NURSE AND PATIENT PERCEPTION IN SELF-MONITORING OF DAWN EFFECT TO ENHANCE SELF-MANAGEMENT IN DIABETES MELLITUS PATIENT'S: A QUALITATIVE CASE STUDY

Ratna Kurniawati[1*], Suhartini Ismail[2]
[1]Alkautsar Nursing Academy
[2]Nursing Science, Faculty of Medicine Diponegoro University
Corresponding Author's e-mail : ratnaummudzaky@gmail.com[1*], suhartini.ismail@fk.undip.ac.id

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Abstract *: Background: A phenomenon in diabetes mellitus patients is called dawn effect, the condition of hyperglycemia suddenly increasing insulin requirement in the morning caused by nonattendance of nighttime hypoglycemia. Self-monitoring can be minimizing the impacts of dawn effect. Self-management can be actualized to oversee the blood glucose levels fluctuation in diabetes mellitus patients. Objective: to gain self-monitoring influencing factors of dawn effect phenomenon, and increase self-management in diabetic patient and nurse knowledge in Temanggung, Central Java Methods: A qualitative study design was used in this research with semi-structured interviews and open-ended questions. Participants were selected using purposive sampling technique from primary healthcare and secondary healthcare of both nurse and patient. Twelve participants consisted of senior nurse (n=5), patients with type 2 diabetes mellitus (n=7). Information of psychometric diabetes self-management scale and blood glucose monitoring were day by day collected within the morning. Result: Nurses' perception of the dawn effect is still relatively low due to a lack of knowledge and competence in self-management of diabetes patients. They followed the doctor's advice. In addition, the patient's perspective of blood glucose monitoring was taken into account, despite the fact that they did not have a glucometer from a mobile device (lack of self-management and dawn effect). Furthermore, all participants (n=7) increase in blood glucose level in the morning. Invasive glucometer has a high accuracy, but inducing finger discomfort, uncomfortable, and increase risk of infection when it checked daily. Conclusion: Perceptions of nurse and patient about self-monitoring can improve patient self-management and prevent the occurrence of dawn effects.*

Keywords : *Dawn Effect, Diabetes Mellitus, Self-Management, Self-Monitoring*

Abstrak : **Latar belakang**: Sebuah Fenomena pada pasien diabetes melitus dikenal dengan Fenomena fajar (dawn effect), yaitu kondisi peningkatan kadar glukosa darah secara mendadak mengakibatkan peningkatan kebutuhan insulin pada pagi hari. Hal ini terjadi akibat hipoglikemia (penurunan glukosa darah) pada malam hari. Self-monitoring dapat meminimalkan dampak dawn effect (fenomena fajar). Self-management

diaktualisasikan untuk mengawasi fluktuasi kadar glukosa darah pada pasien diabetes melitus. **Tujuan**: mengetahui faktor-faktor yang mempengaruhi self-monitoring fenomena fajar (dawn effect), meningkatkan self-management pasien diabetes dan pengetahuan perawat di Temanggung Jawa Tengah. **Metode** : penelitian dilakukan secara kualitatif dengan wawancara semi terstruktur dan pertanyaan terbuka. Peserta dipilih menggunakan teknik purposive sampling dari layanan kesehatan primer dan sekunder baik perawat maupun pasien. Diperoleh dua belas peserta terdiri dari perawat senior (n=5), pasien dengan diabetes mellitus tipe 2 (n=7). Informasi self-manajemen menggunakan diabetes psikometri. Pemantauan glukosa darah dikumpulkan setiap hari di pagi hari. **Hasil**: Persepsi perawat terhadap fenomena fajar (dawn effect) masih tergolong rendah karena kurangnya pengetahuan dan kompetensi dalam self-management pasien diabetes. Perawatan cenderung mengikuti saran dokter. Selain itu, perspektif pemantauan glukosa darah pasien diperhitungkan, pada kenyataanya pasien tidak memiliki glukometer dari perangkat seluler (kurangnya manajemen diri terkait fenomena fajar). Seluruh peserta (n=7) mengalami peningkatan kadar glukosa darah di pagi hari. Glukometer invasif memiliki akurasi yang tinggi, namun menyebabkan jari menjadi nyeri, tidak nyaman, serta meningkatkan risiko infeksi jika digunakan setiap hari. **Kesimpulan**: Persepsi perawat dan pasien tentang self-monitoring dapat meningkatkan self-management pasien dan mencegah terjadinya dawn effect (fenomena fajar).

