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APPLICATION OF THE IPSWICH TOUCH TEST (IPTT) METHOD TO DETECT DIABETIC NEUROPATHY

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ABSTRACT

Background: Neuropathy is the classic and most common complication of DM. One of the early detection of diabetic sensory neuropathy is the Ipswich Touch Test. **Purpose:** This study aims to analyze, compile and examine the results of published research articles containing the application of the IpTT method in detecting diabetic neuropathy. **Method:** Desain of this research is a literature review. Article searches were carried out comprehensively through national and international indexed research journals databases such as Pubmed, Elsevier Clinical Key, and Google Scholar. who met the inclusion and exclusion criteria. The research articles obtained were 6 articles, then all the articles obtained were synthesized and combined. **Results:** The results of the analysis of six journals, there are five research journals with cross-sectional study and systematic review methods, stated that the IpTT examination is significant for detecting diabetic neuropathy, which is evidenced by having a sensitivity ranging from 51-83.3% and a specificity of 90-96, 6% which means it has higher accuracy than the monofilament test. Meanwhile, another journal that uses a cross-sectional study states that the results are not significant/there is no difference between the IpTT examination and the monofilament test, this is because the researchers did not characterize DM respondents in their research. **Conclusion:** In general, five of the six journals recommend that the IpTT examination can be a reliable method, and does not require special costs or tools, and is easy to apply in primary health care and in inpatient care for early detection of diabetic neuropathy.

Keywords : Ipswich Touch Test (IpTT); Monofilament test; Diabetic Neuropathy.

Introduction

Diabetes Mellitus (DM) is a non-communicable disease and is a global, regional, national, and local health problem. The International Diabetes Federation (IDF) reported the prevalence of DM in 2017, as many as 425 million people, and Indonesia was ranked 6th in the world with 10.3 million people with diabetes (1). Riskesdas data (2018) shows a significant increase in the prevalence of DM in Indonesia from 6.9% in 2013 to 8.5% in 2018. The prevalence of DM in Central Java in 2019 was 652,822 people (2).

Diabetes mellitus is a disease that requires integrated treatment. If not getting adequate treatment will cause complications both acute and chronic. One of the chronic complications of diabetes mellitus that results in high morbidity is neuropathy. Neuropathy is a classic and most common complication of diabetes, with an incidence of up to 50% in type 1 and type 2 diabetes (3). The prevalence of diabetic peripheral

neuropathy worldwide reaches 66% and the prevalence of diabetic peripheral neuropathy in Indonesia is 58.0% higher than other Southeast Asian countries such as Malaysia (54.3%) (4).

Diabetic neuropathy is caused by various mechanisms that are triggered by high blood glucose levels (hyperglycemia). The incidence of neuropathy is often not realized by the patient, resulting in the appearance of diabetic ulcers (5). Diabetic neuropathy causes nursing problems with sensory perception disorders in patients. Therefore, the awareness of nurses and other professionals is very important to carry out diabetic foot assessment as early as possible. This is because diabetic foot assessment is a key component in the care of diabetic patients. This assessment includes identification of risk factors for diabetes history, physical examination, foot care education, medication, and referral as needed (6). Health education about foot care in DM patients should also be carried out in both inpatient and outpatient settings every year. In addition, the American Diabetes Association (ADA) and Brazilian Diabetes Society (BDS) guidelines recommend that all diabetics should have at least one diabetic foot assessment each year to identify risk factors for ulceration or amputation and that this foot assessment should begin immediately after the diagnosis of typhoid diabetes. 2 was established, and 5 years after the diagnosis of type 1 DM was established (6).

Neurological examination, in this case, the examination of sensation in the feet can be done through the monofilament test, and the Ipswich Touch Test (IpTT) (7). The 10 g monofilament test is a simple and effective method to identify loss of protective sensation (LOPS) and has become the standard for examining sensation disorders in diabetic feet (8). However, some of these checks in practice require training, special instruments, costs, and accuracy (7). Meanwhile, the Ipswich Touch Test (IpTT) is a new, simple, and tool-free method for neurosensory examination of diabetic feet. The procedure is carried out by lightly touching 6 points on the feet of diabetic patients (9).

