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Knowledge and practices for the prevention of the diabetic foot

Conocimientos y prácticas para la prevención del pie diabético

Conhecimentos e práticas para a prevenção do pé diabético

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ABSTRACT

Objective: Describe the knowledge and practices performed by people for diabetic foot prevention.

Methods: This was a cross-sectional, descriptive study, with a random stratified sample, comprised of 304 people with type 2 diabetes mellitus. The information was collected through an instrument designed by the researchers that assessed sociodemographic aspects, and level of knowledge and practices of the participants in diabetic foot care prevention.

Results: In the assessment of diabetic foot care prevention, there was a low and average level of knowledge, whereas practices were moderately adequate.

Conclusions: The results for diabetic foot prevention knowledge and practices are not very encouraging. In light of this situation, primary care programs are important, where nurses provide effective education, as a mechanism for modifying the behavior of people with diabetes mellitus.

Keywords: Self care. Diabetic foot. Knowledge. Nursing.

RESUMEN

Objetivo: Describir los conocimientos y prácticas que realizan las personas para la prevención del pie diabético.

Métodos: Estudio descriptivo, transversal con muestreo aleatorio estratificado, participaron 304 personas con Diabetes Mellitus tipo 2, la información se recolectó mediante el empleo de un instrumento diseñado por las investigadoras que evaluaban los aspectos sociodemográficos, nivel de conocimientos y prácticas de los participantes en el cuidado de sus pies para la prevención del pie diabético.

Resultados: Al evaluar los cuidados en la prevención del pie diabético, los conocimientos se ubicaron en un nivel bajo y medio, mientras que las prácticas fueron medianamente adecuadas.

Conclusiones: Los resultados en los conocimientos y prácticas orientadas a la prevención del pie diabético son poco alentadores, ante este panorama cobran relevancia los programas de atención primaria, donde se emplee una educación efectiva por parte de Enfermería, como mecanismo para modificar los comportamientos de la persona con Diabetes Mellitus.

Palabras clave: Autocuidado. Pie diabético. Conocimiento. Enfermería.

RESUMO

Objetivo: Descrever os problemas e as práticas realizadas para a prevenção do pé diabético.

Métodos: Estudo descritivo, transversal com amostragem aleatória estratificada, em 304 pessoas com Diabetes Mellitus tipo 2. Os dados foram coletados com o uso de um instrumento delineado pelas pesquisadoras que avalia aspectos sociodemográficos e o nível de conhecimentos e práticas dos participantes no cuidado dos pés para a prevenção do pé diabético.

Resultados: A avaliação dos cuidados na prevenção do pé diabético mostra conhecimentos de níveis baixo e médio, enquanto as práticas foram medianamente adequadas.

Conclusões: Os resultados dos conhecimentos e práticas orientadas para a prevenção do pé diabético não pouco animadores, e frente a este panorama são relevantes os programas de atenção primária, onde de utilize uma educação efetiva da parte de enfermeiros, como mecanismo para modificar os comportamentos de pessoas com Diabetes Mellitus.

Palavras-chave: Autocuidado. Pé diabético. Conhecimento. Enfermagem.

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INTRODUCTION

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. The different types of DM are caused by a complex interaction of genetic and environmental factors. Depending on their etiology, the factors that contribute to hyperglycemia include reduced insulin secretion, a decrease in glucose utilization and an increase in its production. The associated metabolic dysregulation causes secondary pathophysiological changes in multiple organ systems which impose a tremendous load on the individual and the healthcare system. In the United States, DM is the leading cause of end-stage renal disease (ESRD), non-traumatic amputations of lower limbs and adult blindness. It also predisposes those with DM to cardiovascular diseases[1].

It is currently accepted that there are mainly three types of diabetes: type 1 (DM1), type 2 (DM2) and gestational (GDM); there are also other types of the disease, such as monogenic diabetes and secondary diabetes[2]. Type 2 diabetes is the most frequent form and accounts for 90% of the total number of cases of diabetes. It has been calculated that there are around 425 million people around the world, corresponding to 8.8% of adults from the ages of 20 to 70 years, who suffer from it. Approximately 79% live in low- to medium-income countries[3]. Diabetes is one of the leading causes of mortality in the world. The number of deaths due to diabetes, which was less than one million in 2000, reached 1.6 million in 2015[4].