Kata Kunci : Dawn Effect, Diabetes Mellitus, Self-Management, Self-Monitoring

INTRODUCTION

The nurse has a very important role in diabetes treatment, especially understanding the basic knowledge of diabetes. The actual knowledge about diabetes, in hospital and community, influence the nurse perceptions to support self-management of diabetes patients [1], [2].

Dawn effect, which occurs in diabetic patients, is classified into two types: Dawn phenomenon and Somogyi effect. Schmidt et al. established the dawn phenomenon in 1981[3] which describes a situation of hyperglycemia or spontaneous insulin increase in the morning which occur because of the absence of nocturnal hypoglycemia. The dawn phenomenon mainly affects children and adolescents with diabetes type 1. However, 40% of dawn phenomenon goes on the patients with diabetes type 2 [4]. Based on data, the dawn phenomenon comes to 54% patients with type 1 diabetes and 55% patients with type 2 diabetes. The somogyi effect accounted for 12.6% of all cases of fasting hyperglycemia, 24,1% dawn phenomenon, and 63,3% poor control [5]. That condition remains unclear. There is controversy on the number and frequency of the cases, especially in older people with type 2 diabetes because the dawn effect can occur in all patients with type 1 and 2 diabetes mellitus. WHO has estimated that 422 million adults over 18 years old live with diabetes in 2024? In the Asia-Pacific region, the deaths caused by rising of blood glucose reach 490,000 to 944,000 people. In 2012, 1.5 million people died because of diabetes mellitus. As we know that men or women have the potential in increasing the blood glucose levels beyond normal, under the diagnostic threshold which causes the death and morbidity. Indonesia has the fourth rank with the highest prevalence of diabetes in the world [6].

The survey in one of Hospital at Central Java, showed that type 2 diabetes mellitus had the fourth ranked with 240 outpatient visits and 50 hospitalized patients. Based on these population numbers, the predicted of dawn effect on Type 2 Diabetes Mellitus about 168.8 million in the world, where 20 people from 50 patients treated have dawn effect.

The dawn effect in diabetes is an abnormal condition of increasing blood glucose levels in the morning before breakfast. This often called the dawn phenomenon. The dawn phenomenon can be divided in physiological or pathological type. Both of types occur at the same time of the day ie 03: 00-05: 00, but they have a different value of glucose levels. The physiological dawn phenomenon is associated with a natural decrease of insulin secretion at 03: 00-05: 00 WIB combined with elevated blood glucose levels over the standart [6], [7], [8].

The Somogy effect is a condition of hypoglycemia at night due to hyperglycemia in the next day, often called mid-morning hyperglycemia which discovered by Michael Somogyi in 1949. This examination is based on the measurement of plasma glucose concentration between 3-5 am. When the patients has lower blood glucose, it indicates the Somogyi effect, whereas the condition is higher than normally, it called dawn phenomemon [9].

The objectives of this research are exploring the patients and nurses perception about dawn effect self-monitoring which is related to self-management of diabetes mellitus patients.

LITERATURE REVIEW

Self-monitoring

Monitoring methods can minimize the effects of dawn phenomena, such as Self Monitoring Blood Glucose (SMBG) or Continuous Blood Glucose Monitoring (CGM)[10]. Self-monitoring of blood glucose is useful for knowing the state of hypoglycemia or hyperglycemia, motivating lifestyle changes and adjusting treatment so that patient's safety increases [9]. Infrequent self_monitoring could have contributed to poor glycemic control [1]

The invasive Self-monitoring method is done by insert a small needle to the finger, to obtain capillary blood samples. Then, the Blood samples are inserted into the blood glucose monitor machine. The invasive Blood glucose measurement is accurate enough, but has a weakness such as cause the pain, the risk of infection, and less comfortable, especially when the measurement done repeatedly in one day [11]. The Monitoring of the dawn effect incidence can be done by neasure the blood glucose of diabetes patients within four to five times daily, to prevent hypoglycemic and hyperglycemic[12] [13].

