A Descriptive Study Of Diet In Family Of Patients With Diabetes Mellitus Type 2

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ABSTRACT

Diet is one of the main factors related to various diseases including Diabetes Mellitus (DM). High carbohydrate, fat, protein, and low fiber diets can increase the risk of type 2 DM occurrence, especially in the patient's family as a risk group. Previous research on students with DM families in Central Java still had a high-calorie food consumption pattern. The diversity of population, culture, and age may affect the results. Therefore, this study aimed to describe the diet in the family of patients with type 2 DM in the working area of Puskemas (Community Health Center) Garuda Bandung. This research used a quantitative descriptive method by purposive sampling technique. The respondents in this study involved 46 people who were the children of type 2 DM patients in the working area of Puskesmas Garuda. Dietary data obtained from the food record sheet for 3 days and was calculated using Nutrisurvey software in kilocalories (kcal) as the unit of measurement then the results were categorized based on Consensus Perkeni 2015. Data analysis was using frequency distribution. The results showed that 39 (84.8%) respondents in the diet category less than body requirements, 37 (80.4%) respondents in the category of sufficient carbohydrate intake, 39 (84.6%) respondents in the category of excess fat intake, 45 (97.8%) respondents in the category of adequate protein intake, and 41 (89.1%) respondents in the category of less fiber. The conclusions from this study that almost all families of patients with type 2 DM in the work area of Puskesmas Garuda were in the diet category less than body requirement but with the excess fat intake and less fiber. Based on these results, the nurses in Puskesmas are expected to optimize the outreach programs by addressing families of DM patients to make the diet as an attempt to prevent the risk in the family of patients with type 2 DM.

Keywords: Diet, DM patients' families, food record.

Gambaran Diet pada Keluarga Pasien Diabetes Melitus Tipe 2

Abstrak

Diet adalah salah satu faktor utama yang berhubungan dengan berbagai penyakit termasuk Diabetes Melitus (DM). Diet tinggi karbohidrat, lemak, protein, serta rendah serat dapat meningkatkan risiko kejadian DM tipe 2 terutama pada keluarga pasien sebagai kelompok berisiko. Penelitian sebelumnya pada mahasiswa dengan keluarga DM di Jawa Tengah masih memiliki pola konsumsi makanan yang tinggi kalori. Perbedaan populasi, budaya, serta usia mungkin akan mempengaruhi hasil. Oleh karena itu, tujuan penelitian ini untuk menggambarkan diet pada keluarga pasien DM tipe 2 di wilayah kerja Puskemas Garuda Kota Bandung. Penelitian ini menggunakan metode deskriptif kuantitatif dengan teknik purposive sampling. Responden dalam penelitian ini berjumlah 46 orang yang merupakan anak kandung pasien DM tipe 2 di Wilayah Kerja Puskesmas Garuda. Data diet diperoleh melalui lembar *food record* selama 3 hari dihitung mengunakan software *Nutrisurvey* dengan hasil ukur dalam kilokalori (kcal) yang kemudian hasilnya dikategorikan berdasarkan Konsensus Perkeni 2015. Analisis data menggunakan distribusi frekuensi. Hasil penelitian menujukkan bahwa sebanyak 39 (84,8%) responden dalam kategori diet kurang dari kebutuhan, sebanyak 37 (80,4%) responden dalam kategori asupan karbohidrat cukup, sebanyak 39 (84,6%) responden dalam kategori asupan lemak berlebih, sebanyak 45 (97,8%) responden dalam kategori asupan protein cukup, dan 41 (89,1%) responden dalam kategori serat kurang. Simpulan dari penelitian ini bahwa hampir seluruh keluarga pasien DM tipe 2 di wilayah kerja Puskesmas Garuda berada pada kategori diet kurang dari kebutuhan tetapi dengan asupan lemak berlebih dan serat yang kurang. Berdasarkan hasil tersebut, maka perawat puskesmas diharapkan dapat mengoptimalkan program luar gedung dengan menyasar keluarga penderita DM untuk menjadikan diet sebagai upaya untuk mencegah risiko DM pada keluarga pasien DM tipe 2.

Kata kunci : Diet, *food record*, keluarga pasien DM.