The results of the other literature study explained that the Ipswich Touch Test has a high negative predictive value of 92.8%, and a positive predictive value of 81.2% and the IpTT has very good accuracy, as evidenced by the value of sensitivity of 83.33%, and specificity of 97.66%, higher than the golden standard-test monofilament test screening method which only has a sensitivity value of 81% and a specificity of 91% in detecting the risk of DFU in diabetic patients (10). The Ipswich Touch Test can also be taught and applied to diabetic patients with access to limited resources, especially in developing countries because it does not require excessive costs and special tools (11).

The IpTT method has several advantages, namely, it does not cost money and does not require equipment other than the examiner's fingers, and almost no training is needed so that all health practitioners can easily carry out tests, and its simplicity can be done by the patient's family at home (10).

Another advantage, recommends IpTT examination as early detection of the risk of neuropathy and peripheral arterial disease, can be an effort to estimate the cost-savings caused by Diabetic Foot Ulcer (DFU) (12). Concerning the above explanation, it encourages researchers to research with a literature review study design on the IpTT examination method to detect diabetic neuropathy. The search results using the keyword "Ipswich Touch Test" obtained 2 journals containing IpTT and 4 journals containing comparisons of IpTT with monofilament test examinations. Furthermore, the journals were analyzed in the form of data synthesis regarding the differences in the results of significant and non-significant research as well as differences that affect the results of these studies. The purpose of writing this scientific paper is to analyze, compile and examine the results of published research articles containing the application of the IpTT method in detecting diabetic neuropathy.

Methods

This research design uses a literature review study. The research article search strategy is carried out comprehensively through national and international indexed research journals databases including Pubmed, Elsevier Clinical Key, and Google Scholar. The journal search was carried out by applying several inclusion criteria, namely, journals published within 5 years, namely a maximum of publications in 2017, journals related to the IpTT examination and monofilament test, journals containing p-ISSN and e-ISSN, reputable international journal with the Scopus Q1-index. Q3 and reputable national journals with an index of Sinta S1-S4. The exclusion criteria are indexed journals that have been discontinued since 2017, journals that aren't related to the IpTT and monofilament test, and journals that haven't p-ISSN and e-ISSN. The keywords used in the search for research articles are Ipswich Touch Test (IpTT), Monofilament test, and Diabetic Neuropathy. The research articles obtained were 6 articles, then all the articles obtained were synthesized and combined. The flow or chart of the research article/journal selection process is as follows:

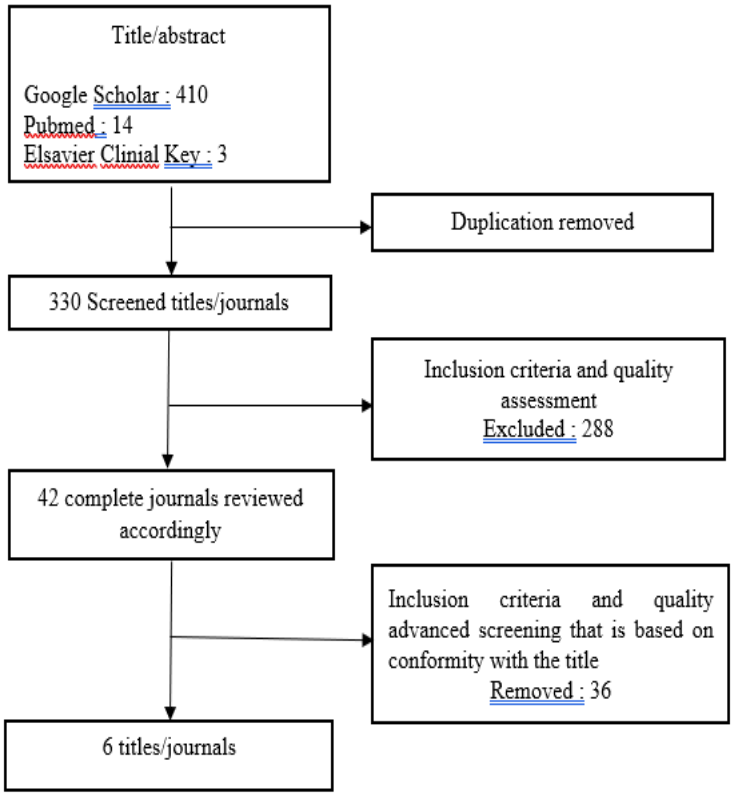

Figure 1. Flow of the Research Article/Journal Selection Process

Results

The results of this literature study, grouping the data begins with synthesizing twenty related journal articles. Then the article is summarized including the name of the researcher, year of publication of the journal, objectives, methods, samples, results and recommendations. Furthermore, the synthesis is explained by using a synthesis matrix to combine and classify different research results from several journals and combine them with different elements to get conclusions from selected articles in general. In detail, this process is described in the following table :

Table 1. Article Identity

Researcher	Journal Name	Journal Qualification
Yuliani et al., (2017)	Hasanudin Student Journal	Sinta (4)
Bubun et al., (2019)	Nursing Scientific Journal	Sinta (4)
Dutra et al., (2020)	Diabetology & Metabolic Syndrome	Scopus (Q2)
Hu et al., (2021)	Diabetology International	Scopus (Q3)
Basir, I. S., Syam, Y., Yusuf, S., & Sandi, S. (2020)	Journal Enfermería Clínica	Scopus (Q3)
Damayanti et al., (2020)	Manado Nursing Scientific Journal	Sinta (4)

Table 2. Synthesis Matrix

Researcher/ year	Instru-ment	Types of DM	Avera-ge age	Dura-tion of DM	Sample	Research design	Effect	Result
Yuliani et al., (2017)	IpTT	DM tife 2	54,24 years	< 5 years	55 sample	*Cross-sectional study*	Signi-ficant	The IpTT method can confirm the symptoms of neuropathy based on the monofilament test about 72.7%-100%. While the results of the IpTT test can confirm that respondents are free from neuropathic symptoms based on the monofilament test, which is around 50%-100%.
Bubun et al., (2019)	IpTT	DM tife 1 & 2	-	-	39 Article	*Systematic review*	Signi-ficant	The results of the literature review study of 39 research articles, some of which stated that IpTT had sensitivity values both at home and in the clinic, namely 78.3% and 81.2%, and had

								specificities of 93.9% and 94.4%, respectively.
Basir, I. S., Syam, Y., Yusuf, S., & Sandi, S. (2020)	IpTT *Monofilament test*	DM tife 2	52,00 years	-	100 sample	*Cross-sectional study*	Not Significant	There was no difference between IpTT against golden standard small fiber neuropathy and large fiber neuropathy . the sensitivity of the IpTT to the pin-prick test was 80.0%, with a specificity of 88.0% in detecting small fiber neuropathy. Meanwhile, the sensitivity of IpTT to detect large fiber neuropathy compared to monofilament was also the same (80.0%).
Dutra et al., (2020)	IpTT, *Monofilament test*	DM tife 2	59,43 years	12,38 ± 8,88 years	250 sample	*Cross-sectional study*	Significant	The Ipswich Touch Test has a sensitivity value of 83.33%, specificity 97.66%, a positive predictive value of 85.71%, and a negative predictive value of 97.21%, a positive probability ratio of 30.19%, and a negative probability ratio of 0.17%, and has a significance level of 5%.

