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Original Research

Early Identification of Neuropathy in Patients with Diabetes Mellitus at RSUD Haji Adam Malik Medan Using the IpTT Method

Murni Sari Dewi Simanullang[1], Ernita Rante Rupang[2], Grace Celline Ayu Putri[3*]

[1,2,3] Department of Nursing, STIKes Santa Elisabeth Medan, Indonesia

ABSTRACT

Background: *Neuropathy is a condition of damage to the nerves of diabetes mellitus patients. Neuropathy can cause serious complications and can even cause amputation in sufferers. So it is necessary to do early detection of neuropathy, one of which is by using the IpTT method. Adam Malik General Hospital is one of the hospitals with the highest percentage of diabetes in Medan, with the cases reported by 1,323 people in 2020. This study aims to identify the incidence of neuropathy in DM patients at Haji Adam Malik General Hospital in Medan using the IpTT method.*

Methods: *The research design used was a descriptive study with a cross-sectional approach with a population of 1470 inpatients. The sampling technique used accidental sampling with a sample of 52 respondents. The instrument used in this study is in the form of an observation sheet using the SOP of the IpTT Method.*

Results: *The results of the study found that out of 52 respondents who had neuropathy, 5 respondents (10%) and 47 respondents (90%) did not experience neuropathy.*

Conclusion: *It is hoped that from the results of this study, DM patients can prevent neuropathy by using the IpTT method.*

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CONTACT
Grace Cellline Ayu Putri
gracecelline26@gmail.com
Department of Nursing, STIKes Santa Elisabeth Medan. Jl. Bunga Terompet No.118, Sempakata, Medan, Indonesia.

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INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder characterised by increased blood glucose levels due to damage to insulin secretion, insulin work, or both. (Istianah et al., 2019) Diabetes Mellitus (DM) is one of the causes of death in the world. Complications that may arise from diabetes mellitus include damage to blood vessels, nerves, and other organs of the body. Cardiovascular disorders, kidney problems, and vision impairments are some examples of serious complications that can arise. Therefore, regular monitoring and blood sugar management are the main keys to preventing or reducing the risk of these complications.

According to the International Diabetes Federation (IDF), in 2021 there will be 537 million adults suffering from DM disease worldwide, which will increase to 634 million people in 2030 and 783 million in 2045. As many as 43% of deaths caused by

high blood glucose levels occur at the age of under 70. The majority of diabetes mellitus in the world in 2014 occurred at the age of more than 18 years, which is 8.50% (World Health Organization, 2016).

The novelty of this study is to identify the early detection of neuropathy events in DM patients using the IpTT method at Haji Adam Malik Hospital Medan with a population of 1470 people and 52 respondents of inpatient DM patients. Of course, it is different from the previous study because in this study there is no hypothesis because this study is descriptive only looking at the picture of early detection of neuropathy in DM patients with the IpTT method at Haji Adam Malik Hospital Medan.

Diabetes Mellitus (DM) is a degenerative disease that can cause neuropathy (Bubun et al., 2020). DM can cause damage to all organs of the body and can cause various complaints or complications, such as chronic eyes, kidneys, blood vessels, and others. Diabetes Mellitus (DM) is a non-communicable and lifelong disease where this condition requires continuous and consistent treatment so that it can be the main prevention of neuropathy (K. Handayani & Saibi, 2019).

Neuropathy is one of the consequences of complications in people with DM. Diabetic neuropathy is also defined as a disorder of peripheral and autonomic nerves that is usually experienced by people with diabetes mellitus. Neuropathy, a disorder of the cellular and molecular nerves that are disturbed, is one of the consequences of DM (Handayani et al., 2019).

Neuropathy causes nerve disorders resulting in pain or numbness, especially in the extremity section. Diabetic neuropathy is a prevalent condition that affects patients with increased falls, causes pain, and also reduces quality of life (Feldman et al., 2019). Studies show that the prevalence of diabetic neuropathy is about 8% in newly diagnosed DM patients, and higher is found in patients who have had DM for a long time at 50% (Rahmi et al., 2022). The prevalence of neuropathy complications in diabetics reaches more than 90%, or almost all diabetics experience neuropathy complications (Rahman et al., 2021).

Sensitivity disorders experienced by people with diabetes mellitus are manifested in the motor, autonomic, and sensory components of the nervous system. This can result in anatomical deformity of the foot and cause protrusion of the abnormal bone and emphasis placed on one point, which ultimately leads to skin damage and ulceration. Advanced diabetic foot conditions that are not treated properly can develop into a foot amputation (Rahman et al., 2021). This condition is usually a type of symmetrical distal sensorimotor neuropathy.

Another clinical characteristic is due to the involvement of small and large nerve fibres (mixed sensorimotor). At first, the most distal part of the affected extremity causes sensory loss with characteristic glove and stocking formations, which indicate the longest involvement of nerve fibers. Sensory loss is followed by the involvement of the upper limbs of the distal portion, the anterior aspect of the torso, and then the apex of the head. Overall, there is a mild palpation sensation, sensitivity to pressure and vibration, as well as joint proprioceptiveness.

