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The Development of Diabetic Foot Ulcer Prevention Model Based on Psychosocial Perspectives, Attitude, Intention, Coping Mechanisms

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Abstract

Context: Objective: Foot ulcer is one of the diabetic complications that causes death in the world. Preventive behavior can be used to prevent diabetic foot ulcers. Therefore, this study aims at developing a model of diabetic foot ulcer prevention based on psychosocial, attitude, intention and coping mechanisms. The study used a cross-sectional study design to look at the relationship between variables using simple random sampling in 329 respondents, ages 18-85 years, who made an inspection visit at a health care center. The research instrument consisted of psychosocial variables namely knowledge and stress, attitude, intention, coping mechanisms, and foot ulcer prevention . Furthermore, the data were analyzed using SEM-PLS software. Results shows most of the respondents were in the youth category ages 18 - 65 years. Analysis of shows that there is a psychosocial influence on attitude T = 10,92, there is an effect of attitude on intention T = 2,43, there is an influence of intention on coping mechanisms T = 8,28, there is an influence of intention on Foot ulcer prevention T = 2,57, there is an influence of coping mechanisms on foot injury prevention T = 5,02. Knowledge, stress, attitude, intention and coping mechanisms contribute to prevent diabetes foot injuries. The Conclusions Knowledge, stress and attitude variables contributed the most indirectly to diabetes foot injury prevention. Contributions are directly affected by coping mechanisms and intentions.

Keywords: *Psychosocial, Attitude, Intention, Coping Mechanisms, ulcer*

Introduction

Diabetes mellitus (DM) is a non-communicable disease because of abnormalities of insulin secretion in beta cells, insulin action, or both.[1] Indonesia is one of the countries with the highest number of diabetic ranked 5th in the world.[2] Research conducted by Hena M. Shows that prevention of diabetic complications can be prevented by increasing behavior from subjective attitude to norms perceived control of behavior, knowledge and behavioral intentions.[3] This study aims to develop a model of diabeticfoot ulcer prevention based on psychosocial, attitude, intention, and coping mechanisms.

Material and Method

The study used a cross-sectional study design on 329 respondents from January 2019 to May 2019. Diabetic patients were selected using simple random sampling with the criteria for patients having ever / never diabetic foot ulcers at the age of 18-85 years.[2] The research variable was psychosocial that is consist of respondent's knowledge of diabetes and patient' stress that refers to the DDS (distress scale),[4]coping mechanisms refers to problem management and emotional regulation, attitude, intention, and Foot ulcer prevention. The research instrument was tested by a questionnaire and the result showed that it is valid and reliable.

Findings: Table 1 shows that the majority of respondents were young people aged 18 - 65 years, the majority were female (72,9%), most were high school education (67,8%), most were married (99,39%).

Table 1: Respondents' Charateristics diabetic patients

Characteristics	Classification	Frequency	Percentage	Mean ± SD Min - Max
Age :	Youths (18– 65 years)	306	93	Mean: 57,29
	Middle-aged adults (66 – 79 years)	19	5,8	SD : 8,88
	Elderies (80 – 99 years)	4	1,2	Min : 35
Sex	Male	89	27,1	
	Female	240	72,9	
Education Level	Higher Education	57	17,3	
	Senior High School	223	67,8	
	Elementary School/ Junior High School	34	10,3	
	Non-students	15	4,6	
Marital status	Married Single	327 2	99,39 0,61	

Table 2 shows that knowledge about DM is in most good category (89,4%), most did not experience the stress of 254 respondents (77,2%) and severe stress (1,4%). The experiential attitude was mostly in good category (53,5%), the instrumental attitude was mostly in poor category (54,1%), total attitude score was in most categories (56,5%). The intention scores were mostly high (51,4%), coping mechanisms for problem management indicators were mostly non-adaptive categories (52,6%), Emotional regulation indicators were mostly non-adaptive categories(57,1%), total preventing diabetic foot complications were mostly in the good category (52,9%).

