Nutrition Education Regarding the Glycemic Index on the Knowledge of Patients with Diabetes Mellitus

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Abstract

BACKGROUND: Knowledge is one of the keys to diabetes management. Increasing knowledge is an effort to improve their lifestyle to maintain the stability of their blood sugar, one of which is through the media booklet. The booklet is an influential media in nutrition education to improve diabetes mellitus patient knowledge related to the glycemic index.

AIM: This study aims to analyze the effect of nutrition education on the knowledge of DM patients about the glycemic index.

METHODS: It was quantitative research using a quasi-experimental research design, with a pre-test and post-test design with a control group. The total sample consisted of 46 respondents: A treatment group (23 respondents) and a comparison group (23 respondents). Nutrition education was conducted through poster media in the control group and booklet media in the treatment group, given 3 times for 2 weeks in patients with diabetes. The Mann–Whitney test was used to analyze the respondent's glycemic index characteristics and intake in the treatment and control, while paired t-test was conducted to determine the difference in the respondents' level of knowledge before and after the intervention.

RESULTS: The dependent t-test showed a significant difference in the average knowledge before and after the nutritional counseling with booklet media in the treatment group, p = 0.024 (α < 0.005).

CONCLUSION: Nutrition education program regarding the glycemic index through booklet media was the potential to increase patients' nutritional knowledge.

Introduction

Diabetes mellitus is a chronic metabolic disorder disease through its complications and severely impacts an individual's quality of life [1], [2]. The prevalence of diabetes and its increasing number of sufferers worldwide can be devastating to the development of health care systems and economies in developing countries. The World Health Organization (WHO) states that the number of people with diabetes is increasing rapidly. According to the International Diabetes Federation (IDF), people with diabetes in Indonesia were 7291.9 in 2011 to 19,465.1 in 2021 [3]. It is supported by the previous research showing that diabetes prevalence had increased by about 6.20% [4].

The increasing prevalence of diabetes requires a new approach to its management. Foods with high carbohydrate content and a high glycemic index and glycemic load can increase the risk of diabetes [5]. A low glycemic index has been proposed as a valuable means of managing the glucose response [6]. The previous studies have shown that adopting a low GI diet in diabetic people is helpful for glycemic control and can reduce body weight [7]. Therefore, broad and clear knowledge is needed to ensure that the GI diet plays a role in controlling complications caused by diabetes [8].

Education is needed to increase the knowledge of diabetics. The previous studies found a positive impact of diabetes education on self-management by diabetics [9]. The information process supports them in gaining the good knowledge needed to practice self-care so that the goals of diabetes therapy are achieved. It requires proper health promotion to change a better lifestyle for diabetics [10]. So far, the provision of interventions to diabetic patients is only limited to knowledge of dietary regulation but not yet specifically knowledge about the glycemic index of food. This study aims to analyze the effect of nutrition education on the knowledge of DM patients.

Methods

Study design

This research was conducted at the Palembang Social Health Center. The allocation of research time

was for 5 months, from August to November 2021. The type of research used was quantitative research using a quasi-experimental research design. The total sample was 46 people consisting of the treatment group and the comparison group (23 people each).

The research design used in this study was a pre-test and post-test design with a control group. The sample in this study was patients with Type 2 diabetes mellitus who underwent outpatient treatment at the Palembang Social Health Center, selected by the purposive sampling technique through the inclusion and exclusion criteria. Inclusion criteria included the patient with Type 2 diabetes mellitus, patients with good awareness and can communicate well, adults (≥40 y.o), willing to be a respondent by signing informed consent, and domiciled in Palembang. Exclusion criteria included Type 2 diabetes mellitus patients with severe complications (cardiovascular disease, kidney, liver cirrhosis, and others) and patients with particular conditions (such as pregnancy).

Nutrition education

Food glycemic index education in this study provided education or knowledge about the glycemic index of food through booklets developed by the researcher. Then, the glycemic index in this study was emphasized on the food group containing a high glycemic index to the treatment group and posters to the control group. The treatment group was people with diabetes mellitus who received education about the glycemic index of food in a booklet given 3 times for 2 weeks and received diabetes mellitus medication. The control group was people with diabetes mellitus who received education about the glycemic index of food in the form of a poster given 3 times for 2 weeks and received diabetes mellitus medication.

