Original Research

"CERDIK" Healthy Lifestyle for Reducing Complications of Diabetes Mellitus

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ABSTRACT

Background: Diabetes mellitus that is not handled properly raises severe complications such as heart attack, stroke, infection of heavy legs or ulcers, kidney failure, sexual dysfunction, and eye disorders. The government recommends adopting healthy living behaviors with regular health checks, getting rid of cigarette smoke, diligent physical activity, a healthy and balanced diet, adequate rest, and stress management (CERDIK) to prevent and control diabetes complications.

Methods: The population in this study were people with diabetes mellitus and the sample consisted of 32 respondents who were selected by purposive sampling with inclusion criteria. The CERDIK implementation is given once a week for one month. The risk of diabetes complications is calculated using the FINRISC Instrument (Fennish Diabetes Risk Score). Hypothesis Testing using the Paired Sample Test.

Results: The results of this study show the majority of the females, reaching 75% with the most dominant age <45 years, 53.1%. The normal dominant waist circumference was 62.5%, the history of hypertension reached 56.2%, and increased blood sugar reached 59.4%. Most of the BMI was normal (81.3%), had a family history of DM (71.9%), 81.2% ate fruits and vegetables, and did 87.5% of physical activity. DM complications are effectively reduced with CERDIK (ρ=0.000).

Conclusion: The risk of complications of diabetes mellitus can be prevented through a healthy lifestyle by routinely and regularly conducting regular health checks, avoiding and not smoking, being diligent and regular in exercising, consuming healthy foods with balanced calories, adequate rest, and being able to maintain a healthy lifestyle while managing stress.

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INTRODUCTION

Diabetes is one of the non-communicable diseases that is still a priority and target for health follow-up in the world (WHO, 2022). Diabetes occurs when the pancreas is unable to produce insulin or use insulin effectively, which is characterized by increased blood glucose levels and the body's inability to react to insulin (PERKENI, 2019). About 537 million adults aged 20 to 79 live with diabetes. It is projected to increase to

643 million in 2030 and 783 million in 2045. Diabetes deaths in low- and middle-income countries will reach 6.7 million (IDF, 2022).

Based on blood sugar analysis, diabetes cases in Indonesia increased from 6.9% to 8.5% in 2018. Regions in Indonesia with the highest cases of diabetes include Jakarta with 3.4%, East Kalimantan with 3.1%, and Yogyakarta with 3.1% (Kemenkes RI, 2018b). An increase in cases of diabetes will be able to hamper a country's economic growth, threaten progress toward the 2030 agenda for increasing sustainable development and hinder poverty reduction (Cakrawala, 2021). Diabetes places a significant financial burden not only on the healthcare system in prevention and treatment but also on the physical and psychological burden of individuals, families, and society as a whole (Sari, 2017).

Clinical manifestations of diabetes include insulin deficiency, severe hyperglycemia, glycosuria, polyphagia, and complaints of tiredness and drowsiness (PERKENI, 2021). Risk factors for diabetes include age, family history, lack of activity, and obesity (Stringhini et al., 2018). High sugar levels can cause various complications such as heart attacks and strokes, severe foot infections, kidney failure, sexual dysfunction, and eye disorders (Decroli, 2019).

The results of Saputri's study in 2020 showed the most complications in diabetes mellitus patients, including microvascular complications consisting of retinopathy, nephropathy, and neuropathy and macrovascular complications including cerebrovascular disorders, coronary heart disease, and foot ulcers (Saputri, 2020). In addition, the presence of ocular complications associated with diabetes mellitus is a progressive cause of the highest morbidity. The pathogenesis of complications of diabetes involves metabolic and hemodynamic disorders, hyperglycemia, insulin resistance, dyslipidemia, hypertension, and immune dysfunction (Verhulst et al., 2019).

Individuals can achieve effective management of diabetes mellitus through independent actions taken by individuals in managing behavior based on their knowledge, skills, and self-efficacy. There are four main pillars in the management of diabetes mellitus, which include education, meal planning, physical exercise, and pharmacological intervention(Efendi et al., 2021). Education has an important role in diabetes management.

With education, it is hoped that diabetics will be able to understand the course of diabetes, re-control activities, complicating factors in treatment, healing, and pharmacological and non-pharmacological management. One form of preventing complications from diabetes mellitus is through CERDIK activities, which include regular health checks, getting rid of cigarette smoke, diligent physical activity, a healthy diet with balanced calories, adequate rest, and managing stress (Permenkes Nomor 5, 2017). CERDIK is effective in increasing public knowledge about DM and being able to prevent the risk of complications of diabetes mellitus (Yuana, 2020).

