Nurjannah, M. & Asthiningsih, N. W. W. (2023)
Jurnal Keperawatan Soedirman – Vol 18, No 1 page 37-42
http://jos.unsoed.ac.id/index.php/jks/index

ORIGINAL ARTICLE

THE EXPERIENCE OF TYPE II DIABETES MELLITUS PATIENTS WITH EARLY SYMPTOMS OF HYPOGLYCEMIA: A PHENOMENOLOGICAL STUDY

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Article Information
Received: 9 January 2022
Revised: 29 June 2022
Accepted: 29 July 2022

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DOI
10.20884/1.jks.2023.18.1.5281

ABSTRACT

Hypoglycemia is one of the acute complications that often occur in diabetes mellitus (DM) patients and could become an emergency condition that requires immediate treatment. The initial symptoms of hypoglycemia are cold sweats, tremors, dizziness, and blurred vision. Generally, DM patients' lack of diet management exacerbates hypoglycemia. This study aimed to explore experience of type 2 diabetes patient's hypoglycemia symptoms and affected factors. This qualitative research applied a phenomenological approach to seven participants. Semi-structured interviews were done to collect data. The Braun & Clarke method was then used to analyze the data. This study revealed three themes including the initial hypoglycemia symptoms, diet modification, and medication adherence. The study's results are expected to provide information on the importance of education and control related to initial hypoglycemia symptoms, nutrition, and medications awareness to the type 2 diabetes patients and family.

Keywords: *Hypoglycemia; symptoms; type II diabetes mellitus*

ISSN : 1907-6637 **e-ISSN : 2579-9320**

INTRODUCTION

Diabetes mellitus (DM) is a heterogeneous group of disorders characterized by elevated glucose levels in the blood, also known as hyperglycemia (Maria Lousiana, et al., 2017) and insulin resistance (Alsahli & Gerich, 2015). DM is a degenerative disease that causes the pancreas to be unable to produce the hormone insulin for the body's needs. This increases blood sugar levels and can cause several other diseases as complications, such as chronic kidney disease, cardivasculer disease, ulcus diabetic.

The International Diabetes Federation (IDF) shows that 463 million people around the world were living with DM within the age range of 20-79 years, with a prevalence rate of 9.3%. This is only estimated to continue to increase (William et al, 2019). Indonesia is ranked 7th in the world for the prevalence of DM sufferers, reaching 10.7 million people. Meanwhile, in Southeast Asia, Indonesia ranks 3rd for the highest number of DM sufferers, with a prevalence of 11.3%. This figure is predicted to increase along with the escalation in the population with diabetes worldwide.

According to an Indonesian Basic Health Research (Riskesdas) report in 2018, there was an increase in the prevalence of DM sufferers in Indonesia. Prevalence reached 2% in 2018 for people above 15 years old (Riskesdas, 2018). This is a significant increase from 2013 which had a prevalence of 1.5%. This increase in the number of DM sufferers occurs in almost every province. In 2013, East Kalimantan was ranked 4th with the highest number of sufferers in Indonesia, but in 2018 this position changed to the 2nd highest in Indonesia. This indicates that the increase in the number of people with DM is happening rapidly.

DM is a disease that is quite difficult for its sufferers to control. Acute and chronic complications often occur in patients with DM. The acute complication that often occurs is hypoglycemia, where blood sugar levels are <50 mg/dl, and blood sugar values are below average. Low blood sugar levels in DM sufferers can cause damage to several organs of the body, especially the brain, due to the lack of nutrients received, thus inhibiting its function (Fatimah, 2015).

Hypoglycemia frequently occurs in patients with type 2 diabetes. This condition is typically based on the length of time the patient has suffered from DM, history of drugs used, diet, and age. Therefore, studies should be conducted to understand the signs and symptoms of hypoglycemia to minimize its risk. Understanding the signs and symptoms of hypoglycemia will significantly help patients and health providers to determine the actions that DM patients will need to take to avoid more severe hypoglycemia conditions (Decroli, 2019).

Hypoglycemia conditions can be categorized into mild, moderate, and severe, depending on the symptoms. Examples of mild to moderate symptoms are headaches, body shakes, cold sweat, heart palpitations, and hunger. Severe hypoglycemia is usually not felt by the patient, but symptoms that can be seen by other people or family members, such as seizures, changes in behavior, physical fatigue, confusion, and even coma. This condition requires immediate medical attention. However, mild to moderate symptoms can be overcome early by giving the sufferer food or drinks containing sugar (Makbul, 2018).