Another method of diagnosing the dawn phenomenon is checked the level of glucose constantly. The Continuous Blood Glucose is a small device which detects the glucose concentration throughout the entire day, through a small sensor which implanted subcutaneously. Once the blood glucose is detected, the data is processed by the computer, then the abnormal glucose concentration can be found more easily, such as the dawn phenomenon, and then the appropriate therapy may be given [9]. That device is not available yet in Indonesia, and the price is quite expensive.

Measuring the dawn phenomenon (dawn effect) can be done by measure the blood glucose levels for several nights at 03:00 to 05:00 pm. The virtue of this method helps to distinguish the dawn phenomenon (Dawn effect) and the Somogyi effect. The dawn phenomenon occurs when plasma glucose levels are normal or high during plasma glucose measurement at night. In the other hand, the low plasma glucose concentrations during measurements showed the Somogyi effect [9][14].

Self-monitoring blood glucose levels should be noted preprandially. First, in the morning before people eat, has indicated the individual basal insulin level. Then, further monitoring two hours after meals is also required. A two-hour postprandial period is required to know the absorption of carbohydrates in the bloodstream and the initial rise of blood glucose levels. The bood glucose level will be increased two hours after eating, thereby reducing blood glucose levels within normal limits is needed [15]. It is also important to monitor blood glucose at night from 2:00 to 3:00 to determine the occurrence of hypoglycemia [16],[17].

Self-care management

Self-care is essential for patients with chronic disease during the healthcare. Several theories of nursing explain about self-care include Dorotea Orem, the grand theory about self-care. Another Middle range theory of self-care was developed by Barbara Riegel. The main difference between Orem's self-care theory and Barbara Riegel's self-care theory is the focus on chronic illness. The riegel's theory has focused on chronic illness, while Orem's theory is not. Orem defined self-care as "the practice of individual activities that perform on their own behalf in maintaining life, health, and well-being"[10].

According to Riegel (2012) self-care is the maintain process of health through health promotion and disease management. Self-care is more prevalent relatively in patients with chronic disease. Engaging in self-care makes the patient an active participant in disease management. The key concepts in this mid-range theory are self-care maintenance, self-care monitoring, and self-care management [10]. Self-care habits give influent on blood glucose monitoring in patients, especially type 2 [18].

Self-care manae in diabetic patients can be measured by diabetes self-management which is operationalized by Diabetes Self-Management Scale (DSMS) with 40 items of questions tested validity [19].

The dawn effect case is often undetectable. Some health workers are not aware of this phenomenon. Patients rarely have sweats and hypoglycemia at night and some patients awake in the morning. When the blood glucose falls too low in the morning, the hormones (such as growth hormone, cortisol, and catecholamine) are released. The dawn effects of blood glucose measurements can be done at 3:00 to 5:00 to get the correct diagnosis [20][5].

The nurse may consider the dawn effect as one of the targets in the treatment of diabetes, like fasting. Subsequent monitoring is performed according to the doctor's advice or if the patient's condition requires close monitoring. Preparation of patient independence has been done such a nutrition education, routine control, taking medication and exercise, While the frequency of blood glucose monitoring has not been explained to the patient. Nurses also expressed that they have not understood the phenomenon of dawn effect in diabetic patients. Based on these backgrounds, researchers interested to develope self-monitoring using a noninvasive glucometer to improve the independence of diabetic patients.

METHOD

The methods of this research are the qualitative method. Research designed to observe social interaction also understand the individual perspectives. Some public qualitative strategies using case study. For example people's experiences, why, what they do, and they need in order to change diabetes self-management [21]. The aim of this research is Explore the nurse and patient's perceptions about dawn effect phenomenon and self-monitoring blood glucose, which is focus on describe the respondents "Lived experience in dawn effect and self-monitoring blood glucose". In this study, the researcher investigated people's natural history about dawn effect phenomenon and their self-management of diabetic patients to control the phenomenon. Phenomenology is a philosophy method and approach that valued for its focus upon describing respondents. The researcher has done interviews the two type participants, both of a nurse and diabetic patients. First interview the nurse and patients to complete observations, then measure blood glucose level in patients two times a day in the morning before breakfast and before dinner time. The interviewees' points have been considered in both sides. Similarities in the Javanese culture of researcher and patients, easy to have the best connection and understand each other.

