked 3rd with a prevalence of 11.3%. The IDF has also projected the number of Diabetes Mellitus sufferers in the population aged 20-79 years in several countries around the world and has identified 10 countries with the highest number of sufferers, with Indonesia ranked 7th among the 10 countries with the highest number of sufferers, namely 10.7 million. Indonesia is the only country in Southeast Asia on the list, so it can be estimated that Indonesia's large contribution to the prevalence of Diabetes Mellitus cases in Southeast Asia (Kementerian Kesehatan RI., 2020).

The 2018 National Basic Health Research (RISKESDAS) collected data on DM sufferers among residents aged 15 years and older. The 2018 National Riskesdas (Basic Health Research) showed that the prevalence of DM in Indonesia, based on doctor's diagnosis for those aged 15 years and older, was 2%. This figure represents an increase compared to the prevalence of DM in the population aged 15 years and older in the 2013 Riskesdas, which was 1.5%. Based on the research results, North Sumatra ranks 13th as the province with the highest number of sufferers out of 34 provinces in Indonesia. (Kementrian Kesehatan Republik Indonesia, 2018).

The results of the 2018 North Sumatra Province Riskesdas showed that the prevalence of Diabetes Mellitus (DM) in North Sumatra based on doctor's diagnosis in the population aged ≥ 15 years also increased from 1.8% in 2013 to 2.0% in 2018. Based on the results of the 2018 Riskesdas, Gunungsitoli City was the largest contributor to the prevalence of DM in North Sumatra, namely 2.86% (Riskesdas Provinsi Sumatera Utara, 2018). Ninety percent of diabetes cases are Type 2 Diabetes Mellitus (DM), characterized by impaired insulin sensitivity and/or impaired insulin secretion. Type 2 Diabetes Mellitus (DM) clinically

appears when the body is no longer able to produce enough insulin to compensate for increased insulin resistance. Type 2 Diabetes Mellitus usually affects people who lead an unhealthy lifestyle, for example, eating mostly fatty and cholesterol-rich foods but low in fiber and vitamins. This condition triggers obesity, which is one of the causes of Type 2 Diabetes Mellitus. Type 2 Diabetes Mellitus (DM) has become a global health problem because the prevalence and incidence of this disease continues to increase, both in industrialized and developing countries, including Indonesia (Decroli, 2019).

DM is often referred to as a silent killer, because without the sufferer realizing it, complications such as cardiovascular disease, chronic kidney failure, retinal damage that can cause blindness and nerve damage that can cause impotence and gangrene, with the risk of amputation (Supri, 2013). Diabetes mellitus is also a widespread problem because of the increasing morbidity rate and the increasing cost impact so that the level of community quality and productivity of the community is ineffective and reduced, where people cannot work well so they get low income due to diabetes mellitus(Cicilia L, 2018).

One treatment that can be implemented to maintain blood glucose balance in diabetes patients, in addition to the four pillars of diabetes mellitus management, is complementary therapy. Complementary therapy is a variety of natural therapies used to improve health, healing, and well-being, complementing disease-focused medical care (Tsai, 2012). Complementary therapy in nursing practice is needed to complement or strengthen conventional and biomedical treatments to accelerate the healing process. Conventional medicine (medicine) prioritizes treating the symptoms of the disease, while natural (complementary) medicine addresses the cause of the disease and stimulates the body's own healing process (Elmatris, 2012). Complementary therapies that can be implemented include water hydrotherapy and acupressure techniques.