Early detection measures can be one solution to prevent diabetic neuropathy. There are several screening methods that can be used in detecting neuropathy. In the research of Papanas & Ziegler (2014), the types of methods that can be used are Neuropad, Ipswich Touch Test (IpTT), VibraTip, and NCS. One easy-to-use early detection is the Ipswich Touch Test (IpTT) (Handayani et al., 2019). IpTT is one way to detect neuropathy early; its procedure does not require a long time and is easy to teach

to DM patients (Paridah et al., 2021). Based on the above background, the author is interested in conducting research on early detection of neuropathy events in DM patients using the IpTT Method.

MATERIALS AND METHOD

The type of research that will be used in this study is descriptive research aimed at describing (exposing) important events that occur in the present (Nursalam, 2020). The design used in this study was cross-sectional. Cross-sectional research is a type of approach that emphasizes observation time only once at a time. This study design aims to identify the incidence of neuropathy in DM patients using the IpTT method. The population in this study is DM patients at Haji Adam Malik Hospital Medan, totaling 1470 people in 2022.

The sampling technique used in the study is non-probability sampling with the accidental sampling method, which takes respondents by chance to meet the researcher as a sample and can be used as a sample if the person the researcher meets happens to be suitable as a data source. The number of samples in this study was 90 people. The variable in this study was the incidence of neuropathy in DM patients.

The instrument used in this study was in the form of an observation sheet using the SOP of the IpTT Method. This research was conducted in the inpatient room of RSUP, Haji Adam Malik Medan. The study will be conducted from April to May 2023. The type of data collection carried out in this study is primary data, namely data obtained directly by researchers from research subjects, and secondary data is data obtained from documentation, both texts, and documents that focus on research. The primary data in this study was to make observations using the IpTT method in DM patients. The secondary data in this study is data obtained from patient medical records at RSUP Haji Adam Malik Medan.

In this study, the author will conduct a univariate analysis that only describes or describes the frequency distribution table and presentation of early detection of neuropathy events in DM patients using the IpTT method at Haji Adam Malik Hospital Medan. Univariate analysis aims to explain or describe the characteristics of each research variable. The form of univariate analysis depends on the type of data. In general, this analysis only produces the frequency distribution and presentation of each variable (Polit & Beck, 2020).

This research has also been ethically qualified by the Health Research Commission of STIKes Santa Elisabeth Medan with letter number No. 055/KEPK-SE/PE-DT/III/2023.

RESULTS

In this section, the results of research on the Early Detection of Neuropathy in DM Patients Using the IpTT Method at RSUP Haji Adam Malik Medan will be described. The respondents in this study were DM patients in inpatient care—as many as 52 respondents.

Characteristics of respondents based on age, gender, education level, occupation, type of DM, and length of DM at RSUP Haji Adam Malik Medan. Respondents in this study were inpatients at RSUP Haji Adam Malik Medan, as many as 52 people. Researchers grouped respondents' demographic data based on age, gender, education level, respondents' occupation, and length of DM.

Table 1. The frequency distribution of respondents based on demographic data of age, gender, education level, occupation, type of DM and length of DM at RSUP Haji Adam Malik Medan as many as 52 people

Characteristic	Frequency(f)	Percentage(%)
Age		
17-25	1	2%
26-35	3	6%
36-45	6	11%
46-55	16	31%
56-65	12	23%
>65	14	27%
Total	**52**	**100%**
Gender		
Male	26	50%
Female	26	50%
Total	**52**	**100%**
Education Level		
Did not finish elementary school	1	2%
Elementary School	10	19%
Junior High School	6	12%
Senior High School	28	54%
Academy/equivalent	7	13%
Other	0	0%
Total	**52**	**100%**
Work		
Not Working	17	33%
Farmer	6	12%
Laborer	7	13%
Self employed	14	27%
Private employees	1	2%
PNS/TNI/POLRI	7	13%
Total	**52**	**100%**
Type DM		
Type I	4	8%
Type II	48	92%
Total	**52**	**100%**
Long suffering from DM		
< 5 year	21	40%
≥ 5 year	31	60%
Total	**52**	**100%**

Based on Table 1, the number of respondents obtained the most respondents aged 46-55 years, as many as 16 respondents (31%), and the least aged 17-25 years, as many as 1 respondent (2%). Female respondents were 26 respondents (50%) and male respondents were 26 respondents (50%). The highest level of education respondents had was high school or equivalent, with as many as 28 respondents (54%), and the lowest level of education was respondents who did not finish elementary school, with as many as 1 respondent (2%). The most respondents' jobs were not working as many as 17

respondents (33%) and the low jobs were independent employees as many as 1 respondent (2%). The majority of DM-type respondents were Type II, with as many as 48 respondents (93%), and the minority DM type, namely Type I, had as many as 4 respondents (8%). And for > 5 years, as many as 31 respondents (60%), and for < 5 years, as many as 21 respondents (40%).