Table 2: Psychosocial, attitude, Intention, coping mechanisms and Foot ulcer prevention for diabetic foot complications

Variable	Indicator	Category	Total	Percentage	Mean ± SD Min - Max
Psychosocial	Knowledge of DM	Low Moderate Good	3 32 294	0,9 9,7 89,4	93,26 ± 10,95 39 - 100
	Stress	Not stress Low Moderate High	254 40 31 4	77,2 12,2 9,2 1,4	13,64 ± 3,72 9 - 32
Attitude	Experiential attitude	Less Good	153 176	46,5 53,5	11,82 ± 1,66 6 – 18
	Instrumental attitude	Low Good	178 151	54,1 45,9	13,39 ± 1,80 8 - 16
Overall attitude score		Low Good	186 143	56,5 43,5	25,22 ± 3,02 18 - 32
Intention	Dietary	Low High	119 210	36,2 63,8	10,04 ± 1,33 6 - 12
	Physical Activity	Low High	121 208	36,8 63,2	6,73 ± 0,92 4 - 8

	Taking Medication	Low High	119 210	36,2 63,8	6,72 ± 0,87 4 - 8
	Blood glucose monitoring	Low High	119 210	36,2 63,8	6,76 ± 0,90 3 - 8
Overall intention score		Low High	160 169	48,6 51,4	30,27 ± 2,84 21 – 36
Copingmechanisms	Problem management	Non-adaptive Adaptive	173 156	52,6 47,4	26,60 ± 3,64 16,32
	Emotional regulation	Non-adaptive Adaptive	188 141	57,1 42,9	36,30 ± 4,72 22 – 44
Foot ulcer prevention	Diet	Low Good	176 153	53,5 46,5	6,17 ± 1,23 3 - 8
	Physical Activity	Low Good	164 165	49,8 50,2	12,76 ± 2,31 4 - 16
	Taking medication	Low Good	178 151	54,1 45,9	7,10 ± 0,99 4 - 8
	Blood glucose monitoring	Low Good	175 154	53,2 46,8	6,18 ± 1,22 3 - 8
Overall Foot ulcer prevention score		Low Good	155 174	47,1 52,9	32,27 ± 3,75 18 - 40

Table 3 shows that the psychosocial construct variables, attitude, intention, coping mechanisms, and preventive measures averaged above 0,5, T values above 1,96, Chronbach's Alpha scores> 0,6 are valid and reliable.[5]

Table 3: Cross Loadings with Convergent Validity and Reliability Result

Construct	**Indicator**	**Loading (λ)**	**T-statistics**	**Chronbach's Alpha**	**Information**
Psychosocial	Knowledge	0,96	49,48	0,96	Valid & Reliable
	Stres	0,97	93,73		
Attitude	Eksperiential attitude	0,96	106,11	0,96	Valid & Reliable
	Instrumen attitude	0,96	55,81		
Intention	Diet	0,98	62,32	0,97	Valid & Reliable
	Physical Activity	0,98	5,38		
	Taking medication	0,98	62,32		
	Monitoring	0,83	27,28		
Coping mechanisms	Problem management	0,95	24,41	0,92	Valid & Reliable
	Emotional regulation	0,90	40,57		
Foot complications prevention	Diet treatment	0,90	28,83	0,89	Valid & Reliable
	Physical Activity Action	0,71	41,89		
	Taking medication Action	0,75	9,01		
	Monitoring Action	0,86	28,42		