Water hydrotherapy is one complementary therapy that can be provided to diabetes patients. Drinking water helps the body eliminate all toxins, including excess sugar. This is supported by research by James (2010), which states that drinking water promotes the breakdown of sugar. To help remove chemicals such as glucose and other substances through the kidneys and the process of cleansing the body's organs, a large amount of fluid is required in one dose in the morning (Jahidin, 2019). Drinking water hydrotherapy was first developed in India and is believed to address various health issues. Natural water therapy can be based on two approaches: internal use, or proper drinking, and external use. In this case, the water therapy referred to is internal, involving drinking 1.5 liters of water every morning immediately upon waking. Based on research and experience, diabetes mellitus is known to be curable with water therapy within 7 days (Jahidin, 2019). This theory is supported by several studies, including a study by Jahidin et al. (2019) entitled "The Effect of Water Therapy on Reducing Random Blood Sugar Levels (GDS) in Type 2 Diabetes Patients." The results showed an effect of water therapy on random blood sugar levels in type 2 diabetes patients in Bumiayu Village, Wonomulyo District, Polewali Mandar Regency (Jahidin, 2019). A study by Elmatris et al. (2012) entitled "The Effect of Hydrotherapy on Reducing Random Blood Sugar Levels (KGDS) in Type 2 Diabetes Mellitus Patients" stated that there was an effect of hydrotherapy in Type 2 DM patients who were given oral therapy. This was seen in a significant difference with $p = 0.00$ ($p < 0.005$) in the average random blood sugar levels (KGDS) between the intervention group (oral therapy and hydrotherapy) and the control group (oral therapy only) (Elmatris, 2012). Hikmah's (2021) study, "The Effectiveness of Water Therapy on Blood Sugar Levels in Type 2 Diabetes Mellitus Patients" (Study: Narrative Review), stated that a review of eight journals showed that water therapy effectively lowers blood sugar levels in Type 2 Diabetes Mellitus patients (Hikmah, 2021).

Acupressure therapy is also believed to control blood glucose levels in diabetes patients. Acupressure therapy is commonly used to improve sleep quality. This is indirectly related to blood glucose control in DM patients, where poor sleep quality and inefficient sleep affect poor control of HbA1c levels in type 2 diabetes. Improved sleep quality in DM patients can lead to significantly better glycemic control and an improved quality of life (Tsai, 2012). William & Hopper (2015) also believe that acupressure therapy can be used to stabilize blood glucose by lowering blood glucose levels. Acupressure is a treatment that falls into the manipulative and body-based modalities category, based on the Meridian theory and the Ying/Yang theory in Eastern philosophy (Afrianti, 2021). Acupressure works by affecting the hypothalamus and activating one of the carbohydrate metabolism enzymes (glucose-6-phosphate). In the pancreas, it increases insulin synthesis, increases receptors on target cells, and accelerates glucose utilization in cells, thereby lowering blood sugar levels. Commonly used acupressure points are Pishu (BL 20), Feishu (BL 23), Shenshu (BL 23), Zusanli (ST 36), Sanyinjiao (SP 6), and Hegu (LI 4) (Masithoh, Ropi, & Kurniawan, 2016). Acupressure therapy is an effective non-pharmacological supplementary strategy for reducing the progression and complications associated with type 2 diabetes mellitus (Chen et al, 2009). This is evidenced by research (Fitrullah & Rousdy, 2016), which demonstrated acupressure's ability to reduce blood glucose levels and significantly reduce diabetes-related complications (Fitrullah, 2017). A study by Jumari et al., 2019, entitled "The Effect of Acupressure on Blood Glucose Levels in Type 2 Diabetes Mellitus Patients," also demonstrated that acupressure is an effective intervention for lowering blood glucose levels in patients with type 2 diabetes mellitus (Jumari, 2019).

A study (Jamaluddin et al., 2019) entitled Analysis of Acupressure Therapy on Blood Glucose Balance in Type 2 Diabetes Mellitus Patients in the Work Area of Jumpandang Baru Makasar Health Center, also showed a significant effect of acupressure therapy on blood glucose balance in type 2 DM patients with a p value = 0.005 in the intervention group and p = 0.977 in the control group. Acupressure therapy has been shown to reduce blood glucose and is very helpful in reducing complications due to diabetes. Acupressure therapy is considered the most effective alternative therapy for controlling diabetes compared to other therapies. Acupressure has been shown to reduce blood glucose and is very helpful in reducing complications due to Diabetes Mellitus (Jamaluddin, 2019). A study (Afrianti, 2021) entitled Application of Acupressure Therapy in Diabetes Mellitus Patients also concluded that there is an effect of acupressure application in reducing nausea and vomiting in patients with Diabetes Mellitus (Afrianti, 2021).

