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Knowledge of patients with type II diabetes mellitus regarding preventive measures of foot ulcer

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Abstract---A foot ulcer is a dangerous diabetic problem caused by the concurrent physiological activities of ischemia, neuropathy, and infection in patients with type II diabetes mellitus. However, patients' knowledge about foot care is essential for avoiding foot ulceration. A cross-sectional descriptive design is carried out in the current study from September 9th 2021 to May 9th 2022, in order to assess the levels of knowledge of type II diabetic patients regarding preventive measures of foot ulcers. A non-probability (purposive sample) of 300 diabetic patients type II. Data collected using a well-designed questionnaire consists of three parts: Part I consists of demographic data. Part II consists of Clinical Data. Part III includes Patients' knowledge regarding preventive measures for foot ulcers. The findings indicate there is a significant association between patients' knowledge and (educational status and occupation). Also, there was a significant association between patients' knowledge and (duration of the disease and education about diabetes). The study concluded that patients with type II diabetes have moderate knowledge about preventive measures for foot ulcers.

Keywords---knowledge, patient, type II diabetes mellitus, preventive measures, foot ulcer.

Introduction

Type II diabetes mellitus is a worldwide disease with incidence increasing and resulting in a global health care burden (Chai et al., 2018). This type of diabetes happens primarily due to insulin resistance when cells fail to react adequately to

insulin (Tao et al., 2015). As the condition worsens, a lack of insulin develops; key reasons include a lack of activity and excess body weight (Ahmed & Iqbal, 2017). Peripheral neuropathy is considered one of the long term complications that mainly affect lower extremities, which is a primary diabetic neuropathic consequence (Zhang et al., 2017). Diabetes can affect both the somatic and autonomic nervous systems, the most prevalent sensorimotor polyneuropathy causes sensory loss first, followed by motor function loss (Graves & Donaghue, 2019).

Ischemia can damage significant blood arteries result in femoral, popliteal, and tibial atheroma; therefore, ischemic alterations in small vessels may influence the microcirculation of the foot (Habbash et al., 2019). Training patients about foot care is the most essential approach for avoiding lower limb amputation; hence, low-cost, low-technology evaluation and proactive methods are required to drastically reduce risk levels (Tork & Elgazzar, 2020).

Screening for diabetic foot problems on time, with follow-up multidisciplinary care, can minimize the incidence of foot ulcer development and amputation by 85 % (Alabbod, 2021). Foot ulcers are avoided with good patient knowledge about the general condition and regular foot care (Adeyemi et al., 2021). Proper treatment for any pre-ulcerative signs or ulcers on foot, ingrown toenails, and fungal infections aid in preventing a foot ulcer in diabetic patients at risk of foot ulceration (Bus et al., 2019). The study objectives include: Assess the knowledge of patients with type II diabetes mellitus regarding preventive measures for foot ulcers. And to determine the association between knowledge and socio-demographical and clinical data.

Method

Design of the Study

A Cross-Sectional Descriptive Design is implemented through the current study to assess the knowledge of type II diabetic patients regarding preventive measures for foot ulcers. The period of the study is from September 9th 2021 to May 9th 2022. A Non-Probability (Purposive Sample) of the sample size determined 300 Diabetes Mellitus patients, those who visit Al-Sadder Medical City / Al-Najaf Center for Diabetes and Endocrine for treatment or follow up or both.

Study instrument

A questionnaire was develop after reviewing literature to assess patients with type II diabetes knowledge regarding preventive measures for foot ulcers, the study instrument consists of three parts, including Part I: Socio-Demographic Data and this part consist of (7) items, including age, gender, marital status, educational level, monthly income, residency, occupation. Part II: Clinical Data and this part covers (5) items, including duration of disease, treatment, receiving health education about diabetes and the sources of receiving instruction, associated conditions and comorbidities, smoking questions and type of smoking. Part III: Patients' knowledge regarding preventive measures for foot ulcers. This part concerns with collection of data gained from type II diabetic patients and consist

from 24 items, and answers through (yes, no). Closed questions are used to assess the patient's knowledge. The answer including Yes was scored as (2) and No was scored as (1). The used questionnaire are adopted and developed from several scientific researches (Tork & Elgazzar, 2020), (Al Amri *et al.*, 2021), (Taksande *et al.*, 2017), (Magbanua & Lim-Alba, 2017), (Al-Hariri *et al.*, 2017).