Diabetic foot is one of the most feared complications of diabetes due to the disability that it generates and its repercussions on the quality of life of individuals suffering from it. It is the most common cause of hospitalization and is defined as a foot affected by ulcers that is associated with neuropathy and/or peripheral arterial disease of the lower limb in diabetic patients[5].

The prevalence of foot ulcers in the diabetic population ranges from 4% to 10%. It is estimated that around 5% of all patients have a history of foot ulcers, whereas the lifetime risk of developing this complication is 15%. A total of 10% to 15% of foot ulcers will remain active and 5% to 24% of them will finally lead to amputation of a member within a period of 6 to 18 months after the first evaluation[5].

It has been found that 40% to 70% of all non-traumatic amputations of lower limbs occur in diabetic patients and that foot ulcers precede approximately 85% of all amputations performed[5].

Compared to non-diabetics, the need for amputation is around 30 to 40 times higher in patients with type 2 diabetes mellitus. The mortality rate five years after amputation is estimated at 39% to 68%[6].

This is a very serious health problem that requires management with a multidisciplinary focus. Prevention is crucial due to the negative impact on quality of life. According to the document entitled Guidance on the management and prevention of foot problems in diabetes (IWGDF) from 2015[7], the basic prevention and treatment principles are: (1) identification of the at-risk foot; (2) regular inspection and examination; (3) education of patients, families and healthcare providers; (4) routine wearing of appropriate footwear; (5) treatment of pre-ulcerative signs.

It is recommended that all diabetic patients and particularly those with high-risk foot conditions, with a history of ulcers or amputations, deformities, loss of protective sensation (LOPS) and peripheral arterial disease (PAD), and their families should receive education about risk factors and appropriate management[2].

People at risk need to understand the implications of these changes in appropriate foot care, including nail and skin care and the importance of foot monitoring on a daily basis. Patients with LOPS should be educated on ways to substitute other sensory modalities (palpation or visual inspection using an unbreakable mirror) to monitor possible foot problems[2].

Adequate self-care can reduce the risk of lesions, infections and amputation in foot-risk people. These measures include daily foot and footwear control, adequate daily hygiene, not walking barefoot, using appropriate footwear, cutting nails, avoiding the use of abrasive material, early professional care for open foot wounds and lesions, and routine foot examinations by a trained professional to identify diabetic foot complications. Foot ulcers and amputations were found to increase in patients who did not adopt these practices[8].

At the same time, knowledge is conducive to proper foot care, whereas lack of knowledge and/or clear daily foot care plans increases the risk of developing ulcers and amputations[9]. It also leads to inadequate practices and confirms the thesis that even diabetics with proper attitudes are unable to perform correct self-care practices[10]. This indicates that the foot care knowledge and practices of patients are highly associated[11]. If these patients received appropriate foot care guidelines and education, they would carry out the corresponding practices[12]. Inadequate knowledge on the part of patients may be due to lack of communication and busyness of medical and nursing personnel[11].

Previous evidence of this highly feared problem among diabetic patients, due to its impact on the quality of life of

people suffering from this disease, gave rise the present study whose objective was: describe the knowledge and practices performed by people for diabetic foot prevention in the Carmen Emilia Ospina (CEO) State Social Company (ESE) in the city of Neiva.

MATERIAL AND METHODS

This was a descriptive, cross-sectional, correlational study. It was conducted with patients registered in the Cardiovascular Risk Program (CVR) from the Carmen Emilia Ospina de Neiva State Social Company (ESE): Canaima headquarters, Eduardo Santos, Granja, IPC, Palmas y Siete de Agosto, from October to December 2017. It was endorsed by the Ethics Committee of Surcolombiana University through Act No. 07/2015 and by the health institution; it took into account Resolution 8430/1993 and the ethical principles of autonomy, confidentiality, respect, charity, and nonmaleficence.

The population was 1,402 users of the CVR program. To calculate the sample, the formula for finite populations was used, with a confidence interval of 95% and an error of 5%. The statistical significance level was set at $p \leq 0.05$, a sample of 304 participants was obtained, and stratified sampling was used.