Table 2. Distribution of neuropathy frequency in DM patients at RSUP Haji Adam Malik Medan

Occurrence Of Neuropathy	Frequency (f)	Percentage(%)
There is Neuropathy	5	1
No Neuropathy	47	
Total	**52**	**100%**

Based on Table 2 above, it was found that the majority of respondents were not affected by neuropathy as many as 47 respondents (90%) and the minority of respondents were affected by neuropathy as many as 5 respondents (10%) out of 52 respondents.

DISCUSSION

Researchers assume that respondents aged 46 years to > 65 years and over are at high risk of neuropathy. The results of the study found patients affected by neuropathy are in the age range of 46 years to >65 years and over, or can be said in the early elderly to the elderly age, so that blood vessels can experience thickening and also decreased degenerative function. The age of someone who is more than 30 years old will experience physiological changes that can reduce a person's body functions. Also, based on the results of the study, it was found that the average respondent in the age range of 46 to > 65 years and over was in line with the majority of patient jobs obtained, namely not working as many as 17 respondents (33%). Because that age range does not allow them to do too much activity.

In the study, it was found that DM patients affected by neuropathy were on average patients affected by Type II DM. And also, type II DM is usually more likely to be experienced by women. From the results of the study obtained, DM patients affected by neuropathy—as many as 5 respondents (10%) were DM patients who experienced type II DM and were also female.

This neuropathy can also occur in DM patients related to the length of DM. Long-lasting DM obtained from the results of the study found that more respondents suffered from DM > 5 years, so some respondents found there were several respondents who were at risk of neuropathy and even had neuropathy. There are also respondents who have been affected by DM for a long time and have even done amputations, without knowing that they have been exposed to neuropathy before.

Respondents affected by neuropathy are not always associated with age, education level, occupation, type of DM, and length of suffering from DM. Based on the results of research through examination with the IpTT method, it was found that there are some DM patients who have even had DM for a long time not affected by neuropathy. In terms of age as well, older respondents were also not affected by neuropathy. Then respondents who were not affected by neuropathy included as many as 47 respondents (90%) because, during the examination using the IpTT method, some respondents felt a light touch on the tips of their toes.

Prolonged hyperglycemia can also increase the activity of polyol pathways, which will decrease myonositol levels and increase the accumulation of sorbitol in nerve cells. This condition will interfere with signal transduction in the nerves. Another factor is that prolonged hyperglycemia will trigger the formation of advanced glycosylation end products (AGEs). This process results in the destruction of body proteins, including nerve cells. Advanced glycosylation end product and sorbitol formed will decrease nitric oxide function, reduce vasodilation, decrease blood flow to nerves, and decrease myoinositol levels in nerve cells that contribute to causing neuropathy (Rahmi et al., 2022).

The research conducted found that complications appeared after the disease ran for 10-15 years because suffering from type 2 DM for a long time caused a continuous accumulation of glucose in the blood, which resulted in complications (Mildawati et al., 2019). It is inversely proportional to research on factors related to the incidence of diabetic peripheral neuropathy, which states that there is no relationship between age and length of suffering from diabetes mellitus (Rahayu et al., 2021). This research is in line with research conducted (Tofure et al., 2021), where the results obtained were that the most common age of diabetic peripheral neuropathy patients was > 55 years with 20 patients (71.43%), and the least was elderly age associated with the accumulation of damage due to free radicals such as increased lipid peroxide levels and changes in enzyme activity, which ends with tissue damage in old age.

Aging occurs at this age; the aging process will cause the ability of pancreatic beta cells to produce insulin to decrease, resulting in glucose intolerance. The aging process that occurs in old age also reduces mitochondrial activity in muscle cells by 35%. This incident is associated with an increase in fat levels in muscles by 30%, causing insulin resistance (Tofure et al., 2021).

The incidence of neuropathy in DM sufferers can be caused by the length of time the sufferer suffers from DM itself. Long-term suffering from DM contributes greatly to the incidence of neuropathy suffered by patients. The length of time indicated for DM in patients is related to the degradation of the function of pancreatic β cells in producing insulin, which then causes complications, and this is generally indicated in patients who have suffered from DM for 5 to 10 years.

The lack of insulin production capacity by pancreatic β cells in the blood also has an impact on reducing the glycolysis process in the cells (Rahmi et al., 2022). According to the researcher, the conclusion of the theory and results of this study is that with a sample of 52 respondents regarding the early detection of neuropathy events in patients with diabetes mellitus with the IpTT method, neuropathy is 10 percent of the specified sample number.

CONCLUSION

Based on the results of a study with a sample of 52 respondents about early detection of neuropathy in DM patients using the IpTT method at RSUP Haji Adam Malik Medan, it can be concluded: the majority of DM patients, as many as 47 respondents (90%) do not experience neuropathy. The incidence of neuropathy in DM patients at Haji Adam Malik Hospital Medan is in the minority of neuropathy—as many as 5 people (10%)—and not ridiculous.

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