The assessment of knowledge by cutoff point (0.33), so that the items is classified as (poor) if the mean of scores between (1-1.33); it is considered (moderate) if the mean of scores between (1.34-1.66); while it is considered (good) if the mean of scores is more than (1.67). Through a preliminary copy of the questionnaire is designed and presented to panel of experts who have high levels of experience in their field to assess the validity of the questionnaire. The reliability of the instrument is concerned with the consistency and dependability of a research instrument to measure a variable of interest. Cronbach's Alpha test was used to know the internal consistency of items for scale and applied it to (17) diabetic patients; the result of reliability showed that Cronbach's alpha is ($r = 0.72$) and is considered statistically accepted.

The obtained data from the research sample has been interred and interpreted by a statistical package for social science (SPSS, version 26) application of a statistical analysis system. Descriptive Data Analysis include frequencies, percentages, and mean scores to assess the knowledge of patients with type II diabetes mellitus regarding preventive measures for foot ulcers. Inferential Data Analysis including Chi-square test to find out the association between knowledge and socio- demographical and clinical data.

Ethical Considerations

The first step that the researcher takes to obtain official approvals to complete the research from the University of Kufa College of Medicine's Ethics Committee granted this permission to the reviser. Finally, subject agreement is obtained verbally from the patients after the researcher explains the purpose of the study to them, and respects participants' confidentiality while making their participation in answering the questionnaire voluntary.

Result

Table (1) Description of socio-demographic data of the study sample

| Socio-Demographic data | Sub-groups | Frequency (N=300) | Percentage |
|------------------------|------------|-------------------|------------|
| Age / years | 33-42 | 50 | 16.7 |
| | 43-52 | 99 | 33.0 |
| | 53-62 | 93 | 31.0 |
| | 63-72 | 58 | 19.3 |
| Gender | Male | 170 | 56.7 |
| | Female | 130 | 43.3 |
| Marital Status | Single | 7 | 2.3 |
| | Married | 238 | 79.3 |
| | Divorced | 11 | 3.7 |

| | | | |
|-------------------|-----------------------|-----|------|
| Educational Level | Widowed | 44 | 14.7 |
| | Do not Read and Write | 55 | 18.3 |
| | Read and Write | 60 | 20.0 |
| | Primary school | 78 | 26.0 |
| | Intermediate school | 31 | 10.3 |
| | Secondary School | 17 | 5.7 |
| | Institutes | 26 | 8.7 |
| | College | 29 | 9.7 |
| Residence | Postgraduate | 4 | 1.3 |
| | Rural | 85 | 28.3 |
| Monthly Income | Urban | 214 | 71.3 |
| | Sufficient | 72 | 24.0 |
| | Barely Sufficient | 90 | 30.0 |
| Occupation | Insufficient | 138 | 46.0 |
| | Retired | 20 | 6.7 |
| | Government Employee | 61 | 20.3 |
| | Free Job | 73 | 24.3 |
| | Jobless / Housewife | 146 | 48.7 |

This shows that the demographical data of the population include (33%) are within the age group (43-52) years; (56.7%) are males. Regarding marital status (79.3%) of sample are married, (26%) of them graduated from primary school. Concerning residency, the study shows that (71.3%) live in an urban area. Regarding occupation, the results show (48.7%) are housewives or jobless.