The data collection was led by the researchers and two research assistants previously trained in the use of the instrument designed by the researchers. It was used to evaluate sociodemographic aspects, level of knowledge and practices performed by people diagnosed with type 2 DM. It was validated by experts on the subject, and graded the results as follows: Knowledge: low (0-5), average (6-11) and high (12-17); self-care practices: inadequate (25-41), moderately adequate (42-58) and highly adequate (59-75). The information was tabulated using Microsoft Excel.

The program SPSS Version 23 was used for the statistical analysis. In the analysis of the demographic and clinical variables, basic descriptive statistics were used. Absolute frequencies and percentages were used for the qualitative variables, both nominal (categorical) and ordinal. Measures of central tendency and dispersion were calculated for the quantitative variables. The different variables were compared using the Kruskal-Wallis statistical test; in all the cases, a significance level of $p < 0.05$ was adopted.

RESULTS

The main characteristics of the sample were: female (68.1%); 50 years of age and older (82.6%); level of education - predominantly incomplete elementary and secondary education (34.9% and 21.1% respectively); the participants reported having a permanent partner, with a marital status of married (28.3%) and common law (23.4%); a high percentage were homemakers (53.9%); the EPS (health insurance plan) with the highest coverage was Confamiliar (44.7%) (Table 1).

Table 1 - Sociodemographic characteristics of people with type 2 DM for diabetic foot prevention

Socioeconomic variables	n	%
Sex		
Female	207	68.1
Male	97	31.9
Total	304	100%
Age group		
<40 years old	7	2.3
40-49 years old	45	15.1
50-59 years old	81	27.1
60-69 years old	93	31.1
70-79 years old	57	19.1
80-89 years old	15	5
≥90 years old	1	0.3
Mean age: 62		
SD: ±11.1		
Total	304	100%
Education		
None	41	13.5
Complete elementary	60	19.7
Incomplete elementary	106	34.9
Complete secondary	26	8.6
Incomplete secondary	64	21.1
Technician	4	1.3
Technologist	1	0.3
University	2	0.7
Total	304	100%
Marital status		
Married	86	28.3
Divorced	27	8.9
Single	64	21.1
Common law relationship	71	23.4
Widowed	56	18.4
Total	304	100%

Occupation			
	Homemaker	164	53.9
	Unemployed	33	10.9
	Employed	9	3
	Self-employed	97	31.9
	Retired	1	0.3
	Total	304	100%
EPS			
	No information	5	1.6
	Cafesalud	8	2.6
	Canaima	1	0.3
	Comfamiliar	136	44.7
	Comparta	58	19.1
	Medimás	95	31.3
	Sisben	1	0.3
	Total	304	100%

Source: Data from the authors based on the results of the questionnaire.

The level of knowledge reported by the participants was classified as low (25.3%) and average (57.6%), which is a risk factor for developing complications, particularly diabetic foot (Table 2).

Table 2 - Level of knowledge of people with type 2 DM for diabetic foot prevention

Level of knowledge	n	%
Low	77	25.3
Average	175	57.6
High	52	17.1

Source: Data from the authors based on the results of the questionnaire.

With respect to the self-care practices of people with type 2 DM, it was moderately adequate among 64.8%, which reflects the results obtained for level of knowledge, since without adequate knowledge on this aspect, it is less likely people will be able to perform self-care practices to meet the needs of their disease (Table 3).

Table 3 - Level of practices of people with type 2 DM for to diabetic foot prevention

Level of practices	n	%
Inadequate self-care practices	4	1.3
Moderately adequate self-care practices	197	64.8
Highly adequate self-care practices	103	33.9

Source: Data from the authors based on the results of the questionnaire.

A significant correlation was found between age group and level of knowledge ($p \leq 0.05$), considering that age may be a negative factor for acquisition of knowledge about the disease and self-care. Similarly, the information collection site was correlated with level of knowledge ($p<0.05$), an aspect that must be taken into account for strengthening educational strategies for this population group (Table 4).

There was also a correlation between level of education and level of knowledge ($p \leq 0.01$), which may indicate that a lower level of education is converted into a factor that negatively affects the knowledge possessed by people with type 2 DM. On the other hand, marital status had a correlation with level of knowledge ($p \leq 0.00$). This finding may be significant since it could be that caregivers are not taking on the necessary support role to strengthen the knowledge required to care for the sick person (Table 4).