Design, setting, and Sample

Design of the study is a qualitative research with case study methods. Research samples using patients with type 1 and type 2 diabetes mellitus, and nurses. The inclusion criteria for the patient were age over 18 years, had diabetes for at least 6 months based on doctor's diagnosed able to read and write in Indonesian. Nursing inclusion criteria are having worked for at least 5

years, understand patients with diabetes mellitus. Exclusion criteria have a psychiatric disorder. The technique of taking a purposive sampling. The sample size was based on similar studies, but the critical determinant was saturation during the research process and characteristic for stopping data collection if overlapping information. Finally, after interview with six (n=6) diabetes patients, and five (n=5) nurses, we gained saturated information.

Data collection

The data collection begins by asking the respondents' willingness and filling the demographic characteristics followed by daily blood glucose measurement and the patient who has agreed to be the research respondent fill in the questionnaire. Research respondents encircle the numbers 0-5 listed in the questionnaire. The process of filling questioner assisted by the researcher conducted recording of interview result. Data retrieval was done using questioner DSMS (Diabetes Self-Management Scale) which translated into Indonesian consist of 40 question items.

Methods the data collection

Data collect with semi-structured used open-ended questions, undertaken with each participant was confirmed to have knowledge abaut dawn phenomenon, dawn effect were covered all nurse and patients. At the beginning of the speech, a general question such as "what is dawn phenomenon and Somogyi effect?" Then there were some questions to cover criteria in attitude, for example: "what is the corelation between dawn phenomenon and the blood glucose monitoring? "Please describe the frequent monitoring of blood glucose every day". Is there any relationship between frequency and dawn effect incidence? The subjects allowed to "tell their story" in "their own words" and in no particular order, the conversation was kept flowing researcher guideline. After permission, recorded the talk using a microphone, handwritten notes in relation to nonverbal communication (researcher's observations, interpretations, feelings, and reflections) were taken during and immediately after the interviews and complemented verbal transcription. We write date, time of interview, place, blood glucose history also demographic information the participants. At the end of an interview process. Both of researcher and participants it was easy to have a good thrust so can understand each other.

The Setting

Two groups for study were in two medical centers in Temanggung City that represented different health condition. Primary healthcare and secondary healthcare. In qualitative method, researcher had an important role within it. Researcher has done interviews in one time for nurse and patients'. A diabetic patient twice a day measuring blood glucose in the morning before breakfast and before dinner. Each patient was follow up for two days.

Sampling Method

Purposive sampling technique during the data collections. Inclusion criteria: adults (≥18 years) diagnose with type 1 DM or type 2 DM (more than5 years) able to participated, Nurse with work duration (> 2 year).

Analyzing Method

Transcribed each response and question from microphone and completely by hand written notes. The interview analyzed using Colaizzi's method (1978). There are seven steps to analysis. Stages 1 make a protocol, second extracting significant statements (recorded by tables and notes). In stages 3 formulating meaning of theme and 4 is clusters of themes between statements. A stage is 5 exhaustive description and stages 6 are fundamental structure. Overall, seventy five percents of statements received identical topics and same fundamental structure.

Reliability and validity

Triangulation is typically a stratgy (test) to improve validity and reliability of research or findings. This using several kinds of methods (both quantitative and qualitative approaches) or multiple methods of data collection and analysis, but does not suggest a specific method for all of researches it's depend on their criteria. We collect information through interviews and direct observation. For analysis, qualitative and quantitative styles with the Colaizzi method

RESULTS AND DISCUSSIONS

From the results of research conducted at the Center of health services at health centers and district hospitals Temanggung results obtained as many as 21 patients routinely check themselves at the health center every once a month on activities PROLANIS (Chronic Disease Service Program), while for inpatients from January to September 2017 obtained data 106 patients with type 1 DM and 179 DM type 2 patients. Based on the results of interviews conducted by four senior nurses in the medical room at Temanggung District Hospital, and one in primary health care. The average of nurse participant has been treating patients with diabetes approximately 51-60 patients, especially type 2 every year. During In October there were 15 patients who were monitored for at least two days, from 15 patients treated by 10 patients suffering from hyperglycemia in the morning. Eight patient's denial informed consent to be a participant so they drop out from the research. Blood glucose measurements every hour from 05:00 to 06:00 before meals. The frequency of monitoring is often held at least once a day in the morning around 05-06.00 pm with fasting conditions. Subsequent monitoring is performed according to the doctor's advice or if the patient's condition requires close monitoring. Preparation of patient independence has been done related to nutrition education, routine control, taking medication and exercise, while the frequency of blood glucose monitoring has not been explained to the patient. Nurses also expressed that they have not understood the phenomenon of dawn effect in diabetic patients. Based on these results researchers are interested in developing self-monitoring using a noninvasive glucometer to improve the independence of diabetic patients. One patient has a glucometer, but he/she monitored her/his blood glucose rarely, six patients have not glucometer, and 7 patients just monitor the blood glucose once a month at health service. The indication of the patient with high blood glucose (57,1 %) were headache and urine quite often at night, (42,9%) of them felt faint. Another health problem was hypertension. The measurement of blood glucose for two days showed that the blood glucose was more normal (100%) and decreased before dinner. Then, the measurement showed that 4 patients (57,1%) before breakfast and 3 patients (42,9%) before dinner, had a blood glucose decrease. Patients Glycemic score in Table 4.1.

