

# The correlation of knowledge of prevention with neuropathy treatment in diabetes mellitus patients in Sukoharjo regency

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## ABSTRACT

**Introduction:** Acute and chronic complications can occur in diabetes mellitus with high blood glucose levels and tend to fluctuate. The most common chronic complication is diabetic neuropathy. Treatment of diabetic neuropathy that is not carried out can lead to diabetic foot ulcers and even amputation. The prevention of diabetic neuropathy can be done by improving patients' knowledge to ease neuropathy treatment; as a result, the disability can be avoided. This study aims to determine the relationship between knowledge about preventing and treating diabetic neuropathy in people with diabetes mellitus in Sukoharjo.

**Methods:** This type of research is descriptive with a correlation design using a cross-sectional approach. The population used in this study was all people with diabetes mellitus, who collected 17,403 patients. The sample used was 120 respondents who were selected by purposive sampling. The research instrument used a knowledge questionnaire. To analyze the data, used Spearman Rank correlation test.

**Results:** The sample in this study was 120 respondents obtained by the purposive sampling technique. The sample used as research respondents are people with diabetes mellitus who have met the research criteria. This study uses an instrument in the form of google form with data analysis using the Spearman rank test. The results showed the respondents' knowledge level was excellent, as many as 76.7% of 120 respondents and the treatment of diabetic neuropathy was good as many as 65% of 120 respondents. Spearman Rank test results showed an r count of 0.439 and a p-value of 0.001 (<0.05).

**Conclusion:** Based on the research that has been done, it can be concluded that knowledge about the prevention of neuropathy in patients with diabetes mellitus in Sukoharjo Regency is mostly very good, the management of neuropathy in patients with diabetes mellitus in Sukoharjo Regency is mostly good. There is a significant relationship between knowledge about the prevention and treatment of diabetic neuropathy in people with diabetes mellitus in the Sukoharjo Regency.

**Keywords:** Diabetes mellitus, neuropathy treatment, prevention knowledge

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## INTRODUCTION

Non-communicable diseases cause the top ten deaths, most diabetes mellitus. Diabetes is a complex chronic disease that requires continuous medical care and multifactorial risk reduction strategies with controlling blood sugar levels.<sup>1</sup> In 2014 the prevalence of diabetes mellitus based on adult age increased to 85% from 4.7% in 1980. It is estimated that the number of people with diabetes mellitus will increase to 629 million in 2045. In Indonesia, people with diabetes mellitus increased to 2.0% in 2018 from the previous 1.5% in 2013.<sup>2</sup> The incidence of diabetes mellitus in Central Java Province has increased,

reaching 652 of 822 patients. Based on the report Pemalang from the Health Office of Central Java Province, Pemalang has the highest cases of diabetes mellitus, as many as 89,661 cases, and the lowest case is in Magelang City with 1,744. In Sukoharjo, there are 17,403 cases.<sup>3</sup>

The trend of diabetes mellitus is always increasing based on some studies. The increase in diabetes will increase chronic complications—the most common chronic complication is diabetic neuropathy. In patients with diabetes mellitus, the prevalence of complications of diabetic neuropathy is estimated to reach 8% in patients newly diagnosed with diabetes, and in patients who have long

been diagnosed with diabetes mellitus, it reaches 50%. Various mechanisms cause diabetic neuropathy due to high blood sugar levels. Usually, the patient does not realize the incidence of diabetic neuropathy, resulting in diabetic ulcers.<sup>4</sup>

Along with the increasing complications of diabetic neuropathy in diabetic patients, it is important to know the prevention and management of these complications. Knowledge of neuropathy prevention is very important in informing personal behavior in treating diabetic neuropathy. From experience and research, knowledge-based behavior will last longer than non-knowledge-based behavior. According to the study,

the patient's knowledge of foot care is average enough. Several factors affect a person's level of knowledge, including age, employment status, sociocultural, educational level and environmental factors. Based on research shows that the incidence of neuropathy is higher in patients who have low knowledge. This study is different from research, where this study focused on patient knowledge about the prevention of neuropathy.<sup>5</sup>

Knowledge has an important role in increasing adherence to diabetes mellitus to achieve the treatment goals. In addition, prevention that can be taken against microvascular complications, especially neuropathy, is by controlling blood sugar levels and conducting early detection.<sup>6</sup> Proper management of diabetic neuropathy is very important to prevent further complications—management of diabetic neuropathy to promote regular blood monitoring. The optimal therapeutic approach includes lifestyle interventions, particularly diet and exercise.<sup>7</sup> Based on the description above and previous research, the researcher aimed to determine the relationship between knowledge of prevention and treatment of diabetic neuropathy in diabetes mellitus patient in Sukoharjo Regency.