Introduction

Diabetes mellitus (DM) is one of the biggest global health problems of the 21st century. According to the International Diabetes Federation (IDF) by 2015, DM caused 5 million deaths worldwide. The number of DM patients always increases every year. As many as 1 of 11 adults in the world suffered from DM. However, an estimated 193 million people have not been diagnosed and are therefore at higher risk of complications.

The incidence of DM in Indonesia is also increasing. Indonesia is currently ranked at the 7th highest DM prevalence in the world (IDF, 2015). According to Ministry of Health RI (2013), the proportion of DM in urban and rural areas was not much diverse. Based on the data of Bandung City Health Office, DM patients in 2015 as many as 31,689 people.

DM category is divided into two types of diabetes type 1 and type 2. Type 1 diabetes is characterized by the inability of the body to produce insulin because of an autoimmune reaction. In type 2 diabetes, the body can produce insulin but becomes resistant so that insulin use in the body is ineffective (MoH RI, 2014). In accordance with the National Health Service (NHS) in 2014, Type 2 diabetes was the most common type of DM. As many as 88.3% of people with diabetes had type 2 diabetes.

Type 2 DM can cause a wide range of macrovascular, microvascular, and neuropathic complications. According to the World Health Organization (2016), type 2 DM and its complications can also provide economic harm to patients, their families, and aggravate the national health and economic system through direct medical costs. Seeing that type 2 DM will have an impact on the quality of human resources and a substantial increase in the health cost, it is necessary to undertake prevention by reducing the risk factor of type 2 DM.

Some of the important risk factors that can increase the incidence of type 2 DM by Perkeni (2015) were race and ethnicity, family history with DM, aging, overweight, lack of physical activity, hypertension, and unhealthy diet. Lack of physical activity was estimated causing 7% type 2 DM in the European Region. In addition, overweight or obesity caused by increasing intake of high energy and fat foods also devoted to about 65-80% of new cases of type 2 DM (WHO, 2015).

Lifestyle changes such as a healthy diet, physical activity, and lessen weight can help prevent the occurrence of type 2 DM (IDF, 2015). According to the American Diabetes Association (2016), modifying lifestyle was an effective way of preventing type 2 DM because it can reduce 58% of the incidence after 3 years. A research conducted by Li, et al. (2008) in China has also shown the benefits of lifestyle changes that focus on a healthy diet that cut down 43% of type 2 DM incidence for 20 years.

Diet is one of the major factors related to various diseases including type 2 DM. A study conducted in Ghana by Frank et al. (2014) showed that high consumption of sweet foods, rice, meat, fruits, and vegetables associated with the risk of type 2 DM. Yul, et al. (2011) explained that a diet high in vegetables, fruits, and fish associated with low incidence of type 2 DM and a diet high in meat and dairy products increased the risk of developing diabetes. In addition, Ngaisyah (2015) study in East Kalimantan showed that carbohydrate, protein and fat intakes were related to blood sugar levels.

The number of carbohydrates in the diet should be reduced because it can affect blood sugar levels in the body (ADA, 2016). Fat and protein intake, mainly saturated fat, also needs to be limited. According to Asif (2014), the more fat in the food the longer the time it takes insulin to transport glucose into the cells. In the study of Ngaisyah (2015), found that people with protein intake exceeding the recommended requirement may lead to an increase in blood sugar 6.9 times greater than those who consume protein as needed. High-fiber foods may be helpful in preventing type 2 diabetes. Food fibers can delay the absorption of glucose in the small intestine so as help prevent the elevation in blood sugar levels (Asif, 2014).

Prevention of type 2 DM in the patient's family should consider primarily. Due to the prevalence of type 2 diabetes with a family history is quite high. In the study of Wagner et al. (2013) obtained that people with parents' history of DM had a 40% tendency to suffer

from type 2 DM and when added with obesity factor and age it will increase about 26%.

A family history of DM may affect the prevention of type 2 DM including implementing a healthy diet. The study of Wijdenes et al. (2013), individuals with a history of type 2 DM in their family still did not limit fat intake despite knowing the risks. Another study conducted by Chang, et al. (2011) also showed that adults in the United States with a family history of type 2 DM did not reduce daily calories and fat intake than those who had no family history. According to Ley, et al. (2016), high consumption of sweet foods, high fat, and few vegetables and fruits can trigger type 2 DM in people who already had a genetic risk. Therefore, the family of type 2 DM patients should have a good diet to prevent the occurrence.