Table 4.1 Patients' Glycemic score

NO	Gender	Age	Educations level	Type of Diabetes	Durations	Blood Glucose (mg/dl)	
						Morning	Night
Patients 1	Female	55	Elementary School	2	3 year	256	158
						318	206
Patients 2	Male	56	Junior High School	2	2 year	258	444
						228	120
Patients 3	Male	70	Junior High School	2	3 year	141	267
						189	242
Patients 4	Female	45	Senior High School	2	4 year	150	164
						236	179
Patients 5	Female	52	Senior High School	2	3 year	206	259
						148	216
Patients 6	Female	60	Junior	2	5 year	141	360

			High School			134	132
Patients 7	Male	50	Junior High School	2	3 year	146 250	195 142

Table 4.2. Patient Characteristic

Property	N (%)
Place	
Hospital	5 (41,6)
Primary Care	7 (58,3)
Sex	
Female	7 (58,3)
Male	5 (41,6)
Age	
41-50	7 (58,3)
51-60	4 (33,3)
61-70	1 (8,3)
Educations	
Elementary School	1 (8,3)
Junior High School	4 (33,3)
Senior High School	2 (16,6)
Diploma 3	1 (8,3)
Bachelor	4 (33,3)

Table 4.3 Nurse Characteristic

NO	Gender	Age	Educations level	Work Durations
Nurse 1	Female	42	Bachelor Nurse	10 year
Nurse 2	Male	49	Diploma	10 year
Nurse 3	Male	43	Bachelor Nurse	15 year
Nurse 4	Female	41	Bachelor Nurse	14 year
Nurse 5	Female	41	Bachelor Nurse	13 year

Theme 1: Nursing Perception about Dawn effect phenomenon in Diabetic patients

(PN1): "I don't know about the phenomenon, I just know about hyperglycemia and hypoglycemia. (PN4): "I'm sorry I don't know this the first time I hear the phenomenon (PN5): I don't know, what dawn phenomenon. If the concept of theory ever read phenomenon of dawn effect, as long as here ever found the case. Blood glucose dawn means very low in the morning"

Theme 2: Nurse perception in frequency of blood glucose monitoring method for diabetic patient

(PN1): "use the invasive method to control blood glucose patient base on advice physician rule. Suitable for the patient condition and fluctuation of blood glucose. Especially in the morning before they eat. Sometime 1-2 times a day"

(PN3): "Regularly check blood glucose patient every morning before eating, and it's consistency based on physician orders. Use a glucometer hospital standard with invasive methods minimal one times a day, sometimes if the patient's conditions not good, with high-risk factor every 4-6 hour regularly check base on doctor's order. So more than 2 time a day".

(PN5): "we check blood glucose once a day sometimes two times and more, based on the patient's conditions, because this is an invasive method so, we must confirm with a

doctor before doing the examination. In this hospital, we regularly check blood glucose in the morning before they eat".

Theme 3: Nursing preparation for Self-management Diabetes Mellitus Patients

(PN2): "Patient-doctor B already have provisions, giving rapid, different doctor management hypoglycemia, insulin pump, report doctor duty to DPJP (In Indonesia Dokter Penangung Jawab Pasien). Patient education before returning home, counseling nutrition used to be, new patients with diabetes mellitus nutrition, routine treatment, signs of hypoglycemia and hyperglycemia"

(PN3): "We are only limited health education, about the diet pattern, foot exercise management (DM foot exercises), as well as drug management-medication, routine taking medication and recognize hypoglycemia". "Perhaps, the self-management program itself is not available for the patient"

(PN4): "Nutrition consultation, to complete the readiness at home. When there is a signs of rising blood glucose, immediately check into health care". Then, doing a routine blood glucose monitor every morning or incidental, if there is a hypo or hyper condition."