Table (2) Description of the clinical data for the study sample

| Clinical data | Sub-groups | Frequency (N=300) | Percentage |
|--------------------------------------|-------------------|----------------------|------------|
| Duration of disease/years | 1-9 | 168 | 56.0 |
| | 10-18 | 103 | 34.3 |
| | 19-27 | 29 | 9.7 |
| Treatment* | Oral antidiabetic | 254 | 84.7 |
| | Insulin | 55 | 18.3 |
| | Diet | 227 | 75.7 |
| | Exercise | 92 | 30.7 |
| Education about Diabetes Mellitus | Yes | 157 | 52.3 |
| | No | 143 | 47.7 |
| Source of Information* | Nurse | 74 | 24.7 |
| | Physician | 142 | 47.3 |
| | Friends | 10 | 3.3 |
| | Mass Media | 20 | 6.7 |
| | Internet | 52 | 17.3 |
| | studies | 1 | 0.3 |
| Associated Diseases* | Heart Disease | 44 | 14.7 |
| | Hypertension | 139 | 46.3 |
| | Obesity | 46 | 15.3 |
| | Thyroid Disease | 13 | 4.3 |
| | Anemia | 11 | 3.7 |
| | Kidney Disease | 20 | 6.7 |

| | | | |
|--|----------------------|-----|-------|
| Smoker | Yes | 63 | 21.0 |
| | No | 237 | 79.0 |
| Type of Smoking (Total of 63 Smokers) | Electronic Cigarette | 7 | 11.11 |
| | Hookah Smoking | 13 | 20.63 |
| | Cigarette | 43 | 68.25 |

* More than one choice was applied

This table shows that more than half of the participants are a duration of disease between (1-9) years, and the highest percentage was (56%). Concerning treatment, (84.7%) of the sample are treated with oral antidiabetic agents. The table also shows (52.3%) of the sample get education about diabetes mellitus, (47.3%) of the sample's source for information is a physician. In regards to associated diseases, (46.3%) of them have a history of Hypertension. Concerning smoking, (79%) are non-smokers, with (73%) cigarette type smoking.

Table (3): Assessment the level of knowledge about preventive measures of foot ulcer for the study sample

| | Knowledge Levels | | |
|------------|------------------|----------|--------|
| | Poor | Moderate | Good |
| Frequency | 19 | 199 | 82 |
| Percentage | 6.33% | 66.33% | 27.33% |

This table exhibited the descriptive statistics of patients' levels of knowledge about preventive measures for foot ulcer; it shows that about (6.33%) of the patients have poor knowledge, (66.33 %) of them have moderate knowledge; while (27.33 %) have good knowledge (Table 3 and figure 1).

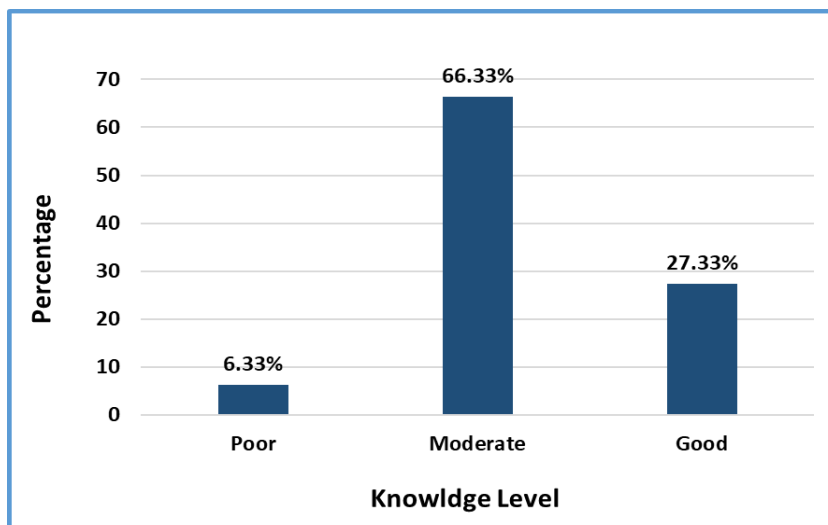


Figure (1): The overall Assessment of knowledge about foot ulcer preventive measures