The role of nurses in reducing the prevalence of type 2 DM that continues to grow every year is as an educator by providing knowledge on how to prevent DM, especially diet. The family is one of the parties at risk since there is a complex interaction between genetic and environmental factors in type 2 DM (Diabetes UK, 2015). According to WHO (2015), people with siblings or parents who had type 2 DM have a risk of 2-6 times exposed to DM compared with those who had no history of DM in their family.

In research Rahayu, Hudha, and Umah (2015), as many as 97% students with a family history of type 2 DM in Muhamadiyah University Malang still had a high calorie food consumption pattern. According to Park, et al. (2005), consumption patterns can be influenced by demographic, socio-cultural, and lifestyle factors. Age factors can also affect someone's diet. Based on the study of Frank, et al. (2014), sweet foods, rice, and meat were consumed more in younger people. Therefore, the demographic and cultural diversities of East Java and West Java may affect one's consumption patterns and the results of the research may be different.

Puskesmas Garuda is a health center with the highest number of DM patients in Bandung. In 2016, based on the data from Bandung City Health Office, the incidence of type 2 DM in Puskesmas Garuda was 1716 people. This number was higher than the average prevalence of DM in Bandung that was 31,689 people. In this puskesmas, there is Prolanis program for health maintenance and prevention of complications for people with DM. But there has been no certain attempt to prevent DM for at-risk groups, especially families of DM patients. Dietary record on the family of type 2 DM patients may be used as a baseline data for puskesmas to develop DM prevention program, especially at the risk group. This study aimed to describe the diet in the family of type 2 DM patients in the working area Puskemas Garuda Bandung.

Research Method

This research used the quantitative descriptive method. The research variable was the diet with components of carbohydrate, fat, protein, and fiber intake. The population was the biological children of DM patients in the working area of Puskesmas Garuda Bandung. The number of patients dwelling at Puskesmas Garuda area and getting treatment there in April 2017 totally 46 people. This study used purposive sampling technique with inclusion criteria aged ≥ 17 years old, living at home with DM patients in their families, not diagnosed with DM or other comorbidities, and not being pregnant. The number of samples meeting the criteria in this study were 46 people from different families. Diet was measured by a food record for 3 days in household size that the calorie count was calculated using a software in kilocalories (kcal). Furthermore, the data were categorized into 3. Dietary intake was categorized less if the calorie consumed by respondents <90%, enough if 90-110%, and excess if >110% of calorie requirement (Hardinsyah & Briawan, 2004).

The face validity test undertook by trying the food record sheet to 3 people with similar characteristics as the planned research. This research was conducted in the working area of Puskesmas Garuda consisting of four sub-districts namely Kelurahan (sub-district) Garuda, Maleber, Dungus Cariang, and Campaka. Data collection was done by door to door. After that, the researcher asked the respondent's consent to participate in this research by filling out the inform-consent sheet. Respondents who agreed to participate

in the research then were explained the procedure of filling food record sheet. After 3 days, the researcher took back the food record sheets that had been filled by the respondent.

This study used univariate analysis. After the amount of food intake in kilocalories was obtained, the carbohydrate, fat, protein, and fiber data were categorized into less, enough, and excess. Subsequently, the data of each variable category was formed in the frequency distribution.

Research Result

Characteristics of respondents used in this study include age, sex, district, ethnic, education, religion, BMI, abdominal circumference, history of Diabetes Mellitus in the family, long history Diabetes Mellitus parents, and exercise.

Based on Table 1 it is known that most respondents at the age of 36–45 years (32.6%), female sex (65.2%), living in Maleber urban village (54.3), came from sunda (97.8% , last high school education (47.8%), and Islam (97.8%). Most of the respondents had a BMI in the normal category (54.3%), had a history of mothers with DM disease (56.5%) and 50% of respondents had a history of DM type

Table 1 Frequency Distribution of Respondent Characteristics (N = 46)

Characteristic	f	%
Age		
17 – 25 years	13	28,3
26 – 35 years	13	28,3
36 – 45 years	15	32,6
> 46 years	5	10,9
Gender		
Male	16	34,8
Female	30	65,2
District		
Garuda	9	19,6
Maleber	25	54,3
Dungus Cariang	8	17,4
Campaka	4	8,7
Ethnic		
Sunda	45	97,8
Other	1	2,2
Education		
Elementary	3	6,5
Junior High School	7	15,2
Senior High School	22	47,8
University	14	30,4
Religion		
Moslem	45	97,8
Christ	1	2,2
BMI		
Underweight	1	2,2