(PN5): "educated, eg DM patient we suggest for the first obedient diet, then Sports to burn calories, routine control at the doctor or hospital, recognize the sign of hypoglycemia and hyperglycemia at home".

Theme 4: General knowledge about dawn effect in diabetes mellitus patients.

Most of the participants explain that they don't know about dawn effect as a serious problem. For example, (Patients 2) a 56-year-old man said: "I don't know what dawn effect is. But every night, I often feel weak until morning. Then my body feels very weak and thirsty"

Theme 5: Patient's Perception in frequency of blood glucose monitoring

(Patient 4) A 45 year old woman said: "I rarely check blood glucose regularly, sometimes once a month, sometimes not necessarily, most often when I feel sick ".

(Patient 3) A 70 year old men said: Before eating I rarely check my blood glucose, especially before exercise, or when traveling away from home, not necessarily in one day I check my blood glucose "(the patient an 52 year old women said" I have my own glucometer but rarely used because I do not know when the right time to measure blood glucose"

Theme 6: Patient's Perception of regulary blood glucose monitoring

Moreover, the patients' perception on blood glucose monitoring is very important considering that they don't have glucometer and mobile equipment. (Patients 3) "I'm afraid when I check my blood glucose every day becaus I'm fear of pain on my hands or infection if every day I should checked it for several times". (Patients 6) "I feel so pain when I check my blood glucose, that's the reason which makes me lazy to check"

On-time examination is very important because it provide effective treatment and increases the patient's life expectancy. (Patients 5) A 52-year-old man said: "if late diagnosis causes side effects, the disease dosn't progress or even early death." They asked personal test and examinations, although there are different kinds and frequencies. Mostly due to lack of valid information, expensive treatment costs and social problems such as overcrowding in clinics or laboratories and traffic jam problem. "Commuting to a clinic is difficult because of traffic" "after leaving previous doctor, there aren't periodical examinations" (A 55-year-old woman). Fewer patients have glucometer in their home, and they did not do regular checking.

Theme 7: Patient's Perception of diabetes self management

Based (Patients 2) "I rarely monitor my blood glucose, blood pressure, cholesterol. Then, I do exercise and eat randomly. I do not reduced carbohydrates, sugar and fat quantity in meal time". (Patients 1): Knowledge of keeping blood glucose remains

stable is limited. I have rarely control my eyes, teeth, and toe, And i have Blood glucose test once a month ".

Some patients say less exercise and only a morning walk several times a week (Patient 4). On patients' speech, the researcher believed that the main reason for not following safe diet program is lacking of self-management to maintenance diet modifications, diabetes knowledge, blood glucose and physical exercise.

Discussions

Researchers have observed about dawn effect in type 2 Diabetes Mellitus by phenomenology qualitative research. The main idea was about self-monitoring blood glucose and self-management in diabetic patients. There are gained 7 themes. In each item, there are multiple aspects and each has different results. These results of themes into two broad categories, there are Self-monitoring dawn effect and self-management.

The process of patient self-sufficiency management (Gharaibeh et al., 2017) that occurs is not appropriate yet, from the nurse's point of view, they said that they do not understand yet about the dawn effect so it will directly impact the patient's habits which lack self-awareness of routine blood glucose measure. This is proved by the incidence of hyperglycemia in the morning, but patients do not realize that the symptoms that show signs of increased blood glucose. The lack of patient self-management is also seen in patients' difficulties to modify diets, maintain sugar intake, and exercise.

At the end of the interview, the patient mentioned the source of information often obtained from primary care and hospitals, mass media programs (TV and radio), but low socio economic status, the important information about blood glucose monitor was incomplette and lack of patient independence triggered blood glucose instability.

Qualitative Colaizzi methods and informant methods participate in analyzing processes and repeated by peer researchers (Suryani, Padjadjaran, View, & Syriac,2016) By using participant words and because of similarity in the interviewer's culture and interviewed, the authenticity has increased. For the first time, researchers were exploree perceptions of patients and nurses. This study eliminates gaps in educational programs. Assessment of blood glucose as part of diabetes control in participant can be connected perception or individual experience about self-monitoring dawn effect to self-management.