Hypoglycemia is a life-threatening condition for people with diabetes. It can occur when DM sufferers forget to eat. This is usually not only caused by forgetting to eat but also an unwillingness to eat. This is frequently seen in the elderly, as they often experience a significant decrease in appetite. Meanwhile, DM patients must continue to consume DM drugs regularly. This situation will cause a decrease in blood sugar in people with DM (Zoungas, 2010).

Another condition that often results in hypoglycemia is excessive activity. Excessive activity without adequate nutritional intake and regular consumption of DM drugs will cause hypoglycemia. This condition will usually be exacerbated if the DM patient has entered elderly age such that hypoglycemia often goes undetected and falls into severe hypoglycemic conditions. Patients with hypoglycemia are often found in an unconscious state after hypoglycemia occurs. This situation is also most commonly found in elderly DM patients (Sutawardana, Yulia, & Waluyo, 2016).

Diet management in DM patients is essential to control the amount of food consumed by the patients. Food arrangements are done to ensure the patients receive balanced meals that are set according to the caloric needs of DM patients. Food management for people with DM includes arranging the amount of food, types of food, and eating schedules that must be obeyed and applied by people with DM. The balanced composition of the DM diet includes 60-70% carbohydrates, 20-25% fat, and 10-15% protein. Moreover, the nutritional status of DM patients must also be calculated based on Body Mass Index (BMI), and this method is a simple way to monitor the nutritional status of adults (Fatimah, 2015).

Medication management is also crucial. The administration of these drugs is done as part of pharmacological management. The drugs given to DM patients are oral hypoglycemic drugs (OHO) or insulin injections. Administering these DM drugs requires reasonable consideration and calculation because the condition of DM patients must be considered, both in terms of age, duration of suffering from DM, comorbid diseases accompanied by previous treatment history, and history of hypoglycemia (Decroli, 2019).

According to Akbar, Hamsah, & Muspiati (2020), the age risk factor for DM sufferers needs to be considered. Based on their research, most DM patients are aged >45 years, this suggests that the majority of DM sufferers are elderly. The elderly has an abundance of health-related problems that are closely related to age. They also usually often experience a decrease in appetite, which causes a decrease in the amount of nutrient intake that enters the body. Thus, DM is often found in the elderly who are malnourished and result in nutritional deficiencies. The nutritional problems of the elderly are closely related to the decline in the body's physiological activity. Moreover, the consumption of an unbalanced diet worsens their condition, which naturally has decreased. This can be further exacerbated by the presence of psychological disorders and a history of illness (Nurfantri & Yuniar, 2016).

Providing health education to DM sufferers about hypoglycemic conditions can help them to identify their hypoglycemic conditions and prevent more severe conditions from occurring. This health education can be given to DM patients and their families and can provide information about setting meal schedules, the nutritional needs needed of DM sufferers, regulating the number of carbohydrates eaten (especially rice), controlling blood sugar regularly, and recognizing the early symptoms of hypoglycemia. According to Shiu and Wong (2002) in Sutawardana et al. (2016), DM patients who control their blood sugar regularly do not guarantee them from being free from hypoglycemia. This is because DM sufferers do not necessarily feel capable and confident that they can implement all measures that can prevent hypoglycemia conditions. Many factors do not support efforts to prevent hypoglycemia. Thus, these efforts are often not implemented properly.

The hypoglycemic conditions experienced by patients are unique encounters. The patients' experiences can differ from one another. Some patients can describe their experiences with hypoglycemia well, but others found it difficult. Currently, there has been a change to a more patient-centered healthcare system; it is hoped that this can prioritize focus on the patient and not only on the disease suffered by the patient. Nurses can provide a holistic, bio, psycho, social, and cultural services for DM patients who have experienced hypoglycemia. Nevertheless, research is needed to explore the phenomenon of hypoglycemia as one of the complications suffered by DM patients. This experience is a reasonably complex problem in DM, and it is necessary to explore the perspective of DM sufferers about this condition to understand the problem as a whole (Cryer, 2007).