Normal	25	54,3
Overweight	15	32,6
Obese	5	10,9
History of type 2 DM in the family		
Both of parents	6	13
Father	14	30,4
Mother	26	56,5
Regular Exercise		
Yes	13	28,3
No	33	71,1

Table 2 Average Nutritional Needs and Caloric Intake of Diabetes Patients Melitus Type 2 in the Work Area of Garuda Public Health Center (N = 46)

Calories	Min	Max	Mean	Deviasi Standar
Needs	1.497	2.706	1.989,33	267,386
Intake	720	2.064	1.307,52	358,310

Table 3 Average Nutritional Needs and Caloric Intake of Diabetes Patients

Variabel	Diet Component	Category					
		Consumption					
		Low		Moderate		High	
		n	%	n	%	n	%
Diet		39	84,8	4	8,7	3	6,5
	Carbohydrates	5	10,9	37	80,4	4	8
	Fat	1	2,2	6	13	39	84,6
	Protein	1	2,2	45	97,8	0	0
	Fiber	41	89,1	5	10,9	0	0

Table 4 Dietary Differences According to Gender In Family Type 2 Diabetes Mellitus Patients in Work Area of Garuda Community Health Center (N = 46)

Diet Consumption	Gender			
	Male		Female	
	N	%	N	%
Low	15	93,8	24	80
Moderate	1	6,2	3	10
High	0	0	3	10

2 parents less than five years, and 71.7% no exercise regularly.

Based on Table 2 can be seen that the lowest calorie intake is 720 and the highest is 2,064. The average calorie intake is still lower than the average calorie requirement of respondents with an average daily consumption of 1,307,52 calories.

Based on table 3 it can be seen that dietary intake almost all respondents have less dietary intake (84.8%) and consumption of fat intake more (84.6%) consumption of less fiber intake (89.1%). As for the type of carbohydrate and protein intake almost all of the respondents (80.4%) experienced sufficient carbohydrate intake and 97.8% had adequate protein intake.

Based on table 4 it can be seen that dietary intake in respondents with male gender (93.8%) more have less dietary consumption compared with women (80%). As for the category of enough and more, 10% of women have enough diet and 10% of women have an excess diet.

Discussion

Diet in the family of Diabetes Mellitus patients in the working area of Puskesmas Garuda was obtained 39 people (84,8%) with less category. Although almost all respondents were less in the diet category, in this study almost all had normal BMI. The results of this study were in line with the research of Muslihah, Winarsih, Soemardini, Zakaria, and Zainudiin (2013) conducted in Malang, the quality of diet on the respondents was still low with 53% had normal BMI. Based on the research by Muslihah, Winarsih, Soemardini, Zakaria, and Zainudin (2013) also showed that diet quality was not related to nutritional status but was related to someone's nutritional knowledge. If energy requirement was not fulfilled then the processes in the body become disturbed (Lavie, Milani, & Ventura, 2009).

In the results of this study, men (93.8%) who less in the diet category were more than women (80.0%). The low diet in men was also found in other studies. In the study by Waloya, Rimbawan, and Andarwulan (2013), dietary deficiency in men was 75% greater than in women. Women stored more fat because they consume more energy than release it (Wu & O'Sullivan, 2011).

3 respondents (6.5%) were in the excess category of daily calorie intake. Excessive intake of high-calorie foods will prompt the insulin resistance through elevated blood sugar levels and free fatty acids in the blood (RI & Wirawanni, 2012). According to FAO (2011), chronic excessive energy intake can also lead to weight gain and overweight.

Based on the results of research for carbohydrate intake showed almost all respondents (80.4%) consumed adequately. The recommended amount of carbohydrate is 45-65% of the total energy intake (Perkeni, 2015). The result of this research was in line with Ngaisyah research (2015) conducted on the member of East Kalimantan Provincial Assembly with 86.7% respondents had a good carbohydrate intake.

In this study 4 (8%) respondents had excessive carbohydrate intake. The excessive carbohydrate intake will increase the risk of Diabetes Mellitus (Feinman, et al., 2015).