Table 4 - Correlation between the sociodemographic variables and level of knowledge of people with type 2 DM

Variable		Level of knowledge						p
		Low		Average		High		
		n	%	n	%	n	%	
Age group	<40 years old	1	14.3	4	57.1	2	28.6	0.015
	40-49 years old	9	20.0	25	55.6	11	24.4	
	50-59 years old	12	14.8	49	60.5	20	24.7	
	60-69 years old	21	22.6	64	68.8	8	8.6	
	70-79 years old	22	38.6	27	47.4	8	14.0	
	80-89 years old	8	53.3	4	26.7	3	20.0	
	≥90 years old	0	0.0	1	100.0	0	0.0	

CEO Headquarters	Canaima	17	21.8	43	55.1	18	23.1	0.014
	Eduardo Santos	16	45.7	14	40.0	5	14.3	
	Granjas	14	20.0	42	60.0	14	20.0	
	IPC	14	30.4	32	69.6	0	0.0	
	Palmas	11	22.4	30	61.2	8	16.3	
	Siete de Agosto	5	19.2	14	53.8	7	26.9	
Education	None	18	43.9	22	53.7	1	2.4	0.000
	Complete elementary	10	16.7	42	70.0	8	13.3	
	Incomplete elementary	36	34.0	53	50.0	17	16.0	
	Complete secondary	5	19.2	12	46.2	9	34.6	
	Incomplete secondary	7	10.9	45	70.3	12	18.8	
	Technician	1	25.0	0	0.0	3	75.0	
	Technologist	0	0.0	0	0.0	1	100.0	
	University	0	0.0	1	50.0	1	50.0	
Marital status	Married	14	16.3	48	55.8	24	27.9	0.001
	Divorced	7	25.9	15	55.6	5	18.5	
	Single	13	20.3	43	67.2	8	12.5	
	Common law	17	23.9	44	62.0	10	14.1	
	Widowed	26	46.4	25	44.6	5	8.9	

Source: Data from the authors based on the results of the questionnaire.

With respect to self-care practices, a correlation was found between EPS and self-care practices ($p \leq 0.05$), i.e., a relatively adequate level in relation to the link with the EPSs may mean that educational practices have not contributed to strengthening these practices. Similarly, there was a correlation between self-care practices and sex, since women assume multiple roles that may have a negative effect on maintaining their self-care practices (Table 5).

Table 5 - Correlation between the sociodemographic variables and level of practices of people with type 2 DM

Variable		Level of practices						p
		Inadequate self-care practices		Moderately adequate self-care practices		Highly adequate self-care practices		
		n	%	n	%	n	%	
EPS	No information	1	20.0	3	60.0	1	20.0	0.049
	Cafesalud	0	0.0	7	87.5	1	12.5	
	Canaima	0	0.0	0	0.0	1	100.0	
	Comfamiliar	2	1.5	97	71.3	37	27.2	
	Comparta	1	1.8	35	61.4	22	36.8	
	Medimás	0	0.0	54	56.8	41	43.2	
	Sisben	0	0.0	1	100.0	0	0.0	
Sex	Female	3	1.4	143	69.1	61	29.5	0.018
	Male	1	1.0	54	55.7	42	43.3	

Source: Data from the authors based on the results of the questionnaire.

DISCUSSION

In relation to the sociodemographic characteristics, the majority were women, an aspect also found in an investigation conducted in Mexico[9]. The mean age was 62 years (SD±11.1), homemaker was the predominant occupation, and most were mated and lived with their spouse and/or children. In various studies[9,13-16] the sociodemographic characterization obtained similar results to those in the present study.

The participants had a low level of education, and as explained earlier, low educational levels affect the ability of diabetic patients to understand, process, read and write, which impacts the quality of life of this group of people[17]. It is also considered to be one of the causes of social and socioeconomic disparities, which have a greater effect on the complex situation of people with DM and increases the risk of developing foot ulcers[14].

In the present study, the self-care practices of women were moderately adequate. However, in the literature review, the findings in relation to the analysis of knowledge, attitudes, and practices indicate that men, statistically, have more knowledge about appropriate footwear, whereas women are more inclined to include self-care practices in their daily routine[10].

Knowledge is essential in self-care for diabetic foot prevention, and thus it is important to recognize how low levels of knowledge on the subject are associated with the scant information they receive from health professionals[12]. Likewise, in relation to practices, it is critical to recognize how reinforcement and the emphasis assigned by healthcare teams are indispensable for improving self-care practices[12].