One of the instruments that can be used to measure the risk of complications of diabetes mellitus is using FINDRISC (*Fennish Diabetes Risk Score*). There are eight assessment components, which include age, body mass index (BMI), waist circumference, physical activity, consumption of vegetables and fruit, use of anti-inflammatory drugs, hypertension, a previous diagnosis of high blood sugar, and a family history of hypertension (Lindström & Tuomilehto, 2022). A healthy lifestyle by maintaining a balanced diet and regular physical activity has a relationship with preventing diabetes mellitus (Hariawan et al., 2019).

In addition, the results of community service that has been carried out by (Ernia et al., 2022) also show that DM disease education that is carried out on an ongoing basis includes the causes and healthy lifestyles to provide changes in healthy lifestyles for DM sufferers. According to researchers, the risk of complications of DM can be avoided not only by a healthy lifestyle and diet but also coupled with healthy physical activity in patients, in addition to regular health checks for DM patients and counseling in the form of discussions about preventing smoking. Therefore, researchers are interested in conducting research through CERDIK activities to prevent complications of DM. The aim of this study is to analyze the effectiveness of CERDIK in reducing the risk of complications of diabetes mellitus.

MATERIALS AND METHOD

This study is a pre-experimental study with a one-group pretest and post-test design approach (John & Creswell, 2017). Calculation of the sample size using Federer's formula, namely (t-1)(r-1) 15, where (t) is the number of treatments, and (n) is the number of samples, so that a total sample of 32 people is selected by purposive sampling. Respondents were selected according to the inclusion criteria that had been set, which included awareness of compos mentis and willingness to become respondents. While the exclusion criteria included unwillingness to participate in activities and hearing and vision impairment.

This research activity was carried out from 20 June 2022 to 18 July 2022 in Blang Krueng Village, Baitussalam District, Aceh Besar District. CERDIK activities in preventing complications of diabetes mellitus were carried out twice, namely a pretest and a posttest. The independent variable in this study was CERDIK while the dependent variable in this study was the risk of diabetes complications. The researcher used univariate and bivariate data analysis.

Univariate analysis was used to look at the characteristics of respondents, including gender, age, waist circumference, history of hypertension, history of increased sugar, BMI, family history of DM, eating fruits and vegetables, and physical activity. Bivariate analysis using a paired t-test to see the effectiveness of CERDIK in reducing complications of diabetes mellitus. This research has obtained an ethical permit from UPPM Akper Kesdam Iskandar Muda Banda Aceh with the number 50/UPPM/XI/2022.

RESULTS

Based on the characteristics of the respondents in table 1, it was found that the majority of respondents in this study were women, as many as 24 respondents (75%) of a total of 32 respondents, while the median age was <45 years old, reaching 17 respondents (53.1%) of a total of 32 respondents. The most dominant waist circumference was normal for as many as 20 respondents, with a percentage of (62.5%) of a total of 32 respondents, and a history of hypertension for at most 18 respondents (56.2%) of a total of 32 respondents. While the increase in sugar was the majority of an increase in sugar for as many as 19 respondents (59.4%) of the total 32 respondents.

The highest BMI in this study was normal for as many as 26 respondents (81.3%) out of a total of 32 respondents. There was no history of DM in the family, reaching 23 respondents (71.9%) out of a total of 32 respondents. There were 26 respondents who ate the most fruits and vegetables (81.2%) out of 32 respondents, and there were 28 physical activities with a percentage of 87.5%.

Table 1. Characteristics of Respondents

Characteristics	Frequency	Percentage
Sex		
Male	8	25 %
Female	24	75 %
Total	32	100 %
Age		
≤ 45	17	53,1 %
> 46	15	46,9 %
Total	32	100 %
Waist Circumference		
Normal	20	62,5 %
Obesity	12	37,5 %
Total	32	100 %
History of Hypertension		
There is a history of hypertension	18	56,2 %
No history of hypertension	14	43,8 %
Total	32	100 %
History of increased sugar		
There is an increase	19	59,4 %
No improvement	13	40,6 %
Total	32	100 %
Body Mass Index		
Normal	26	81,2 %
Fat	4	12,5 %
Obesity	2	6,3 %
Total	32	100 %
Family history of Diabetes		
There is a history	9	28,1 %
No history	23	71,9 %
Total	32	100 %
Eating fruits and vegetables		
There are eating fruits and vegetable	26	28,1 %
No eating fruits and vegetables	6	71,9 %
Total	32	100 %
Physical activity		
There is physical activity	28	87,5 %
No physical activity	4	12,5 %
Total	32	100 %

The data in table 2 shows the risk of diabetes complications before the CERDIK intervention was in the high category with as many as 5 respondents (15.6%) and the low category with 15 respondents (46.9%), while after the CERDIK intervention, the high category only reached 3 respondents (9.4%) and the low category increased to 21 respondents (65.6%) from a total of 32 respondents. The paired sample t-test had a significance value of 0.000, which means $p\text{-}value <\alpha$ (0.05). This means that Hipotesis is rejected, so it can be concluded that CERDIK is effective in reducing the risk of complications of diabetes mellitus.