Table (4) Assessment and mean scores of knowledge for the study sample

| # | Items | MS | SD | Assessment |
|----|--|------|------|------------|
| 1 | Medicine are not taken regularly then predisposes to complications | 1.83 | 0.38 | Good |
| 2 | Continuous care is essential for a foot because it may get minor painless injuries | 1.66 | 0.47 | Moderate |
| 3 | Diabetic wound care is a must because infections do not heal quickly | 1.65 | 0.48 | Moderate |
| 4 | Smoking leads to reduce blood supply in the lower extremities | 1.42 | 0.49 | Moderate |
| 5 | A diabetic patient must exercise to improve circulation in the feet | 1.64 | 0.48 | Moderate |
| 6 | The diabetic patient should check their foot | 1.75 | 0.44 | Good |
| 7 | Obesity contributes to Diabetes | 1.74 | 0.44 | Good |
| 8 | Sleeplessness contributes to Diabetes | 1.32 | 0.47 | Poor |
| 9 | Sedentary habits lead to Diabetes | 1.26 | 0.44 | Poor |
| 10 | Stress contributes to Diabetes | 1.28 | 0.45 | Poor |
| 11 | Hyperglycemia assist to diabetic foot problems | 1.69 | 0.47 | Good |
| 12 | Ischemia facilitates to diabetic foot problems | 1.54 | 0.50 | Moderate |
| 13 | Foot ulceration may be caused by atherosclerosis | 1.35 | 0.48 | Moderate |
| 14 | Infection is one of the contributing factors to foot ulceration | 1.32 | 0.47 | Poor |
| 15 | Inspect foot regularly for foot ulcers | 1.80 | 0.40 | Good |
| 16 | regular washing the foot can help the patient find out foot ulcer early | 1.67 | 0.47 | Good |
| 17 | Wash foot with warm water to increase blood supply | 1.71 | 0.45 | Good |
| 18 | Cut nails straight across and not too short to prevent injury to the skin around the nails | 1.70 | 0.46 | Good |
| 19 | Receive tips before buying shoes to choose the right shoes | 1.63 | 0.48 | Good |
| 20 | Measure the size of foot before buying shoes to prevent foot injury | 1.71 | 0.45 | Good |
| 21 | Check the inner part of shoes constantly to prevent foot injury from hard parts inside the shoes | 1.63 | 0.48 | Moderate |
| 22 | Walk barefoot frequently can help the foot to relax | 1.36 | 0.48 | Moderate |
| 23 | Clean nails with sharp objects to remove dirt | 1.70 | 0.46 | Good |
| 24 | Wear tight rubber stockings on foot | 1.78 | 0.42 | Good |
| | Overall Assessment of knowledge | 1.60 | 0.46 | Moderate |

MS: Mean of Scores; SD: Standard Deviation; Poor : MS = 1-1.33 ; Moderate : MS =1.34-1.66 ; Good : MS≥1.67

This table shows the Assessment and means scores of diabetic patients' knowledge about preventive measures for a foot ulcer. Several items had good level of knowledge, while most items had (moderate) knowledge, and a few items exhibited (poor) knowledge. This Assessment is based on the statistical scoring system, in which the items are classified as (poor) if the mean of scores is between

(1-1.33); it is considered (moderate) if the mean of scores is between (1.34-1.66); while it is assumed (pass) if the mean of scores is more than (1.67).

Table (5) Association between the overall Assessment of the study sample knowledge and demographic data

| Demographic data | Chi Square | Correlation Coefficient | df | P value | Significance |
|-------------------|------------|-------------------------|----|---------|--------------|
| Age / years | 3.22 | 0.16 | 6 | 0.76 | NS |
| Educational Level | 15.23 | 0.63 | 14 | 0.03 | S |
| Marital Status | 3.44 | 0.38 | 6 | 0.33 | NS |
| Gender | 1.34 | 0.32 | 2 | 0.52 | NS |
| Residence | 3.54 | 0.28 | 2 | 0.26 | NS |
| Monthly Income | 2.84 | 0.42 | 4 | 0.22 | NS |
| Occupation | 17.66 | 0.72 | 6 | 0.02 | S |

df= degree of freedom; NS: Non-significant at P value >0.05 ; S: Significant at P value <0.05

This shows the association between the overall Assessment of diabetic patients' knowledge regarding preventive measures for foot ulcers and their demographic data. It shows that there is a significant association between the overall Assessment of diabetic patients' knowledge regarding preventive measures for foot ulcers with (educational status and occupation) at (P<0.05).