The combination of these two complementary therapies, drinking water hydrotherapy and acupressure, is expected to be more effective in helping people with diabetes mellitus control their blood sugar levels. Simultaneously, drinking water hydrotherapy promotes sugar breakdown, aids glucose excretion through the kidneys, and promotes organ cleansing. Acupressure can improve sleep quality, activate the hypothalamus, activating one of the carbohydrate metabolism enzymes (glucose-6-phosphate), increase insulin synthesis in the pancreas, increase receptors on target cells, and accelerate glucose utilization in cells.

A preliminary study at the Gunungsitoli District Health Center (UPTD) found that diabetes ranked first among the 10 most common diseases in 2022, with 828 people suffering from diabetes. Ilir Village contributed the highest number of type 2 diabetes mellitus sufferers in the entire Gunungsitoli District Health Center (UPTD) work area, with 141 sufferers. The results of interviews conducted with 4 health workers at the Gunungsitoli District Health Center UPTD revealed that DM sufferers had never been educated to carry out a combination of drinking water hydrotherapy and acupressure techniques as a non-pharmacological therapy

to control blood glucose levels in DM sufferers. The results of interviews with 5 people with type 2 DM were found to have never carried out a combination of drinking water hydrotherapy and acupressure techniques to control their blood glucose levels. Based on the above background, the researcher was interested in conducting research with the aim of analyzing"The Effect of the Combination of Drinking Water Hydrotherapy and Acupressure Techniques on Blood Glucose Levels During Type II DM Sufferers in Ilir Village, the Working Area of the Gunungsitoli District Health Center UPTD in 2024.

METHOD

Type of research is a quasi-experimental with a nonequivalent control group design approach (Arikunto, 2009). The study population was all Type 2 DM patients in Ilir Village, Gunungsitoli District Health Center Working Area, with a sample size of 32 respondents. The sampling technique was purposive sampling (Notoatmodjo, 2012). The sample was selected according to the researcher's wishes with inclusion criteria: age 30-70 years, type 2 diabetes mellitus diagnosed by a doctor, stable drug therapy ≥ 4 weeks (no change in dose/type of insulin), random blood sugar 140-300 mg/dl, good hydration status, adequate kidney function and no fluid restrictions, controlled blood pressure; exclusion criteria: type 1 DM, gestational DM, changes in antihyperglycemic therapy < the last 4 weeks, suffering from kidney failure, heart failure, experiencing acute infections, uncontrolled blood pressure, skin disorders/wounds. Researchers used the repeated ANOVA test if the data were normally distributed or the Friedman Test if the data were not normally distributed. For comparison of the intervention and control groups, researchers used the t-test if the data were normally distributed or the Mann Whitney test if the data were not normally distributed.

RESULT

From the results of the univariate test, data on the characteristics of respondents in the intervention group and the control group were obtained, which can be seen in the table below:

Table 1.
Characteristics of Respondents in the Intervention Group and Control Group

Variables	Group			
	Intervention		Control	
	n	%	n	%
Gender				
Man	6	37,50	7	43,75
Woman	10	62,50	9	56,25
Age				
Matur (< 45 tahun)	3	18,75	2	12,5
Pre - Eldery (45 – 59 tahun)	9	56,25	8	50
Eldery (> 59 tahun)	4	25	6	37,5
Education				
Tall	3	18,75	2	12,5
Medium	12	75	10	62,5
Low	1	6,25	4	25

Based on table 1 above, it can be seen that in the intervention group, the majority gender was female with 10 respondents (62.50%), the majority age was pre-elderly with 9 respondents (56.25%), the majority education was secondary education with 12 respondents (75%). In the control group, the majority gender was female with 9 respondents (56.25%), the majority age was pre-elderly with 8 respondents (50%), and the majority education was secondary education with 12 respondents (75%).