Data collection and measurements

Direct interviews obtained data regarding the identity of the respondents, while anthropometric measurements were obtained by measuring the patient's weight and height. The respondent's body weight was measured using a digital tread scale with an accuracy of 0.5 g, and their height was measured using a microtoise with an accuracy of 0.1 cm. Knowledge data were obtained through a questionnaire consisting of 20 multiple-choice questions developed by the researcher, which had been tested for validity and reliability with a Cronbach alpha of 0.678. Nutritional status data were calculated using body mass index. Data on the nutritional intake of respondents were obtained using 3 times of 24-h recalls by direct interviews with patients.

Statistical analysis

The Mann–Whitney test was used to analyze the respondent's glycemic index characteristics and intake in the treatment and control. Paired t-test was conducted to determine the respondents' level of knowledge before and after the intervention based on the 95% of significance level (α = 0.05) when the dependent t-test between the treatment and comparison groups had p < 0.05, which means equally significant, then it was continued with the independent t-test.

Ethical approval

This research had received ethical approval from the Health Research Ethics Commission of the Mataram Health Polytechnic, West Nusa Tenggara. The ethical approval was based on Review Decision No: LB.01.03/6/7295/2021.

Results

The characteristics of respondents observed in this study consisted of four variables, including age, gender, occupation, education, and nutritional status. Respondents in this study were aged 44–69 years old; respondents aged 44–59 years old were categorized as pre-elderly, and 60–69 years old were categorized as elderly. The total sample was 46 respondents divided into the treatment group (booklet) and the comparison group (poster), as shown in table.

Table 1 shows that the treatment group mainly was aged 60–69 years old while the control group was 44–49 years old. Gender was female primarily in both the treatment and control groups. In general, the education of the respondents was secondary level. Based on occupation, the most of the treatment group did not work or were housewives, while the control group worked as laborers and entrepreneurs. Nutritional status in the treatment group had almost the same proportion between normal nutritional

Table 1: Characteristics of respondents

Characteristics	Groups		p
	Treatment (booklet), n (%)	Comparison (poster), n (%)	
Age (years old)			
44–59	10 (43.5)	14 (60.9)	0.342
60–69	13 (56.5)	9 (39.1)	
Gender			
Male	10 (43.5)	6 (26.1)	0.162
Female	13 (56.5)	17 (73.9)	
Education			
Primary	5 (21.7)	7 (30.4)	0.082
Secondary	14 (60.9)	11 (47.8)	
High	4 (17.4)	5 (21.8)	
Occupation			
Housewife/pensionary/not working	9 (39.1)	2 (8.7)	0.421
Civil servant/military/police officer	5 (21.7)	5 (21.7)	
Laborer	6 (26.1)	8 (34.8)	
Entrepreneur	3 (13.1)	8 (34.8)	
Nutritional status			
Undernutrition	0 (0)	6 (26.1)	0.563
Normal	8 (34.8)	11 (47.9)	
Overweight	7 (30.4)	1 (4.3)	
Obese	8 (34.8)	5 (21.7)	

status, overweight, and obese, while most had normal nutritional status in the control group. The t-test showed that based on the characteristics of the respondents, there was no difference between the treatment group and the control group.

Table 2 shows that the average knowledge of people with diabetes mellitus in the treatment group before the intervention was 45.86, with a standard deviation of 7.63. The average blood glucose level of patients with diabetes mellitus in the treatment group after the intervention was 65.22, with a standard deviation of 11.72. The dependent t-test results showed a significant difference in the average knowledge before and after nutrition counseling with the treatment group's booklet media, a p-value of 0.024 ($\alpha < 0.005$). There was an average difference in the increase in knowledge in the treatment group before and after the intervention. The average knowledge of people with diabetes mellitus in the comparison group before the intervention was 41.96, with a standard deviation of 8.49. After the intervention, the average knowledge of people with diabetes mellitus in the comparison group was 51.96, with a standard deviation of 10.63. The dependent t-test results showed a significant difference in the average blood glucose levels before and after nutrition counseling with the comparison group poster media, a p-value of 0.001 ($\alpha < 0.005$). There was an average difference in the increase in knowledge in the comparison group.