Table (6) Association between the overall Assessment of the study sample knowledge and clinical data

| Clinical data | Chi-Square | Correlation Coefficient | df | P-value | Sig. |
|-----------------------------|------------|-------------------------|----|---------|------|
| 1. Duration of disease | 13.22 | 0.58 | 4 | 0.05 | S |
| 2. Treatment | 5.66 | 0.63 | 6 | 0.45 | NS |
| 3. Source of Information | 2.24 | 0.29 | 10 | 0.31 | NS |
| 4. Education about Diabetes | 22.34 | 0.79 | 2 | 0.000 | HS |
| 5. Associated Diseases | 2.18 | 0.32 | 10 | 0.26 | NS |
| 6. Smoking | 3.36 | 0.37 | 2 | 0.29 | NS |
| 7. Type of Smoking | 7.24 | 0.46 | 4 | 0.12 | NS |

df= degree of freedom; D.M.: Diabetes Mellitus; NS: Non-significant at P value >0.05 ; S: Significant at P value <0.05; HS: High Significant at P value <0.01

This table shows the association between the overall Assessment of diabetic patients' knowledge regarding preventive measures for a foot ulcer and their clinical data. The table shows that there was a significant association between patients' knowledge with (duration of the disease and education about Diabetes) at (P<0.05).

Discussion

The study revealed most participants had moderate knowledge regarding preventive measures for foot ulcer. One of the previous studies found (72%) had intermediate knowledge, (13.3%) had good knowledge, and (14.7%) had poor knowledge (Al-Aboudi *et al.*, 2016). Another previous study found that more than two-thirds of diabetic patients were knowledgeable about diabetic foot management (67.4%), the remaining have poor knowledge (32.6%) (Al Amri *et al.*, 2021). Another study revealed that (53.3%) of the sample had moderate knowledge, while insufficient knowledge represented (46.7%) (Alhuqayl *et al.*, 2019).

The study indicates diabetic patients' answers in the current study show moderate knowledge about healing in wounds; smoking may lead to ischemia and poor circulation in the foot as a primary reason for foot ulcer. Interestingly, the results revealed that a few participants missed essential information, such as they didn't know Diabetes was linked with sleeping disturbance and unhealthy lifestyle habits, which may affect people with this disease. A significant majority of participants understood the importance of having correct shoes measurements and knowing what shoes were appropriate. They also checked the inner areas of their shoes and received tips before buying shoes. In addition to cleaning, trimming nails and washing feet, these results may be due to participants having this information from their Islam religion; as the person gets ready for praying and acting ablution, the feet will be inspected and washed before every prayer time. The current study results are inconsistent with another study that concluded that most participants gained good knowledge and revealed the same items with moderate (Al-Hariri *et al.*, 2017).

The study indicate that there is a significant association ($p \text{ value}=0.05 \leq 0.05$) between patients' educational level with their level of knowledge regarding preventive measures for foot ulcer. They concluded that the participant's knowledge levels depend mainly on their educational status. Therefore, when someone has good knowledge and information, their answers naturally differ from others without correct information. This study is supported by previous research that demonstrates a statistically significant relationship between educational level and patients' knowledge (Qasim *et al.*, 2021). Another study also revealed that there is an association between knowledge and educational levels (Seid & Tsige, 2015). There is a significant association between occupation and knowledge levels. It can be related to most participants being housewives or jobless, leading them to gain more information through seeking information about diabetes mellitus. The present study disagrees with another previous study that indicated a non-significant association ($p \text{ value}= 0.45 > 0.05$) between housewife or jobless with knowledge scores (Abo deif & Abdelaziz, 2019).