METHOD

Study design

This was a qualitative study using a phenomenological approach. This study explored patients with type II DM experiencing hypoglycemia and affected factors.

Informants

The participants selected using a purposive sampling method. The inclusion criteria in this study were patients with type II DM who had and had never experienced hypoglycemia. A total of seven participants met the inclusion criteria, namely, suffering from DM for at least two years, got diabetes medications, had and/or had never experienced hypoglycemia, and were not hospitalized, able to share their experiences orally well, and were willing to be participants. A total of three male and four female participants participated in this study. This qualitative interpretive research was conducted in the working area of the Juanda Health Center, Samarinda.

Instruments
Data were obtained through interviews with semi-structured questions. The researcher developed the interview guideline. Pre-interviews are conducted with some people who share the same traits as the actual participants. Researchers doing pre-interviews with type II DM patients who have ever had hypoglycemia. Before conducting interviews with actual participants, researchers make modifications based on the findings of the pre-interview. The researcher also repeated the important questions at different times throughout the interview process to obtain optimal information. Data saturation was obtained from seven participants. The researcher is the instrument in this study, hence the researcher needs to get ready. Before interviewing skills, researchers conduct pre-interviews before conducting actual interviews.

Data collection
The researchers met with the head of Primary Health Center Juanda, Samarinda to explain the study's objectives and asked for permission to conduct the study. Data on type 2 DM patients were requested by researchers from Primary Health Center Juanda, Samarinda. Potential participants were approached and were provided the study related information by researchers. If the potential participants were agreeing to participate in this study, they signed an informed consent form. The in-depth interview lasted around 30-60 minutes for each participant. The interviews were recorded using a mobile phone's audio recorder. In addition, the researchers made field notes to collect participant nonverbal data. The study was carried out in July 2021.

Data analysis
The results of the study were analyzed using the Braun & Clarke (2014) method, such as:

1. Familiarizing yourself with your data
   In the first stage, researchers familiarize themselves with the data to become comfortable with the data they have gathered. The researchers listened and repeated interviews that have been recorded. Researchers create data transcripts and read through them several times. The researchers highlighted key concepts or words from the data in the initial ideas or words.
2. Generating initial codes
   The researchers created a code from all the data collected, and organize the relevant data. The researchers searched for important words as keys from the data.
3. Searching for themes
   From codes, the researchers connected sub-themes, and related topics. The researchers organized codes into themes and gathers pertinent keywords for each theme.
4. Reviewing themes
   Each themes were examined by researchers. The researchers re-read the data code on each theme. Data were connected to themes by researchers. Data codes that did not fit with the themes were not used, data codes were created for a different themes based on additional supporting data.
5. Defining and naming themes
   Each theme is defined and fixed in detail by the researchers during this time. The themes were determined by extracting themes' name and clear findings for each theme from the words proposed by the participants
6. Producing the report
   The final step of data analysis in this the study was provided a report to answer the study questions.

Trustworthiness
According to Lincoln and Guba (1985) in Jailani (2020), building trust in data is accomplished with credibility, dependability, confirmability, and transferability. Credibility was established using interview guideline, familiar with data, and member checking. Dependability was developed through details explanation of study process from the beginning until finish. Confirmability were considered through recording the interviews, made verbatim transcriptions, and reported appropriate quotations. Purposive sampling was used by researchers to select a sample for the study that represented a variety of participant backgrounds to ensure transferability.

Ethical consideration
This research's feasibility test was conducted at Muhammadiyah University, East Kalimantan No. 006/KEPK/UMKT/I/2022.

RESULTS

All participants in this study had type 2 DM, with most having had DM for 4-5 years. Four of the seven participants experienced mild to moderate hypoglycemia symptoms, while the others had never experienced hypoglycemia. All participants had never experienced a severe condition of hypoglycemia. Three of the seven participants were high school graduates and four were elementary school graduates. In this study, three respondents were private sector workers, one respondent was a retired civil servant, and the others were housewives. The age range of the participants in this study was 55-70 years old.

Table 1. The Participant`s Characteristic Data

Indicators	f	%
Age		
55 - 60 years old	3	42.9
61 - 65 years old	1	14.3
66 - 70 years old	3	42.9
Educational Background		
Elementary	4	57.1
Junior High	1	14.3
Senior Hight	3	42.9
Long Experience DM		
≥ 5 years	3	42.9
< 5 years	4	57.1

The theme of this study answered the questions related to experiences of hypoglycemia symptoms and related factors. The themes included the initial hypoglycemia symptoms, diet modification, and medication adherence.