Table 2: Differences in knowledge before and after intervention

Knowledge	Mean ± SD		p	t
	Initial	Final		
Treatment group	45.86 ± 7.63	65.22 ± 11.72	0.024	8.76
Comparison group	41.96 ± 8.49	51.96 ± 10.63	0.001	5.71

SD: Standard deviation.

Table 3 shows that the average increase in knowledge in the treatment group was 19.36, while the average increase in knowledge in the comparison group was 10. The independent t-test statistical test results obtained a p-value of 0.002 (p < 0.05), which means there was an effect of providing nutritional counseling with booklet media on increasing knowledge of Type 2 diabetes mellitus sufferers at the Palembang Social Health Center.

Table 3: The difference in the average improvement in knowledge among the treatment and the comparison groups

Groups	Blood glucose level		The difference	Δ	t	p
	Initials	Finals				
Treatment/booklet	45.86	65.22	19.36	9.36	3.318	0.002
Comparison/poster	41.96	51.96	10			

Discussion

Diabetes is an epidemic disease this century due to the increasing prevalence of diabetes worldwide [11]. There is evidence of a substantial gap in developing countries between rates of diabetes mellitus and the prevention and control of its complications [12]. It is immensely influenced by the lifestyle changes such as weight control, physical activity, and nutrient intake (calories and carbohydrates intake, particularly the glycemic index) [8], [13].

The glycemic index is an alternative system that classifies foods according to carbohydrate quality [14]. Food carbohydrate sources provide different blood glucose responses [15]. The concept of the glycemic index was introduced to divide foods according to the classification of the postprandial glycemic response of diabetic patients [16]. Consumption of foods that contain a high glycemic index is associated with an increased risk of diabetes. The previous studies have shown that a person who eats foods with a high glycemic index has a relative risk of 1.16 times the incidence of Type 2 diabetes [17]. Therefore, consuming foods with a low glycemic index are highly recommended to improve postprandial hyperglycemia [18].

Knowledge about diabetes is an essential factor influencing diabetes and its complications [19]. Education about the glycemic index of food to diabetic patients is needed as a diabetes prevention and control measure. Good knowledge of the glycemic index needs to be possessed by diabetic patients as a basis for good practice in controlling dietary patterns [20]. The previous studies have shown that most diabetic patients have insufficient knowledge, so education in diabetes management is needed [21]. Patient knowledge about diabetes can be increased by providing nutrition education to patients. Grant *et al*. (2020) stated that providing nutrition education materials for at least 1 week significantly increased the knowledge of diabetic patients [22]. Nutrition education interventions are positively associated with increased knowledge and can effectively control Type 2 diabetes patients [23], [24].

Booklets are a very effective medium used in nutrition education interventions. Research conducted by Putri and Pritasari (2017) shows that providing nutrition education in the form of booklets can increase the knowledge and attitudes of diabetic patients and patients' eating patterns toward a better lifestyle [25]. This is supported by research by Grant *et al*. (2020), which states that the provision of nutrition education through booklets with low glycemic index material affects the patient's dietary pattern in maintaining weight and health of diabetic patients [22]. Therefore, it can be concluded that the provision of nutrition education in the form of booklets is very effective and recommended in increasing patient knowledge.

Conclusion

Nutrition education program regarding the

glycemic index of food through booklet media was significantly higher in increasing patients' nutritional knowledge. Nutrition education is one of the measures that can effectively control the glycemic index in diabetic patients. A low glycemic index diet is needed as a part of medical therapy for diabetic patients. Developing an effective glycemic index-based nutritional education in the community is necessary to facilitate the understanding related to diet management to prevent the risk of complications arising in the future. Glycemic index in a balanced nutritional diet can maintain the weight and health of patients with diabetes mellitus.

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