Discussion of association between the overall assessment of the study sample knowledge and clinical data, there is a significant association between the overall assessment of knowledge and the duration of Diabetes less than ten years; this means recently diagnosed with Diabetes attending to gain sufficient information about the disease. These results agree with a previous study indicating that patients who had recently been diagnosed (1-10 years) are more knowledgeable;

the familial expertise may have increased participants' awareness of Diabetes (El-Khawaga & Abdel-Wahab, 2015). There is a highly significant association between overall assessment of knowledge and education about diabetes mellitus; when the diabetic patient had educated and informed about Diabetes as an available lead to the acquisition of knowledge concerning preventive foot ulcer. The current results are supported by another study that found a significant association between knowledge and education about Diabetes (Mustafa *et al.*, 2017). While there is a disagreement between this study and a previous study that proves education about diabetes had no effects on the patient's knowledge level (Yücel & Sunay, 2016).

Conclusion

Most diabetic patients have moderate knowledge regarding preventive measures for foot ulcers. The majority of the remaining sample has a good level of knowledge regarding preventive measures for foot ulcers. There is a strong relationship between patients' knowledge regarding preventive measures for a foot ulcer and socio-demographic data that involve educational levels and occupation. There is a strong relationship between diabetic patients' knowledge regarding preventive measures for a foot ulcer and clinical data involving the duration of diabetes and education.

Recommendations

Training and educating newly graduated nurses who were distributed to work in diabetic and endocrine center to prepare them for related practices and skills about diabetic foot ulcers and related complications. Construct a structured educational program about preventing and managing diabetic foot ulcers for diabetic patients and health care providers.

References

- Abo deif, H. Ibrahim, & Abdelaziz, S. H. (2019). KNOWLEDGE AND PRACTICE OF FOOT CARE IN PATIENTS WITH TYPE 1 AND 2 DIABETES AT NATIONAL INSTITUTE OF DIABETES AND ENDOCRINOLOGY IN CAIRO. *The Malaysian Journal of Nursing*, 11(02), 77–86. <https://doi.org/10.31674/mjn.2019.v11i02.009>
- Adeyemi, T. M., Olatunji, T. L., Adetunji, A. E., & Rehal, S. (2021). Knowledge, practice and attitude towards foot ulcers and foot care among adults living with diabetes in tobago: A qualitative study. *International Journal of Environmental Research and Public Health*, 18(15). <https://doi.org/10.3390/ijerph18158021>
- Ahmed, R., & Iqbal, Y. (2017). Evaluation of knowledge, attitude and awareness about diabetic foot associated complications in Karachi. *J Toxicol Pharmaceut Sci*, 1(2), 85–90. <http://www.jtps.com.pk>
- Al Amri, A. M., Shahrani, I. M., Almaker, Y. A., Alshehri, D. M., Argabi, M. A., Alghamidi, F. A., & Alqahtani, Y. Z. (2021). Knowledge, Attitude and Practice Regarding Risk of Diabetic Foot Among Diabetic Patients in Aseer Region, Saudi Arabia. *Cureus*, 13(10). <https://doi.org/10.7759/cureus.18791>
- Alabbod, M. (2021). *A Study on Diabetic Foot Disorders in Basrah , Southern Iraq*.