1. The initial hypoglycemia symptoms
The initial hypoglycemia symptoms experienced by the respondents in this study were cold sweats, blurry vision, and body shaking. These symptoms were described by the participants' statements below:

"I experienced cold sweat..." (P1)
"I felt blurry vision…bit blurry..." (P3)
"hands were shaking" (P4)
"When walking, it felt like I was spinning round and round" (P7)

Additionally, the participants felt a decrease in appetite, which usually preceded the onset of the above symptoms. Their decreased appetite caused them to not eat, which might cause hypoglycemia. This is based on the following statements:

"...Usually, I do not want to eat..." (P1) "... it is okay, I am afraid to eat."(P6)
"I don't have much of an appetite..." (P7)

2. Diet modification
Adaptation to hypoglycemia made by participant in this study was diabetes mellitus diet program that the participants follow. This diet is performed by limiting the participants' number of servings, especially their rice intake. This is explained by the following statements:

"Sometimes I'm told to go on a diet if..." (P1)
"Just eat less rice, I used to eat more rice, it is different now.
"That is all that is reduced."(P3) "Yes, I eat less rice now" (P4) "Eating has been reduced, yes" (P7)

3. Medication adherence
Another cause of hypoglycemia in this study is the use of diabetes mellitus drugs such as glibenclamide and metformin. These DM drugs are consecutively taken once and three times a day after meals, respectively. As shown in the following statements:

"Before eating, I would take one glibenclamide, after eating, I would also take metformin three times a day" (P3)
"I take these pills three times a day (indicating metformin), this one, only one time, one pill a day (indicating glibenclamide)" (P4)
"There are 2 kinds of medicine, one of them is small. There is a morning before eating, and metformin is taken after eating" (P5)

DISCUSSION

The participants conveyed their early symptoms of hypoglycemia through the emergence of several complaints. These early symptoms include mild symptoms, such as cold sweats, shaking hands, and headaches. The symptoms experienced by the participants were classified into several groups.

The initial symptoms felt by participants were different from one another. Symptoms of cold sweat and shaking hands (tremors) are neurogenic symptoms that arise due to low blood sugar. This is in accordance with the explanation of Kittah & Vella (2017) who stated that neurogenic symptoms arise from psychological perception changes due to hypoglycemia conditions stimulating the sympathoadrenal system. These symptoms appear when blood sugar levels reach around 60 mg/dl. These neurogenic symptoms can be grouped into the following two conditions: adrenergic and cholinergic symptoms. Adrenergic symptoms include palpitations, tachycardia, anxiety, and tremors. While cholinergic symptoms appear as excessive sweating, paleness, nausea, and excessive hunger.

A blurry eyes appear as early symptoms of hypoglycemia. This is equivalent to the explanation of Khan, Barlow, & Weinstock (2014) who found that hypoglycemia conditions can also cause eye disorders, especially in DM patients. The symptoms that the sufferers often feel are blurred eyes, diplopia, loss of contrast sensitivity, and retinal disorders. These symptoms often appear when there has been a decrease in blood sugar levels. Dizzy and spinning when walking symptoms experienced by participants in this study. These symptoms are neuroglycopenic symptoms that appear early in the event of hypoglycemia. This finding accordant with Cryer et al. (2009), who stated that neuroglycopenic symptoms appear more severe than neurogenic symptoms. The condition will appear when blood sugar levels are around 50 mg/dl or lower. This low blood sugar level causes the brain to be deprived of glucose supply. The symptoms of this condition would manifest as weakness, dizziness, confusion, headaches, seizures, decreased cognitive function, decreased consciousness, and coma. This condition can be categorized as severe if there has been a decrease in consciousness. Severe hypoglycemia can cause damage to organs, especially the brain, which can lead to permanent brain damage and even death (Decroli, 2019).

This study revealed that the hypoglycemia may be caused by the participants' decreased appetite. This might be caused by the participants' elderly age. All participants in this study are in the elderly age phase and they all mentioned their small appetites. As explained by Nurfantri & Yuniar (2016), inadequate nutritional intake in the elderly is caused by a disturbance in the digestion or food absorption process. This condition causes insufficient nutrient intake, an inability to digest food, and inadequate nutrient absorption. These issues are mainly experienced by the elderly. Moreover, the decreasing appetite in the elderly could also be caused by psychological factors (loss of a spouse), a history of illness, and food availability (amount and type).