Table 2. Risk of diabetes complications before and after CERDIK intervention

Category	Before CERDIK		Intervention After CERDIK	
	Frequency	Percentage	Frequency	Percentage
Low	15	46,9 %	21	65,6 %
Medium	12	37,5 %	8	25 %
High	5	15,6 %	3	9,4 %
Total	**32**	**100 %**	**32**	**100 %**

The results of statistical tests using Paired Sample t test p value = 0,000

DISCUSSION

Research results show CERDIK is effective in reducing the risk of diabetic complications. CERDIK is a preventive action to prevent an increase in cases of non-communicable diseases by controlling their health in a comprehensive and integrated manner. Besides that, CERDIK can prevent the emergence of complications from diabetes through appropriate health education interventions and information (Peraturan Menteri Kesehatan Republik Indonesia Nomor 5 Tahun 2017 Tentang Rencana Aksi Nasional Penanggulangan Penyakit Tidak Menular Tahun 2015-2019, 2017).

CERDIK is part of a government program that can control the occurrence of diabetes mellitus and prevent complications from the disease, CERDIK activities can be carried out through daily activities in the community with a proactive and integrated approach involving diabetic patients and health workers through health information and health interventions (Yulianti, 2022). Information Health education is carried out in the community as one of the activities that can affect a person's views and perceptions of themselves and their environment. Health workers have a role in being able to increase public knowledge so as to reduce the risk of complications from a disease (Ayu & Damayanti, 2018).

Changes in health behavior in the community can be realized by using the right education and using creative methods (Hamzah et al., 2021). The use of audiovisual media in health education is more effective in helping patients with diabetes mellitus understand their disease and the prevention of complications caused by it (Jayanti, A., Falah, F., & Dasong, S., 2019). CERDIK is capable and effective in preventing non-communicable diseases in patients through changes in cognition, attitudes, and skills about health through health promotion (Hariawan, 2020).

Changes in attitudes and behavior are determined by health information received by the community to produce new behavior in a better direction, more mature towards themselves and the environment (Notoatmodjo, 2014). CERDIK is a government program through the Healthy Living Community Movement (GERMAS) that stands for regular health checks, getting rid of cigarette smoking, diligent exercise, a balanced diet, adequate rest, and managing stress through intervention and health information to the public (Permenkes, RI, 2019). Health checks for DM patients include random blood sugar tests, a glucose tolerance test in DM patients, and the HbA1C test to help monitor blood sugar levels (Kemenkes RI, 2018a).

This is to the results of research conducted by Yuliani et al., (2017) which shows that the symptoms of diabetes mellitus in the form of angiopathy and neuropathy and complications of DM can be controlled through regular activities or regular health checks held in Indonesia at the village hall in Poswindu. People with diabetes have microvascular complications. The presence of substances contained in cigarettes causes

glucose tolerance so glucose tolerance is disturbed and there is an increase in diabetes cases (Mariola & Milnerowicz, 2017).

Cigarette smoking has a bad effect on health, including for patients with diabetes mellitus. Cigarette smoke can cause problems with the pancreas and exacerbate diabetes complications. In addition Harsa, (2020) said the nicotine content in cigarette smoke can reduce adiponectin production. Hypoadiponectinemia causes insulin resistance.

Physical activity is one of the activities that can be done to control and lower blood glucose levels, through the utilization of glucose in muscle cells (Fikri Amrullah, 2020). Physical activity carried out by diabetics needs to pay attention to the duration and intensity of the exercise as one of the factors in controlling and lowering blood sugar levels. It can be in the form of leisurely walking, cycling, and jogging (Sundayana, 2021).

A healthy and balanced diet is part of CERDIK as a treatment and helps in the process of preventing complications of diabetes. Optimization of metabolic control through the management of a good and balanced diet (Cumatunaro et al., 2020). The right diet and meeting health standards can help control and control blood glucose levels to prevent the occurrence of complications that continue in people with diabetes (Trilestari & Suprayitno, 2016).

Adequate rest and stress management are modifiable factors in patients managing their sugar levels (Mesrina et al., 2021). One of the signs of diabetes is polyuria, skin itching, and others. These symptoms can cause an increase in the frequency of awakening, so sleep quality can decrease in people with diabetes (Bingqian et al., 2017).

Stress has a relationship with hyperglycemia in the body and insulin resistance. Increased stress occurs in mitochondria as a result of excess glucose. Homeostatic changes lead to insulin resistance (Burgos-mor et al., 2019).

CONCLUSION

CERDIK is a preventive measure that can be used as a program to reduce the risk of diabetes mellitus and prevent complications that arise from DM. This study has limitations that can be taken into consideration for future researchers, namely the information provided to respondents through questionnaires that do not show the actual opinions of respondents because of differences in understanding of each respondent. It is recommended for further researchers to involve the participation of family members so that CERDIK can be carried out on an ongoing basis so as to prevent the risk of complications of DM.

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