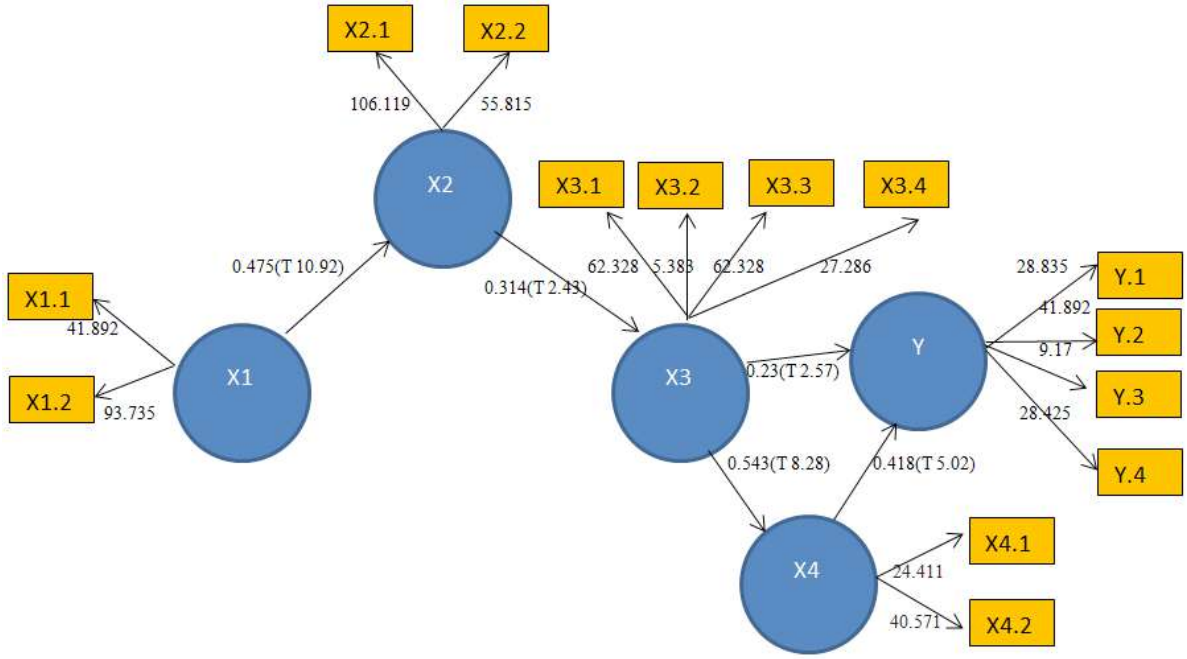

Figure 1: X1 = Psychosocial, X2 = Attitude, X3 = Intention, X4 = Coping Mechanisms, Y = foot complications prevention.

Discussion

1. **Psychosocial influence on attitude:** Figure 1 shows that there is a direct psychosocial influence on the attitude of patients in Gorontalo. Respondents reported the cause of the patient's stress because they had suffered complications to the foot and had an amputation of the toe. This condition causes patients to often think of their illness, which can trigger stress. Respondents report that stress not only affects the lives of individuals but can also trigger an increase in blood sugar. The results of research conducted by Tomayahu M. and Adam L that stress can increase blood sugar levels in diabetic patients. These results indicate that there is a significant relationship with stress with an increase in blood sugar levels.[6]

   Respondents reported an increase in knowledge and attitude since attending counseling on diabetic foot complications prevention. Research conducted by Khunkaew S. that low knowledge can reduce the attitude of diabetic patients towards patient blood sugar control.[7] This is reinforced by research conducted by Abbasi Y. F., et al., That knowledge has a significant relationship with increasing patient attitudes.[8]Diabetic patients report an increased knowledge can change the attitude of patients in preventing diabetic foot ulcers. This is indicated by positive changes in terms of experiential attitude in which patients report happy doing physical activity every day.

2. **Effect of attitude on intention:** Figure 2 shows the influence of attitude towards the intention to prevent diabetic foot ulcers. The results showed respondents reported rarely doing physical activity. Some respondents also reported that the implementation of the diet was not carried out to the maximum, did not carry out the diet continuously, and carried out the diet only at certain times. Respondents also reported having the habit of consuming sweet foods and drinks in the morning and evening. Nevertheless, the patient's attitude towards taking medicine is quite good, where the patient does not feel bored by taking diabetes medication every day. Diabetes medication is always taken every month in accordance with the stock of drugs given by the health center. According to Ajzen, I., & Fishbein, M. Behavioral intentions of someone in behavior are closely related to individual attitudes and normative beliefs about the behavior in question. If attitudes and beliefs are good, it will increase individual intentions in behavior.[9]This was confirmed by Lestarina W.N. that a positive attitude towards treatment has a significant relationship to the patient's blood sugar control. A positive

attitude that adheres to treatment will increase the intention to frequently control diabetes treatment.[10] This is in line with research conducted by Abbasi F.Y. that there is a significant relationship between attitude and practice for diabetes prevention.[8] A positive attitude of patients towards the prevention of diabetic foot complications can increase patient intention. Research conducted by Putri M. shows that there is a significant relationship between attitude and the intention of the elderly with diabetes in visiting health services.[11] This result shows that attitude gives the biggest contribution to increasing intention to prevent diabetic foot ulcers.

