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## Nutritional management of diabetes mellitus: A single-case study

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### Abstract

**Background:** Imbalance of the body's nutritional needs is a condition in which nutrient intake is insufficient to meet the metabolic needs of the body. Diabetes mellitus is a disease caused by high levels of glucose in the blood due to the body's inability to release or use insulin adequately.

**Purpose:** to find out whether nursing interventions can meet the nutritional needs of the body in patients with diabetes mellitus.

**Method:** This descriptive research uses a case study approach. The participant is a 68-year-old man who is 3 years old with diabetes mellitus. He felt weak, dizzy, and his legs tingled. He had no appetite and to eat, he only ate half of the plate. Current blood sugar level is 548 mg/dl and blood pressure is 200/94 mmHg. Intervention - within 3 days, participants were assessed on vital signs, nutritional status and favorite foods. Participants received education about oral hygiene and important nutrition for their bodies. Participants had received insulin and a 1700 calorie diet.

**Results:** With this intervention, participants' blood sugar levels were randomly assigned to drop from 548 mg/dl to 200 mg/dl, appetite increased, and food intake increased from half a plate to one plate. His blood pressure dropped from 200/94 mmHg to 120/80 mmHg.

**Conclusion:** The results of these participants provide encouraging assessment of vital signs, nutritional status and favorite foods, education about oral hygiene and essential nutrients for the body, collaboration of insulin diet and diabetes patients.

**Keywords:** Nutritional; Management; Diabetes Mellitus

### INTRODUCTION

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both (Soelistijo, Suastika, Lindarto, Decroli, Permana, Sucipto, Kusnadi, Budiman, Ikhsan, Sasirani, Sanusi, HS, & Susanto, 2021). Indonesia ranks first with the highest prevalence of type 1 diabetes in Asean, around 41,817 diabetics are found in 2022 (Annur, 2023).

Chronic hyperglycemia of diabetes mellitus is associated with long-term damage, dysfunction and

failure of various organs, especially the eyes, kidneys, nerves, heart and blood vessels (Dewi, 2022), hypertension and myocardial infarction (Lestari, Zulkarnain & Sijid, 2021).

Type 2 diabetes complications can be acute or chronic and long term (Irwanto, Siregar, Ginting, & Ndruru, 2021). Risk factors for diabetics include obesity, dyslipidemia, race, age, lifestyle, family history or heredity, polycystic ovary syndrome, mothers with a history of gestational diabetes, and sufferers of

hypertension, CHD, and hyperthyroidism (Kardiyudiani & Susanti, 2019).

Signs and symptoms of Diabetes Mellitus include polyuria, polydipsia, polyphagia and weight loss (Imelda, Santoso & Tarigan, 2022). The therapy that can be applied to diabetics is to regulate the Diabetes Mellitus diet. The principle of eating management in diabetic patients is a balanced diet according to the calorie and nutritional needs of each individual, the importance of eating regularly in terms of meal schedules, type and amount of food, especially for patients who use insulin.

Imbalance of the body's nutritional needs is a condition in which nutrient intake is insufficient to meet metabolic needs in the body (Heather & Shigemi, 2015). Behavioral assessment of fulfilling nutritional needs by identifying changes in appetite, history of weight loss, complaints of nausea, vomiting and bloating (Arifin & Utami, 2022).

Patients with diabetes mellitus need to be aware of the problem of nutritional imbalances less than body requirements, so the nursing interventions given are regular weight measurements, providing information on nutritional needs, checking blood sugar using a finger stick, giving small and frequent portions. , provide the most food for breakfast, maintain oral hygiene before and after eating, suggest eating in an upright sitting position, provide a diet low in fat and calories, consult a nutritionist to support the nutrition team in providing a diet according to patient needs with input of fat and protein according to tolerance , collaboration with the medical team (Wulandari, Suandika, & Susanti, 2021).

Data obtained from the Sari Mutiara Hospital Medical Records show that diabetic patients experience fluctuating waves every year (131 cases in 2020, 155 cases in 2021 and 123 cases in 2022). Therefore researchers are interested in studying the nutritional imbalances of the body's needs in diabetic patients (Sari Mutiara Hospital, 2023).

## RESEARCH METHOD

The design of this study is a descriptive study with a case study approach, to explore whether interventions can meet the nutritional need of the body

in diabetes mellitus patient. This study was conducted at Sari Mutiara Hospital in North Sumatra, Indonesia. The study was conducted in April to July 2023. The participant of this study was a 68 year's old, male who was 3 years with diabetes mellitus. Data collection used interview and taken from medical records on Sari Mutiara Hospital.

The intervention was given to participants for 3 days. The interventions given on the first day consisted of examining nutritional status and nutritional preferences, providing education about nutritional deficiencies and maintaining oral hygiene before and after meals, then collaborating with nutritionists (for dieting) and doctors (for insulin administration) and measuring vital signs. The intervention on the second day consisted of assessing the participants' nutritional status, monitoring their weight, monitoring their blood sugar while administering insulin, counseling about the recommended diet program and measuring vital signs. Intervention on the third day consisted of monitoring nutritional status, monitoring body weight, administering insulin, measuring blood sugar levels and vital signs. and after 3 days an evaluation was carried out.

## RESEARCH RESULTS

The participant in this study was a 68 year old man with high school education, married and working as a farmer with a medical diagnosis of Diabetes Mellitus. From the previous medical history, it was known that the respondent had Diabetes Mellitus since 3 years ago, besides that the respondent also had a history of hypertension. These participants have expressed their willingness to participate in this study.