Dama-yanti et al., (2020)	IpTT *Monofi-lament test*	DM tife 2	>17 years	-	7 article	*Systematic review*	Signi-ficant	IpTT has a high negative predictive value of 92.8%, and a positive predictive value of 81.2%, and IpTT has a very good accuracy when compared to other standard screening methods such as the golden standard- MF test which only has a sensitivity value of 81% and 91% specificity in detecting DFU.
Hu et al., (2021)	IpTT *Monofi-lament Test*	DM tife 1 & 2	-	-	5 article	*Systematic review*	Signi-ficant	The results of the literature study from five research articles stated that when compared with the monofilament test, IpTT had a sensitivity ranging from 51-83.3% and specificity ranging from 96.4-98%, which means that IpTT had a higher specificity value to be used as a screening in detecting loss of protective sensation on the feet of patients with diabetes mellitus.

Discussion

Nursing care for people with diabetes with problems with sensory perception disorders caused by diabetic neuropathy begins with a comprehensive assessment both subjectively and objectively on the sensory system. Sensory is a stimulus both internally and externally that enters through the sensory organs in the form of the senses. The sensory system has an important role in transmitting information to the central nervous system about the surrounding environment (13). One of the examinations of the sensory system in diabetic neuropathy can be done through the monofilament test method and the Ipswich Touch Test (IpTT) examination method.

The monofilament test is the most commonly used non-invasive screening test to detect sensory neuropathy. The monofilament test is considered the gold standard and level I evidence to identify the loss of protective sensation in the feet of patients with impaired sensation in people with diabetes mellitus (14). However, in practice, this examination requires tools and practitioners who need training in carrying out this examination. This is of course an obstacle in certain areas where there is still no monofilament test tool so that other examination alternatives are needed that have the same purpose but are simpler and do not require special tools such as the IpTT examination method (7).

Based on the search results using the keyword "Ipswich Touch Test" obtained 2 journals containing IpTT and 4 journals containing comparisons of IpTT with monofilament test examinations.

The results of the literature study explained that the Ipswich Touch Test has a high negative predictive value of 92.8%, and a positive predictive value of 81.2%, and the IpTT has very good accuracy, as evidenced by the value of sensitivity of 83.33%, and specificity of 97.66%, higher than the golden standard-test monofilament test screening method which only has a sensitivity value of 81% and a specificity of 91% in detecting the risk of DFU in diabetic patients (10).

The others research showed the results that IpTT can confirm neuropathic symptoms in patients with type 2 DM based on the monofilament test, which is around 72.7%-100%, and respondents who are free of confirmed neuropathy symptoms are around 50%-100% (15). So it can be said that IpTT can be used as an alternative to detect the presence of neuropathy symptoms when there are no tools available at health care centers. The Ipswich Touch Test can also be taught and applied to diabetic patients with access to limited resources, especially in developing countries because it does not require excessive costs and special tools (11).

In Brasilia that the IpTT had a sensitivity value of 83.33%, a specificity of 97.66%, a positive predictive value of 85.71%, and a negative predictive value of 97.21%. monofilament test (positive probability ratio = 35.61), and has a significant level of 5% (16). Other studies also state that the IpTT method is considered to have high sensitivity and specificity (17). However, there is one study that states that there is no significant difference between the sensitivity and specificity of the IpTT method with the golden standard monofilament test for the detection of small fiber neuropathy and large fiber neuropathy. This is due to the similarity of touchpoints in the detected foot area and more in the monofilament test touch area (18).

Ipswich Touch Test can screen for Loss Of Protective Sensation (LOPS) in the foot area of DM patients (19). In addition, the IpTT method has several advantages, namely, it does not cost money and does not require equipment other than the examiner's fingers, and almost no training is needed so that all health practitioners can easily carry out tests, and its simplicity can be done by the patient's family at home (10). Another advantage, recommends IpTT examination as early detection of the risk of neuropathy and peripheral arterial disease, can be an effort to estimate the cost-savings caused by Diabetic Foot Ulcer (DFU) (12). IpTT examination can be taught to patients and families in detecting the risk of Diabetic Foot

Ulcer (DFU) in diabetics. The IpTT method also has several advantages, namely it is inexpensive and requires no equipment other than the examiner's fingers, almost no training is required so that all health practitioners can easily carry out the test, and simplicity minimizes the need for patient cooperation (10).