From the results of the repeated ANOVA test, data was obtained on the difference between blood sugar levels before and after the intervention was given in the intervention group in the table below:

Table 2.
Test of Within Subjects Effects

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Waktu	Sphericity Assumed	57856.297	3	19285.432	94.769	<.001
	Greenhouse-Geisser	57856.297	1.309	44183.743	94.769	<.001
	Huynh-Feldt	57856.297	1.384	41796.100	94.769	<.001
	Lower-bound	57856.297	1.000	57856.297	94.769	<.001
Error (Waktu)	Sphericity Assumed	9157.453	45	203.499		
	Greenhouse-Geisser	9157.453	19.642	466.225		
	Huynh-Feldt	9157.453	20.764	441.030		
	Lower-bound	9157.453	15.000	610.497		

Based on table 2, it is known that the Greenhouse-Geisser significance value is 0.001 (p = < 0.05), which means there is a significant difference between blood sugar levels before and after the intervention in the intervention group.

From the results of the independent t-test, comparative data was obtained on random blood sugar levels after being given a combination of drinking water hydrotherapy and acupressure therapy 3 in the intervention group and the control group, as follows:

Table 3
Comparison of random blood sugar levels after being given a combination of hydrotherapy, drinking water, and acupressure therapy 3 in the intervention group and the control group.

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
Random Blood Sugar Level Post 3	Equal variances assumed	7.505	.010	-9.626	30	<.001	<.001	-86.62500	8.99928	-105.00397	-68.24603
	Equal variances not assumed			-9.626	22.288	<.001	<.001	-86.62500	8.99928	-105.27437	-67.97563

Based on table 3, it is known that the two-sided significant value is 0.001 (p < 0.05), which means there is a significant difference between random blood sugar levels in the intervention group and the control group after intervention 3.

DISCUSSION

The research results revealed a Greenhouse-Geisser significance value of 0.001 (p = <0.05), indicating a significant difference between random blood sugar levels before and after the intervention in the intervention group. The two-sided significance value was also 0.001 (p <0.05), indicating a significant difference between random blood sugar levels in the intervention group and the control group after intervention 3. Therefore, it can be concluded that the combination of water hydrotherapy and acupressure therapy significantly reduces blood glucose levels in patients with diabetes mellitus.

Water hydrotherapy is a complementary therapy that can be given to patients with diabetes. Drinking water helps eliminate all toxins in the body, including excess sugar. This is supported by research by James (2010), which states that drinking water causes sugar breakdown. To help remove chemicals such as glucose and other substances through the kidneys and cleanse the body's organs, a large amount of fluid is needed in one morning (Jahidin, 2019). Drinking water hydrotherapy was first developed in India and is believed to address various health issues. Natural water therapy can be based on two uses: internal use, or by drinking water correctly, and external use. In this case, the use of water therapy referred to is internal water therapy, which involves drinking 1.5 liters of water every morning immediately after waking up. Based on research and experience, Diabetes Mellitus is known to be curable with water therapy within 7 days (Jahidin, 2019).

This theory is supported by several studies, including a study by Jahidin et al. (2019) entitled "The Effect of Water Therapy on Reducing Random Blood Sugar Levels (GDS) in Type 2 DM Patients." The results of the study showed an effect of water therapy on random blood sugar levels in type 2 DM patients in Bumiayu Village, Wonomulyo District, Polewali Mandar Regency (Jahidin, 2019). Elmatris et al.'s (2012) research entitled The Effect of Hydrotherapy on Reducing Instantaneous Blood Sugar Levels (KGDS) in Type 2 Diabetes Mellitus sufferers stated that there was an effect of hydrotherapy in Type 2 DM sufferers who were given oral therapy, this was seen as a significant difference with $p = 0.00$ ($p < 0.005$) from the average instantaneous blood sugar levels (KGDS) between the intervention group (administration of oral therapy and hydrotherapy) and the control group (only administration of oral therapy) (Elmatris, 2012). Hikmah's (2021) research entitled The Effectiveness of Water Therapy on Blood Sugar Levels in Type 2 Diabetes Mellitus Patients Study: Narrative Review stated that the results of a review of 8 journals showed that drinking water therapy was effective in reducing blood sugar levels in Type 2 Diabetes Mellitus patients (Hikmah, 2021).