Levels of knowledge in the present study were in the low to average range, and self-care practices were inadequate or moderately inadequate. These findings coincide with other investigations that pointed out significant deficits in levels of knowledge, in addition to self-care practices that were either not performed or were incomplete[10,13,18]. These results are striking and lead one to reconsider whether the intervention strategies used for people with DM and their caregivers are effective for achieving the necessary and pertinent changes in the care behavior of this group of people.

In this study, it was found that a significant association exists between foot self-care knowledge and level of education. A review by different authors who addressed the subject[12,19-20] also identified statistically significant associations between level of education and foot self-care knowledge.

There was likewise a correlation between self-care and the person's sex, which differs from the studies reviewed, where no statistically significant associations were found between these two variables[9,20]. It was also found that spouses play an essential role in care and dietary support, and that living with a family promotes preventive health care support among family members[14].

In the present study, it was observed in the patients' narratives on day-to-day living with DM that spouses were mindful of the family's diet in relation to the care of the other spouse. Most of them said they served the same food prepared for the person with DM to the whole family. In this particular aspect, all the family members were involved in the preventive health care of the person with DM.

The low levels of knowledge reported by the participants may be due to different factors, such as lack of properly trained personnel in interventions involving the care of people diagnosed with DM; insufficient time allotted to medical and nursing consultations; and lack of clear and precise communication between the different parties involved in caring for the sick person, which hinders the acquisition and consolidation of knowledge that helps reduce the impact of the devastating effects of the disease.

In this regard, it is recognized that scant communication, lack of counseling by health professionals and insufficient diabetic foot prevention education negatively influence the level of knowledge of people receiving treatment[20]. Therefore, it is necessary to strengthen educational strategies and promote their inclusion into the routine practices of the different care services, as a protection factor to mitigate the impact of the disease and reduce the risk of foot ulcers which, in turn, can lead to amputations and all the resultant effects on the quality of life of people in this situation.

CONCLUSIONS

The main characteristics of the population in this study were: female, mated, homemaking as the main occupation, low household income and low level of education. The level of knowledge varied from average to low, and in terms of the participants' self-care practices, there was a high percentage in the moderately adequate range. In relation to level of knowledge, there was a correlation between age group, data collection sites, level of education and marital status. A correlation was also found between self-care practices, sex and the ESP to which they were connected.

It can be concluded that effective education by health professionals, especially nurses, is important for improving the level of knowledge and would help modify the behavior of people with type 2 DM. This would also help them to understand that performing these practices can prevent the onset of diabetic foot and, at the same time, improve self-care and the quality of life of people with DM.

For the discipline, it represents an opportunity for primary care to establish foot ulcer prevention programs, which would include training for diabetics and their families. This would strengthen learning related to performing self-examinations and care of the feet, as well as promote timely detection of any abnormality as a way of preventing and minimizing the appearance of complications.