## METHODS

This type of research is quantitative research with a correlation design using a cross-sectional approach. The research site was in Sukoharjo Regency, carried out from September 2020 to March 2021. The population used in this study was all people with diabetes mellitus who collected 17,403 patients obtained through the Sukoharjo Regency Health Service Data.<sup>3</sup> The sample used was 120 respondents selected by purposive sampling that met the criteria, including type 2 diabetes mellitus patients living in the Sukoharjo Regency, aged 45 years, able to read, and willing to be respondents. Research respondents first filled in the data in the google form. After that, the researchers selected samples that matched the inclusion criteria used as research samples.

The research instrument used a knowledge questionnaire about the prevention of neuropathy and the treatment of neuropathy made by

researchers who have passed the validity and reliability test of the instrument. Data was collected using a questionnaire filled out online via a google form, which had been distributed through social media such as WhatsApp, Instagram, and Facebook then filled in by the respondent. Spearman rank correlation test was used to analyze the data. All the data items from 120 respondents were complete; there were no missing data. The methods of reducing culture bias, this research respondent was the same cultural background, which was Javanese culture.

This research has been declared to have passed the ethical test by the Health Research Ethics Commission (KEPK) Faculty of Medicine, Universitas Muhammadiyah Surakarta with the number 3363/B.1/KEPK-FKUMS/III/2021.

## RESULTS

Based on **Table 1**, the results of the data analysis on the characteristics of the

respondents, as shown in table 1, show that most of the respondents aged 55-64 years were 62 respondents (33.3%), the female was 82 respondents (44.1%), the last education was high school as many as 41 respondents (22%), the age characteristics diagnosed with diabetes mellitus showed that most of them were 6-10 years old.

In **Table 2**, the results show that the majority of respondents' knowledge is excellent as many as 92 respondents (76.7%), then good as many as 24 respondents (20%), and little four respondents (3.3%).

In **Table 3**, it is found that the treatment of neuropathy carried out by diabetes mellitus patients as good as many as 78 respondents (65%), then 21 respondents (17.5%) bad, 19 respondents (15.8%) Excellent, and two worse respondents (1.7%).

**Table 4**, the results showed a relationship between knowledge of prevention and treatment of neuropathy had a p-value smaller than 0.05 and a Z count value was greater than the Z table,

**Table 1. Characteristics of respondents**

No.	Characteristics	Frequency	Percentage (%)
1.	Respondent's Age (years old)		
	a. 45-54	55	29.5
	b. 55-64	62	33.3
	c. 65-74	3	1.6
2.	Gender		
	a. Man	38	20.4
	b. girl	82	44.1
3.	Education		
	a. No school	8	4.3
	b. SD	29	15.6
	c. middle school	28	15.1
	d. high school	41	22
	e. College	14	7.5
4.	Long time suffering from DM (years)		
	a. 0-5	27	22.5
	b. 6-10	86	71.7
	c. 11-15	7	5.8
Total		120	100

**Table 2. Frequency distribution of neuropathy prevention knowledge levels in diabetes mellitus patients**

No.	Knowledge level	Frequency	Percentage (%)
1.	Excellent	92	76.7
2.	Good	24	20
3.	Little	4	3.3
Total		120	100

so it can be concluded that the data were not normally distributed. Concluded that the data is not normally distributed

In **Table 5**, the results of the cross-tabulation showed that respondents with Excellent knowledge and good handling were 63 (52.5%), Excellent knowledge but bad handling as many as 11 (9.2%), little knowledge and good handlers as many as 2 (1.7%), and little of knowledge with handling worse as many as 2 (1.7%).

The results of the Spearman Rank correlation test for the relationship between knowledge of prevention and treatment of diabetic neuropathy in patients with diabetes mellitus obtained an r-value of 0.439 with sufficient correlation and a significance value (p-value) of 0.001. The p-value is less than 0.05 ( $0.001 < 0.05$ ), so the analysis result is  $H_0$  accepted. It means that there is a relationship between knowledge of prevention and treatment of diabetic neuropathy in people with diabetes mellitus in the Sukoharjo Regency.