Acupressure therapy is also believed to control blood glucose levels in diabetics, where acupressure therapy is commonly used to improve sleep quality. This is indirectly related to blood glucose control in DM patients, where poor sleep quality and inefficient sleep affect poor control of HbA1c levels in type 2 diabetes. Improved sleep quality in DM patients can lead to significantly better glycemic control and an improved quality of life (Tsai, 2012). William & Hopper (2015) also believe that acupressure therapy is an intervention that can be used to stabilize blood glucose by lowering its levels. Acupressure is a treatment that falls into the category of manipulative and body-based modalities based on the Meridian theory with the Ying/Yang theory in eastern philosophy (Afrianti, 2021).

Acupressure works by affecting the hypothalamus and activating one of the carbohydrate metabolism enzymes (glucose 6 phosphate), in the pancreas increasing insulin synthesis, increasing receptors on target cells, and accelerating glucose utilization in cells, thereby lowering blood sugar levels. The acupressure points frequently used are Pishu (BL 20), Feishu (BL 23), Shenshu (BL 23), Zusanli (ST 36), Sanyinjiao (SP 6), Hegu (LI 4) (Masithoh et al., 2016). Acupressure therapy is an effective non-pharmacological supplementary strategy to reduce the development and complications associated with type 2 diabetes mellitus (Chen et al, 2009). This is proven by research conducted (Fitrullah & Rousdy, 2016) where acupressure therapy has been shown to reduce blood glucose and is very helpful in reducing complications due to diabetes (Fitrullah, 2017). The results of research (Jumari et al., 2019) entitled The Effect of Acupressure on Blood Glucose Levels in Type 2 Diabetes Mellitus Patients also prove that acupressure is an effective intervention to reduce blood glucose levels in Type 2 Diabetes Mellitus patients (Jumari, 2019). A study (Jamaluddin et al., 2019) entitled

Analysis of Acupressure Therapy on Blood Glucose Balance in Type 2 Diabetes Mellitus Patients in the Work Area of Jumpandang Baru Makasar Health Center, also showed a significant effect of acupressure therapy on blood glucose balance in type 2 DM patients with a p value of 0.005 in the intervention group and p = 0.977 in the control group. Acupressure therapy has been shown to reduce blood glucose and is very helpful in reducing complications due to diabetes. Acupressure therapy is considered the most effective alternative therapy for controlling diabetes compared to other therapies. Acupressure has been shown to reduce blood glucose and is very helpful in reducing complications due to Diabetes Mellitus (Jamaluddin, 2019). A study (Afrianti, 2021) entitled Application of Acupressure Therapy in Diabetes Mellitus Patients also concluded that there is an effect of acupressure application in reducing nausea and vomiting in patients with Diabetes Mellitus (Afrianti, 2021).

The combination of these two complementary therapies, namely drinking water hydrotherapy and acupressure techniques, is expected to be more effective in helping Diabetes Mellitus sufferers control their blood sugar levels, where at the same time doing drinking water hydrotherapy can cause sugar breakdown, help remove glucose through the kidneys and the process of cleansing body organs, by doing acupressure techniques can improve sleep quality, have an effect on the hypothalamus in activating one of the carbohydrate metabolism enzymes (glucose 6 phosphate), in the pancreas increase insulin synthesis, increase receptors on target cells, and accelerate the use of glucose in cells.

CONCLUSION

There is an effect of the combination of drinking water hydrotherapy and acupressure therapy on reducing blood glucose levels in diabetes mellitus sufferers as evidenced by the results of the Greenhouse-Geisser significance value of 0.001 (p = <0.05), which means there is a significant difference between blood sugar levels before and after the intervention in the intervention group and from the two-sided significant value of 0.001 (p <0.05) which means there is a significant difference between blood sugar levels in the intervention group and the control group after intervention 3.

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