The high intake of carbohydrates related to its metabolism causes the elevation of blood glucose that uncontrollable within normal limit (Ngaisyah, 2015). Blood sugar absorption causes increased blood sugar levels and insulin secretion. Therefore it is necessary to reduce carbohydrate. In accordance with the research by Samaha, et al. (2003) increased carbohydrate intake may decrease insulin sensitivity in healthy individuals and lead to an elevation in fasting blood glucose levels in DM patients.

Based on the results showed almost all respondents (84.6%) consumed excess fat more than the recommendation. These results were in line with the study by Wijdenes, et al. (2013) conducted in Amsterdam. According to that study found that individuals with a family history of DM still did not limit fat intake. The recommendation of fat intake is 20-25% of calorie requirement and is not allowed to exceed 30% of total energy intake (Perkeni, 2015).

Excessive fat consumption can lead to increased production of free fatty acids. Free

fatty acids that accumulate in the tissues will induce insulin resistance, particularly in the liver and muscles. Insulin resistance by these fatty acids results from the competition of fatty acids and glucose to bind to insulin receptors (Sulistyoningrum, 2010). Therefore, the more fat in the food, the longer it takes insulin to transport glucose into the cells (Asif, 2014).

Individuals with a family history of DM should reduce fat intake since it may help insulin to perform better. Based on the results for protein intake showed that almost all respondents (97.8%) had adequate protein intake. Protein requirement of 10-20% of total energy intake (Perkeni, 2015). Good sources of protein are fish, shrimp, squid, lean meats, skinless chicken, low-fat dairy products, beans, tofu and tempeh (Arisman, 2008).

If energy is insufficient from carbohydrate and fat sources, then the energy requirement is generated from some amino acids through gluconeogenesis where glucose is broken down into energy. The excessive protein intake will be stored in the form of fat in the body and used as a substrate for the process of gluconeogenesis (Ngaisyah, 2015).

Based on the results of fiber intake showed almost all respondents (89.1%) consumed less than the recommended amount of fiber. The recommended fiber intake is 20-35 grams/day (Perkeni, 2015). Less fiber intake may increase the risk of DM. There is a relationship between fiber consumption with blood glucose levels. The higher the fiber intake, the lower the blood glucose level (RI & Wirawanni, 2012). As stated in the study by Amanina, Raharjo, and Setyo (2015), a person with poor fiber intake was at least 2.5 times likely to have type 2 DM.

Individuals with a family history of diabetes should consume enough fiber. According to Ley, at al (2016), when individuals consumed enough fiber, especially derived from cereal products, it will reduce the risk of Diabetes Mellitus. Dietary fiber can delay the absorption of glucose in the small intestine by slowing the peristaltic movement of nutrients (blood glucose) from the small intestine wall to the absorption area so that help prevents the elevation in blood sugar levels (Asif, 2014). Water-soluble fiber can absorb fluid and form gel in the gastric. Gel slows down the process of emptying gastric and absorption of nutrients (glucose) resulting in decreased blood glucose levels (Gropper SS, 2013).

The nurses are the first person who may be able to provide diet information to an individual considering they are the patient's bridge to the health system. Therefore, nurses can enforce as nutritional educators to prevent type 2 DM in families by providing nutritional information that DM can not only be caused by consuming too many sugary foods but the family must also reduce fatty foods and consume fiber to prevent type 2 DM.

Conclusion

Based on the results of the undertaken research almost all respondents (84.8%) had less diet than the requirement with an average calorie intake of 1,307.52 calories. For carbohydrate intake, almost all respondents (80.4%) experienced a sufficient level. In contrast, almost all respondents (84.6%) had an excessive fat intake. For protein intake, almost all respondents (97.8%) had sufficient category, but almost all of them (89.1%) consumed less fiber. This needs to be anticipated by health care workers. An attempt is needed so that families of type 2 DM patients can take the right diet to reduce the risk of its occurrence.

The results of this study are expected to be a recommendation and evaluation material for programs implemented by health workers at Puskesmas Garuda in planning and preventing to reduce the incidence of type 2 DM in the working area. The study is also expected to help community nurses as educators in providing health education through outreach program optimization such as home visits related to proper dietary choices, particularly reducing high-fat and low-fiber foods for families of type 2 DM patients, so families can prevent the occurrence of type 2 DM.

The results of this study can be used as a reference and preliminary data for further researchers to examine and discuss the factors that can affect the diet in the family of type 2 Diabetes Mellitus patients.

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