3. **Effect of intention on coping mechanisms:** Table 3 shows the loading factor no less than 0,6. Figure 1 shows that there is a significant effect on the coping mechanisms of the patient. According to Pinidiyapathirage J., et al., Intention is one of the strong predictors to improve patient coping.[12] Patient participation in the form of patient visits in health care facilities is one of the benchmarks evaluating the increase in patient intention to prevent diabetic foot complications.[13] Obstacles in visiting health facilities, including monitoring are the lack of patient intentions.[13]Some patients report a lack of intention in monitoring foot hygiene and blood sugar monitoring. According to patients, the intention to maintain foot hygiene is already there, but the implementation has not been maximized. This shows the intention to prevent diabetic foot complications has not reached the stage of action. According to Faries DM, many things can be done to realize intentions in action including increasing attitude, perceived norm, personal agency, self-efficacy.[14] According to him in realizing a diabetes prevention behavior is difficult to realize, especially related to diet, physical activity, taking medication and monitoring blood sugar.[14]The intention has a close relationship with improving coping mechanisms. A good coping mechanisms from an individual can control an unpleasant situation and increase the intention to run a diabetes treatment program. With a good coping mechanisms, it will be able to control situations that can cause stress.[15] If individual stress has occurred it can cause a lack of individual intention to prevent diabetic foot ulcers.

4. **Effect of intention on Foot ulcer prevention:** Figure 3 shows the influence of intention on the patient's actions to prevent diabetic foot ulcers. Some patients report having strong intention in woundmonitoring, and blood glucosemonitoring as it is quite high. This is demonstrated by participating in activities related to diabetes in-service facilities. Respondents reported that in addition to being carried out in service facilities once a month, patients also performed physical activities at home once a week. Some respondents reported experiencing obstacles in carrying out routine blood sugar checks as a result of less cost. This reason is one of the causes of the decrease in the intention of some respondents in taking action to prevent diabetic foot complications. The intention to carry out a diet is reportedly done well in the form of maintaining a daily diet with reference to 3J, namely the amount, hours and types of food. Research conducted by Braver D.N.R et al. that a change in a patient diet-related to food intake, fruit fat and fruit intake is strongly influenced by the patient's intention to take precautionary measures. If patient's intentions are good, it will produce a preventative measure for diabetic foot ulcers.[16] This study is strengthened by Lestarina WN which shows there is a significant influence on the intention with adherence and injured preventive in the form of periodic blood sugar control.[10] To produce good intentions, several elements that are very influential are needed, including the main factors are knowledge and skills to conduct a behavior. The second factor is that there are no obstacles to taking action.[17] Barriers can be from around individuals including families, barriers to distant service areas. With these obstacles, family support is needed to increase the patient's intention to prevent diabetic foot ulcers.

5. **Effects of coping mechanisms on diabetic foot complications prevention:** The results of Figure 1 show that there is an effect of coping mechanisms on diabetic foot ulcer prevention. Some respondents pointed out coping mechanisms in adaptive problem management. The adaptive response is indicated by examining a doctor or health care facility when experiencing signs of foot abnormalities. This shows the level of awareness of the complications is quite high. According to Okafor S.E., the importance of coping for individuals can improve behavior more adaptive to stress. The results of his study showed that good coping tended to show fewer depressive symptoms and increase positive behavior.[18] The results revealed that not all patients know the danger of diabetic foot ulcers, which lead to amputation. Some patients do not understand

that diabetic foot ulcers can be prevented by taking care of the feet. According to Pranoto A. Infection of wounds resulting from poor treatment causes gangrene in wounds caused by bacteria and aerobic clostridium. The degree of infection starts from first degree without infection to fourth-degree with severe infection accompanied by sepsis.[19] This is supported by research conducted by Amelia R. that good and correct treatment behavior in the feet can reduce the incidence of diabetic foot ulcers.[20]

Conclusion

Knowledge, stress and attitude variables contributed the most indirectly to diabetes foot injury prevention. Contributions are directly affected by coping mechanisms andintentions.

Conflict of Interest: None

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Etichal Clearance: This study has been approved by the Ethics Commission of the Faculty of Nursing Airlangga University (number 1173-KEPK) with an explanation of informed consent given to respondents.

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