REFERENCES

1. Kasper DL, Wiener C, Fauci AS, Stephen L, Hauser MD, Longo DL, et al. Harrison's principles of internal medicine. 18th ed. New York: McGraw-Hill; 2012.
2. American Diabetes Association. Standards of Medical Care in Diabetes - 2018. Diabetes Care. 2018 Jan [cited 2018 Apr 10];41(suppl 1):S1-S159. Available from: http://care.diabetesjournals.org/content/diacare/suppl/2017/12/08/41.Supplement_1.DC1/DC_41_S1_Combined.pdf.
3. International Diabetes Association (BE). International Diabetes Federation Atlas. 8th ed. Brussels: IFD; 2017 [cited 2018 Apr 10]. Available from: http://diabetesatlas.org/component/attachments/?task=download&id=254.
4. Organización Mundial de la Salud (CH) [Internet] Geneva: OMS; c2018 [citado 2018 mai 25]. Las 10 principales causas de defunción; [about 1 screen]. Available from: http://www.who.int/mediacentre/factsheets/fs310/es.
5. Alexiadou K, Doupis J. Management of diabetic foot ulcers. Diabetes Ther. 2012;3:4. doi: http://doi.org/10.1007/s13300-012-0004-9.
6. Volmer-Thole M, Lobmann R. Neuropathy and diabetic foot syndrome. Int J Mol Sci. 2016;17(6):E917. doi: https://doi.org/10.3390/ijms17060917.
7. Schaper NC, Van Netten JJ, Apelqvist J, Lipsky BA, Bakker K, International Working Group on the Diabetic Foot. Prevention and management of foot problems in diabetes: a Summary Guidance for Daily Practice 2015, based on the IWGDF Guidance Documents. Diabetes Metab Res Rev. 2016 Jan;32(Suppl 1):7-15. doi: https://doi.org/10.1002/dmrr.2695.
8. Bonner T, Foster M, Spears-Lanoix E. Type 2 diabetes–related foot care knowledge and foot self-care practice interventions in the United States: a systematic review of the literature. Diabet Foot Ankle, 2016;7:29758. doi: https://doi.org/10.3402/dfa.v7.29758.
9. Bohorquez Robles R, Compeán Ortiz LG, González Quirarte NH, Berry DC, Aguilera Pérez P, Piñones Martínez S. Knowledge and practices of diabetes foot care and risk of developing foot ulcers in México may have implications for patients of Mexican heritage living in the US. Diabetes Educ. 2017;43(3):297-303. doi: https://doi.org/10.1177/0145721717706417.
10. Policarpo NS, Moura JRA, Melo Júnior EB, Almeida PC, Macêdo SF, Silva ARV. Knowledge, attitudes and practices for the prevention of diabetic foot. Rev Gaúcha Enferm. 2014;35(3):36-42. https://doi.org/10.1590/1983-1447.2014.03.45187.
11. Dündar C, Akinci GE. Knowledge and practice of foot care in diabetic inpatients: a descriptive cross-sectional study. Erciyes Med J. 2017;39(4):160-4. doi: https://doi.org/10.5152/etd.2017.17023.
12. Chiwanga FS, Njelekela MA. Diabetic foot: prevalence, knowledge, and foot self-care practices among diabetic patients in Dar es Salaam, Tanzania: a cross-sectional study. J Foot Ankle Res. 2015;8:20. doi: https://doi.org/10.1186/s13047-015-0080-y.
13. Hassan ZM. Mobile phone text messaging to improve knowledge and practice of diabetic foot care in a developing country: feasibility and outcomes. Int J Nurs Pract. 2017;23(S1):e12546. doi: https://doi.org/10.1111/ijn.12546.
14. Silva LWS, Silva JS, Squarcini CFR, Souza FG, Ribeiro VS, Gonçalves DF. Health promotion of people with diabetes mellitus regarding diabetic foot care . Cienc y Enferm. 2016;22(2):103-16. doi: https://doi.org/10.4067/S0717-95532016000200008.
15. Bañuelos-Barrera P, Arias-Merino ED, Bañuelos-Barrera Y. Risk factors of foot ulceration in patients with Diabetes mellitus type 2. Invest Educ Enferm. 2013;31(3):442-9.
16. Rossaneis MA, Haddad MCFL, Mathias TAF, Marcon SS. Diferencias entre mujeres y hombres diabéticos en el autocuidado de los pies y estilo de vida. Rev. Latino-Am Enfermagem. 2016;24:e2761. https://doi.org/10.1590/1518-8345.1203.2761.
17. Hu J, Amirehsani K, Wallace DC, Letvak S. Perceptions of barriers in managing diabetes perspectives of Hispanic immigrant patients and family members. Diabetes Educ. 2013 Jul/Aug;39(4):494-503. doi: https://doi.org/10.1177/0145721713486200.
18. Bonner T, Harvey IS, Sherman L. A Qualitative inquiry of lower extremity disease knowledge among African Americans living with type 2 diabetes. Health Promot Pract. 2017;18(6):806-13. doi: https://doi.org/10.1177/1524839916688867.
19. Targino IG, Souza JSO, Santos NMG, Davim RMB, Silva RAR. Factors related to the development of ulcers in patients with Diabetes mellitus. J Res Fundam Care Online. 2016 out/dez;8(4):4929-34. doi: https://doi.org/10.9789/2175-5361.2016.v8i4.4929-4934.
20. Desalu OO, Salawu FK, Jimoh AK, Adekoya AO, Busari OA, Olokoba AB. Diabetic foot care: self-reported knowledge and practice among patients attending three tertiary hospitals in Nigeria. Ghana Med J. 2011 Jun;45(2):60-5.

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