Baseline Examination- A detailed baseline clinical assessment was carried out prior to intervention on the participant. Participants said the body felt weak, dizzy, tingling feet and blurred vision. Currently the respondent has no appetite, eats 3 times a day and only finishes half of the plate. Consciousness: Compos mentis with vital signs: blood pressure 200/94 mmHg, pulse: 76 beats per minute, breathing: 20 times per minute and temperature 36.50C. Height: 165 cm and weight: 74 kg. The results of examination of the mouth area showed that the lips were not cyanotic, there was

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no stomatitis in the mouth. Random blood sugar test result: 548 mg/dl.

Intervention was given to participants for 3 days. The intervention given on the first day consisted of examining participants' nutritional status and food preferences, providing education about the importance of nutritional needs and maintaining oral hygiene before and after meals, then collaborating with nutritionists (for dieters) and doctors (for insulin administration), and measure vital signs. The intervention on the second day consisted of assessing the participants' nutritional status, monitoring their weight, monitoring their blood sugar while administering insulin, counseling about the recommended diet program and measuring vital signs. Intervention on the third day consisted of monitoring nutritional status, monitoring body weight, administering insulin, measuring blood sugar levels and vital signs.

Results-evaluation was carried out after providing intervention for 3 days. Participants said that there was an increase in appetite as evidenced by no longer feeling weak, the respondents were able to portion of food on one plate. The laboratory results of the participants showed blood sugar levels: 200 mg/dl with body weight: 72 kg and height: 165 cm. Participants received novolin insulin. Measurement of vital signs showed that blood pressure was 120/80 mmHg, pulse 83x/minute, temperature: 36°C, and respiration; 22x/minute. Participants stated that they understood the nutritional needs of the body where participants got 1700 calories for the diet.

## DISCUSSION

In the beginning this study found that the participant was no appetite and weak caused by diabetic ketoacidosis where the body burns fat to produce energy (Dhiya'najmi, 2019; Gershuni, Yan, & Medici, 2018; Suryati, 2021; Wanti, 2022). The intervention was given on the first day to the participant consist of monitoring his nutritional status and weight and vital signs. Other interventions include assessing the participant's preferred food, education about the importance of nutrition, maintaining oral hygiene with the aim of increasing the participant's

appetite, collaborating with a nutritionist for a type of diet and a doctor for administering insulin.

The results obtained on the first day the participants said they still had no appetite, body weight 72 kg, vital signs: blood pressure 200/94 mmHg, pulse 76x/minute, breathing 20x/minute, temperature: 36°C, favorite food consumed by participants was chicken porridge. Participants were able to explain again about the importance of maintaining oral hygiene and the benefits of nutrition for the body. After collaborating with nutritionists, the participants went on a 1,700 calorie diet and the results of the collaboration with doctors stated that the insulin the respondents got was subcutaneous injections of novolin. The intervention given on the second day to the participants consisted of monitoring nutritional status and vital signs and blood sugar, as well as administering insulin injections.

The results obtained on the second day the patient said he still had no appetite and his food intake was only half the plate. Vital signs showed that blood pressure was 140/80 mmHg, pulse 80x/minute, respiration 20x/minute, temperature: 36.50°C, random blood sugar test 340 mg/dl. The intervention given on the third day to the participants consisted of monitoring the nutritional status of vital signs and blood sugar, administering novolin injections.

The results obtained on the third day, participants said they had no appetite. He could eat one plate and his body no longer felt weak. The participant's weight is still 74 kg with a height of 165 cm (fat), the results of blood sugar checks are 200 mg/dl. Vital signs showed that blood pressure was 120/80 mmHg, pulse 83x/minute, respiration 22x/minute, temperature: 36.50°C.

This intervention is similar to research in Karanganyar Village, Banjarnegara, which states that the problem of nutritional imbalance in people with diabetes mellitus can be overcome (Wulandari, Suandika and Susanti, 2021). Fulfillment of nutrients is needed for growth, maintenance of body functions, and regulation of tissues through the digestive system (Arifin & Utami, 2022; Ramadhini, 2022; Svennersten-Sjaunja, & Olsson, 2005; Guilloteau, Zabielski, Hammon, & Metges, 2010).

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Research in India states that various Indian food recipes with low glycemic value can be selected to help vary glucose levels ( $> 200$  mg/dL) of Indian diabetic patients. The goal programming method optimizes energy (calorie) levels by taking into account the allocation of the maximum number of food recipes and minimizing the overall deviation over and under the achievement of nutritional goals. Efforts are also made to ensure food recipes contain a low percentage of carbohydrates, fats and meet all the other nutrients required for diabetic patients, which plays an important role in menu selection. The calculated optimal menu is helpful for varying the glucose level of diabetic patients as it is within the recommended diabetic intake range (Paidipati, Komaragiri, & Chesneau, 2021).

Research in the United Kingdom elucidates the important role of diet in controlling and managing type II diabetes. In addition, we have evaluated the psychological and sociological issues responsible for unhealthy food choices in type II diabetes. It is imperative that active and effective diet education is continuously provided to diabetes patients to prevent the onset of diabetes and its complications. Further, there is a need to empower individuals to make better dietary choices, healthy eating patterns, and weight management (Rajput, Ashraff, & Siddiqui, 2022).

## CONCLUSION

This research found that the outcomes in this participant are encouraging by given assessment about vital sign, nutrition status and his favorite food, education about oral hygiene and essential of nutrition to body. The collaboration about insulin and the diet of diabetic patient, it's needed.

## SUGGESTION

It is need to control blood sugar of diabetic patient to avoid the occurrence of nutritional imbalance on diabetes mellitus patients.

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