## DISCUSSION

Most of the respondents in this study were 55-64 years old. It is in accordance with the age group according to,<sup>8</sup> which shows the prevalence of type 2 diabetes mellitus sufferers has increased in the elderly to

the elderly where the peak is at the age of 55-64 years. The results of this study are in accordance with, which showed that the age of 45 years affects the incidence of diabetes mellitus.<sup>9</sup>

Gender characteristics most of the research respondents are female. Several things affect the incidence of diabetes mellitus in women, namely weight gain, menstrual cycles, and menopause, so men are more at risk of suffering from diabetes mellitus than men. The results of this study are in line with research,<sup>9</sup> where most respondents are female. Another study<sup>10</sup> revealed that men have a greater risk of diabetes because of the amount of fat in the body compared to women. In men, fat accumulation around the abdomen causes central obesity, leading to metabolic disorders.<sup>11</sup>

The characteristics of respondents based on education were mostly high school. The level of education affects behavior in seeking treatment and care for his illness. People with high education have more health knowledge and will be aware of their health. Education increases individual knowledge, skills, reasoning, effectiveness, and various other abilities that can be utilized to produce health.<sup>9</sup> The results of this study are in accordance with the research conducted. It can be concluded that there is a relationship

between education and eating behavior in people with type 2 diabetes mellitus; most of the respondents have a high school education which refers to sufficient conditions for a person to understand the information received so that he can have a good understanding.

Most respondents have suffered from diabetes mellitus for 6-10 years. How long a person has diabetes can affect the occurrence of complications of diabetic neuropathy; the longer the patient has diabetes, the greater the risk of complications. In accordance with research,<sup>12</sup> there is a relationship between age, gender, and length of suffering from diabetes with the incidence of diabetic peripheral neuropathy, where the majority of respondents were with diabetes length of 5 years. However, another study showed different results where most patients with diabetes mellitus had less than five years. It indicates that there are more new DM patients than old DM patients.<sup>13</sup> It may be related to the increase in the number of new DM patients and the survival rate of old patients. Thus, further research is needed to investigate this issue.

Most of the respondents in this study had very good knowledge of neuropathy prevention. Knowledge is an important part of shaping behavior. High knowledge can overcome confusion, increase self-confidence, and motivate better self-care management. The high level of knowledge of respondents in this study may be influenced by formal education and internal, external, and supporting factors, for example, learning about diabetes independently through various media, so that respondents have a higher level of knowledge. According to research, there is a positive relationship between the level of education and knowledge of respondents about diabetes complications,

**Table 3. Frequency Distribution of Neuropathy Treatment in Diabetes Mellitus Patients**

No.	Handling	Frequency	Percentage (%)
1.	Excellent	19	15.8
2.	Good	78	65
3.	Bad	21	17.5
4.	Worse	2	1.7
Total		120	100

**Table 4. Summary of Data Normality Test Results**

Variable	Z count	p-value	Conclusion
Knowledge and Handling	0.300	0.000	Abnormal

**Table 5. Cross-tabulation results, the relationship between knowledge of prevention and treatment of neuropathy**

Knowledge	Handling										r = 0.439 p-value 0.001
	Excellent		Good		Bad		Worse		Total		
	f	%	f	%	f	%	f	%	f	%	
Excellent	16	13.3	63	52.5	11	9.2	2	1.7	92	76.7	
Good	3	2.5	13	10.8	8	6.7	0	0	24	20	
Little	0	0	2	1.7	2	1.7	0	0	4	3.3	
Total	19	15.8	78	65	21	17.5	2	1.7	120	100	

where respondents with a good education have a higher level of knowledge than respondents with low levels of education.<sup>14</sup>

Respondents in this study carried out the management of neuropathy well. Several factors experienced by the respondents certainly influence this situation. According to the factors that influence the management of diabetes include knowledge and attitudes. Action change occurs when patients know self-management to improve their survival. If knowledge and attitudes increase, there will be changes in good actions.<sup>15</sup> Patient knowledge about Diabetes Mellitus is very helpful in managing diabetes mellitus because the patient's knowledge about the management and prevention of DM can determine the degree of pain suffered by the patient. It is in line with research, where respondents' knowledge is significantly related to attitudes, meaning that increased knowledge is associated with positive attitudes.<sup>16</sup>