Researchers have identified a number of key themes, which may be useful in increasing the awareness of the experience and attitudes of diabetic patients. Knowledge has a direct influence on attitudes (Islam et al., 2015). Patients who do not have enough knowledge about several topics, such as the cause, type, eating habits, appropriate activities and physical exercise, can't maintain their independence. These results need to be considered to design a more effective management of diabetes patients and more accurate and convenient blood glucose screening without pain.

Causes of dawn effect include decreased beta cell function without insulin therapy, decreased growth hormone, and cortisol and catecholamine cause hyperglycemia. This is seen when high morning glucose levels remain high until mid-morning. The phenomenon of dawn can occur because of the large intake of carbohydrates DM patients. Lack of sleep needs can also trigger the occurrence of dawn phenomenon [8]. There is a need for deeper research related to this issue. Determining the phenomenon of dawn correctly to overcome the instability of blood glucose.

Self-monitoring is helpful to provide feedback on the effects of diet, exercise and stress on blood glucose so as to provide patient information on the daily pattern of blood glucose levels as a consideration evaluating the effectiveness of diet, lifestyle and drug doses [9].

If blood glucose levels are controlled then the incidence of complications can be prevented, more sophisticated methods of monitoring blood glucose levels of patients can be combined to help reduce the incidence of complications and improve the quality of life of diabetic patients. Health professionals use this information to evaluate the effectiveness of treatment and

lifestyle and to identify where adjustments may be necessary to maintain blood glucose levels within normal parameters. This helps diabetic patients to identify the incidence of hypoglycemia and hyperglycemia, the effects of diet and exercise on blood glucose levels, and the effectiveness of the drug administered [15],[9]. The main methods used to monitor the control of blood glucose in people with diabetes are HbA1c and urinalysis as self-monitor blood glucose levels 6.

For diabetic patients monitoring blood glucose is important and should be performed rapidly, at least 4 times a day for DMT1 and according to the need for type 2 diabetes (NICE guideline),[22] this examination is done several times the stabbing on the finger that can cause pain after measurement of blood glucose levels. Blood glucose measurement of the invasive method causes pain and risks infecting the patient if performed continuously. It takes a noninvasive examination to control blood glucose so as to help improve the self-care of DM patients. [23]. Blood glucose testing results can be incorporated into informatics-based applications that serve as a reminder between patient and nurse. Monitor and evaluation of sustained blood glucose is an important step to prevent the occurrence of hyperglycemia or hypoglycemia in diabetic patients [24][25][26].

Monitoring is often done using an invasive method by inserting a small needle on a finger, to obtain a capillary blood sample, then inserted glucometer [13]. The measurement of the invasive method is quite accurate. The disadvantages of this method cause pain, infectious risks, and discomfort especially if the patient if done repeatedly in one day [11]. Measurements three times or more cause serious health problems, very uncomfortable for patients. The impact of blood sampling invasive method resulted in the weakening of skin long healing period, infection risk, pain [27]. Blood glucose measurements can be performed four to five times a day, to prevent hypoglycemic and hyperglycemic [12].

Various current methods of monitoring blood glucose levels can be combined using non-invasive telemonitoring communication technology. Health professionals use this information to maintain blood glucose levels within normal limits [28],[9]. Therefore, there is a need to develop new methods, which allow the detection of a continuous and non-invasive blood glucose [29]. Self-monitoring of blood glucose in real-time is very useful in determining the level of hypoglycemia and hyperglycemia can help improve patient safety [16], [30] especially patients who are using insulin, sulphonyl-urea or glinides, known as hypoglycemic agents. Nurses can monitor the results in real time by utilizing telecommunication devices that support health services such as internet and mobile phone [29]. Self-monitoring of blood glucose is important in motivating patients to change lifestyle and adjust treatment [30].

CONCLUSION

Self-Management in patients with diabetes mellitus can be enhanced by reinforcing patients' knowledge, developing positive perception and encouraging behavior change while taking into consideration patients' backgrounds. To improve self-management, health care team especially nurses should be utilizing a patient-centered approach in order to deliver diabetes information as pecific issues of management practice. Good perception on nurse and patient important to manage the disease.

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