In this study, majority of the participants were on a DM diet or had limited food intake (especially rice). This is performed to avoid high blood sugar levels. In addition, these diets are part of the management of DM. Fatimah (2015) described DM management in Indonesia as being focused on food regulation to prevent increased blood sugar levels. This food management emphasizes meal schedules, as well as types and amounts of food, especially for patients with DM who regularly consume DM medication. For diabetic patients, having the option to consume different types of food sometimes emerge as temptations that are more difficult to be managed. Therefore, it is more challenging for richer patients to adhere to diet management (Kurniawan & Yudianto, 2016). The recommended food standards must be balanced between the needs of carbohydrates, fats, and proteins. However, it is quite difficult to implement for participants who are all elderly.

Participants in this study adhere to consume DM medication routinely. There were two types of medications taken by the participants, namely, glibenclamide, which was taken once a day, and metformin, which was taken three times per day. This finding is in accordance with Decroli (2019), who stated that the drug glibenclamide is a sulfonylurea drug with a short half-life and a faster metabolism. The half-life of glibenclamide is 3-5 hours, and the hypoglycemic effect lasts 12-24 hours, so this drug is only taken once a day. Administering glibenclamide to the elderly with type 2 diabetes requires special attention because it can cause hypoglycemia. This happens because, in the elderly, hypoglycemia is caused by slower sulfonylurea metabolism. In addition, it is quite challenging to recognize hypoglycemia in the elderly because the onset is prolonged and slowly precedes acute signs. Therefore, what often happens is a decrease in consciousness and coma.

The participants in this study also consume metformin. Metformin is taken three times per day after meals. According to Decroli (2019), metformin is a class and a biguanide. Metformin is an antihyperglycemic drug that does not stimulate insulin secretion and does not cause hypoglycemia. Metformin works to decrease sugar production in the liver and increase insulin sensitivity in muscle and adipose tissue. It is

absorbed in the intestine and enters the circulation, and is not bound to plasma proteins at the time of circulation. Metformin is excreted in the urine. The half-life of metformin is about two hours, so it is safe for the elderly because it does not cause hypoglycemic effects. It can also function as a weight-loss drug for obese diabetic patients. However, metformin is not given to patients with impaired renal function.

The participants in this study regularly consume glibenclamide and metformin. However, medication consumption by the participants are often not accompanied by adequate nutritional intake due to a decrease in appetite and diet that are done as part of the management of DM. Moreover, the dose taken is not controlled according to the needs of the participants. This causes the emergence of symptoms of hypoglycemia in participants. In patients diagnosed with DM, the participation of other family members in guiding their medication, diet, physical exercise, and positive free time for family health plays an active role in the successful self- management of DM (Yamin & Sari, 2018). Therefore, in this case, support and family participation is needed in the management of DM to minimize the occurrence of hypoglycemia in patients.

A longer period of diabetes will cause the patient to become accustomed to the condition and its treatments, particularly self-care. When it comes to minimizing complications or practicing diabetic self-care, newly diagnosed patients may have different motivations and responsibilities than those who have had the disease for a long time (Rahayu, Kamaluddin, & Hapsari, 2018). Health care providers need to prioritize the newly diagnosed DM patients into medication effect education consideration.

This reaseach's limitation is that there were less visits from Diabetes Melitus patients in Juanda Health Center Samarinda, during the data collection period due to pandemic covid-19 conditions. The patients's family administer the medications as usual (children of the patient).

CONCLUSION AND RECOMMENDATION

Based on this study's results, it can be concluded that patients with type 2 DM experienced the early symptoms of hypoglycemia, namely, neurogenic symptoms, symptoms of cold sweat, and shaking hands (tremors). The neuroglycopenic symptoms felt are dizziness and blurred vision. The following recommendations are provided for type 2 DM patients: (1) DM patients must have a balanced and adequate nutritional status, especially the elderly who have decreased appetite, (2) dietary education is needed to both patients and their families, and (3) nurses and family collaboration are required for type II DM patient's daily diet and medicine consumption effects.

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