In this study, most respondents with very good knowledge had good neuropathy treatment, as many as 63 (52.5%). It is caused by several factors such as forming health behaviors such as family support, socio-economic and knowledge. However, other factors such as stress management, health beliefs and health services are also important factors for the health behavior of patients with diabetes mellitus.<sup>17</sup> Knowledge is closely related to how a person pays attention to changes in him, for example, when someone feels his feet start to feel cold or numb. Another study also showed that respondents who had good knowledge about diabetes had the lowest percentage of neuropathy. People with diabetes who have good knowledge tend to be more obedient in undergoing diabetes treatment.<sup>5</sup> It is in line with research, where there is a significant relationship between knowledge, attitude, and management in patients with type 2 diabetes mellitus in the Kuala Muda area, Malaysia.<sup>18</sup> Although overall, they have good knowledge, attitude, and management, it is still necessary to conduct health education interventions to encourage increased knowledge, attitudes and management of people with diabetes mellitus. Knowledge is very important for successful diabetes management because good knowledge about diabetes and a good

self-care attitude is significantly related to blood sugar control. Knowledge of DM is likely to inform patients about specific actions in the diabetes management process. So, the more knowledge patients have, the more they understand their disease and perform self-care behaviors such as adhering to the diet, performing recommended physical activities, controlling blood sugar regularly, and so on.<sup>18,19</sup>

Respondents with very good knowledge but poor neuropathy management were 11 (9.2%). It is in accordance with the study, which explained that higher knowledge about diabetes mellitus was not interpreted in good practice because more than 50% of research subjects were not involved in diabetes prevention measures including regular blood sugar control and regular exercise.<sup>19</sup> Therefore, various interventions must be given to overcome the problem of unfavorable attitudes and practices towards people with diabetes mellitus.

Respondents with little knowledge but good neuropathy treatment were two people (1.7%). It may be due to other factors that affect patient compliance in managing diabetes mellitus, namely the severity of the disease and direct intervention from health workers. According to, the level of knowledge cannot guarantee that a person will act on the knowledge he has because of the personality system, experience, and individual habits.<sup>17</sup>

Respondents with little knowledge and poor neuropathy management were two people (1.7%). Knowledge is closely related to behavior because knowledge has the basis for making choices. Lack of knowledge about the disease suffered by DM will result in developing an uncontrolled disease, including early detection of DM complications. On average, a person who suffers from diabetes mellitus can live a normal life if they have good knowledge and management of diabetes mellitus.<sup>20</sup> The results of this study are in line with where there is low knowledge, bad attitudes, and inadequate practices found in the survey community, so there is a need for a health education program to assist diabetes patients in increasing knowledge, attitudes, and good practices in people with diabetes mellitus. The results of the Spearman Rank correlation test obtained

an r-count value of 0.439 and a p-value of 0.001, so it can be concluded that there is a significant relationship between knowledge and treatment of diabetic neuropathy in patients with diabetes mellitus in Sukoharjo Regency, the better the knowledge of people with diabetes mellitus, treatment of diabetic neuropathy better.

According to this study, educating patients with type 2 diabetes mellitus is important because knowledge about the disease contributes to patient acceptance and adherence to treatment. Early detection of symptoms and supportive care and health care practitioners play a key role in educating the diabetes population.<sup>21</sup> Good patient knowledge contributes to better foot care practice among diabetic patients.<sup>5</sup> This study is in accordance with research which showed a significant relationship between knowledge and practice values.<sup>22</sup> The suggestion in this study is that health care institutions can maintain and increase knowledge of diabetes mellitus patients about the prevention and management of diabetic neuropathy through structured education to improve diabetes compliance in management, lead a healthy lifestyle, and the arrival of disease complications.

## CONCLUSION

Based on the research that has been done, it can be concluded that knowledge about the prevention of neuropathy in patients with diabetes mellitus in Sukoharjo Regency is mostly very good, the management of neuropathy in patients with diabetes mellitus in Sukoharjo Regency is mostly good. There is a significant relationship between knowledge about the prevention and treatment of diabetic neuropathy in people with diabetes mellitus in the Sukoharjo Regency. Patients with diabetes mellitus are always advised to maintain and increase knowledge about neuropathy prevention and early detection to prevent neuropathy.

## DISCLOSURE

### Conflict of Interest

The authors declare no conflict of interest

### Funding

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### Ethics Approval

This research has been declared ethical by the Health Research Ethics Commission (KEPK) Faculty of Medicine, Universitas Muhammadiyah Surakarta, with number 3363/B.1/KEPK-FKUMS/III/2021

### Author Contribution

Author 1: creating research ideas, directing and coordinating research, making reports and publications. Author 2: take care of licensing, collect data, assist in analysis and make reports.

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