As for the results of the analysis of the six research journals on the comparison between IpTT and monofilament tests, five of them showed significant IpTT examination results and one of them showed different or insignificant results. However, some studies have a risk of bias such as research results being interpreted without knowing the results of the IpTT standard values, and some studies do not specifically state whether there is a time interval between the implementation of IpTT and the test that is used as a reference (10, 18). Another risk of bias is that there is only one study that excluded respondents with neuropathy due to common causes (16). Other characteristics of respondents that can affect the results of the study, namely a long history of suffering from DM, and a history of the respondent's average blood sugar level, were included in the inclusion criteria in two studies (15, 16). Meanwhile, the other five studies were not included. Assessment of blood glucose levels is very important before the IpTT examination because uncontrolled blood sugar can be a risk factor for DM patients to develop neuropathy.

Based on the results of the literature review, the IpTT examination will be more effective if the patient is relaxed, not tired and the patient's age range needs to be considered because it will be related to his cognitive abilities.

Relevance for DM patients with unstable blood sugar levels, if left unchecked, they will be at risk for acute and chronic complications. One of the chronic complications is diabetic neuropathy. Neuropathy often goes unnoticed by the patient, resulting in the appearance of diabetic ulcers. Therefore, an early examination is needed to detect neuropathy, one of which is the IpTT method. Ipswich Touch Test (IpTT) is a new method for foot neurosensory screening in detecting diabetic neuropathy. The implementation of this method is simple and without the need for special tools and can be used independently at home both by the patient and his family. In addition, this method can be used as a step for DM patients to carry out and implement self-management. One of self-management is to do foot care as early as possible to prevent diabetic ulcers.

Relevance for nursing practice, the awareness of nurses and other professionals is very important to carry out diabetic foot assessment as early as possible. This is because diabetic foot assessment is a key component in the care of diabetic patients. The assessment includes identification of risk factors for the patient's history of diabetes, physical examination, foot care education, medication, and referral as needed (6). In addition, health education about foot care in DM patients must be carried out both inpatient and outpatient every year, including the IpTT examination which is classified as a neurological assessment.

The Ipswich Touch Test (IpTT) is an early detection examination of neuropathy that is simple, without special tools, easy, and requires relatively fast time, and does not require special training. This examination is effective because it can confirm the symptoms of neuropathy based on the monofilament test, which is around 72.7%-100%, and respondents who are free from confirmed neuropathy symptoms are around 50%-100%. In addition, this examination method can be taught to patients and their families so that they can be applied independently at home.

Relevance for in the hospital is having problems that often arise related to the provision of early detection of neuropathy screening include limited tools and costs, and require special training (20). In addition, it is supported by the unavailability of Standard Operating Procedures (SOPs) which contain the procedures for the examination of neuropathy detection. Therefore, it takes a simple method, without special tools that is

very easy, and quickly done as an early detection of diabetic foot neurosensory disorders, namely the IpTT method that can be applied by doctors and nurses. Another benefit of the IpTT method can become efforts to estimate cost-savings caused by Diabetic Foot Ulcers (DFU), including regular IpTT screening as a form of primary prevention. especially in patients at risk for neuropathy and peripheral arterial disease.

Conclusion

Based on the results of the analysis of several journals that the IpTT examination is significant for detecting diabetic neuropathy, it has a sensitivity ranging from 51-83.3%, a specificity of 90-96.6% and has a higher accuracy rate than the monofilament test. In addition, the IpTT examination can be a reliable method, doesn't require special costs or tools, and is easy to apply in primary health care and inpatient care for early detection of diabetic neuropathy.

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