- July, 10–24. <https://doi.org/10.37319/iqnjm.3.2.2>
- Al-Aboudi, I. S., Hassali, M. A., & Shafie, A. A. (2016). Knowledge, attitudes, and quality of life of type 2 diabetes patients in Riyadh, Saudi Arabia. *Journal of Pharmacy & Bioallied Sciences*, 8(3), 195. <https://doi.org/10.4103/0975-7406.171683>
- Al-Hariri, M. T., Al-Enazi, A. S., Alshammari, D. M., Bahamdan, A. S., AL-Khtani, S. M., & Al-Abdulwahab, A. A. (2017). Descriptive study on the knowledge, attitudes and practices regarding the diabetic foot. *Journal of Taibah University Medical Sciences*, 12(6), 492–496. <https://doi.org/10.1016/j.jtumed.2017.02.001>
- Alhuqayl, A., Alaskar, M., Alsahli, F., & Alaqil, S. (2019). Awareness of foot care among diabetic patients. *International Journal of Medicine in Developing Countries*, 3(January), 154–158. <https://doi.org/10.24911/ijmdc.51-1540846403>
- Bus, S. A., Lavery, A. L., Monteiro-Soares, M., Rasmussen, A., Raspovic, A., Sacco, I. C. N., & Van Netten, J. J. (2019). IWGDF Guideline on the classification of diabetic foot ulcers. *International Working Group on the Diabetic Foot*, 1–15.
- Chai, S., Yao, B., Xu, L., Wang, D., Sun, J., Yuan, N., Zhang, X., & Ji, L. (2018). The effect of diabetes self-management education on psychological status and blood glucose in newly diagnosed patients with diabetes type 2. *Patient Education and Counseling*, 101(8), 1427–1432. <https://doi.org/10.1016/j.pec.2018.03.020>
- El-Khawaga, G., & Abdel-Wahab, F. (2015). KNOWLEDGE, ATTITUDES , PRACTICE AND COMPLIANCE OF DIABETIC PATIENTS IN DAKAHLIA, EGYPT Ghada. *European Journal of Research in Medical Sciences*, 3(1), 40–53. https://scholar.google.com/scholar?hl=ar&as_sdt=0%2C5&q=El-Khawaga%2C+G.%2C+%26+Abdel-Wahab%2C+F.+%282015%29.+Knowledge%2C+attitudes%2C+practice+and+compliance+of+diabetic+patients+in+Dakahlia%2C+Egypt.+Euro+J+Res+Med+Sci%2C+3%281%29&btnG=
- Graves, L. E., & Donaghue, K. C. (2019). Management of diabetes complications in youth. *Therapeutic Advances in Endocrinology and Metabolism*, 10, 1–12. <https://doi.org/10.1177/2042018819863226>
- Habbash, F., Saeed, A., Abbas, F., Yousif Ajlan, B., Abdulla, F., & Al-Sayyad, A. S. (2019). Knowledge and Practice Regarding Foot Care in Patients with Diabetes Mellitus Attending Diabetic Clinics in Health Centers in the Kingdom of Bahrain. *International Journal of Medicine and Public Health*, 9(4), 148–153. <https://doi.org/10.5530/ijmedph.2019.4.32>
- Magbanua, E. C., & Lim-Alba, R. (2017). Knowledge and practice of diabetic foot care in patients with diabetes at Chinese General Hospital and Medical Center. *Journal of the ASEAN Federation of Endocrine Societies*, 32(2), 123–131. <https://doi.org/10.15605/jafes.032.02.05>
- Mustafa, A., Iqbal, M., & Parvez, M. A. (2017). Assessment of Knowledge , Attitude and Practices of Diabetics Regarding Their Foot Care. *Apmc*, 11(1), 43–47. <https://doi.org/https://doi.org/10.29054/apmc/2017.244>
- Qasim, M., Rashid, M. U., Islam, H., Amjad, D., & Ehsan, S. B. (2021). Knowledge, attitude, and practice of diabetic patients regarding foot care: Experience from a single tertiary care outpatient clinic. *Foot*, 49, 101843. <https://doi.org/10.1016/j.foot.2021.101843>

- Seid, A., & Tsige, Y. (2015). Knowledge, Practice, and Barriers of Foot Care among Diabetic Patients Attending Felege Hiwot Referral Hospital, Bahir Dar, Northwest Ethiopia. *Advances in Nursing*, 2015, 1–9. <https://doi.org/10.1155/2015/934623>
- Taksande, B., Thote, M., & Jajoo, U. (2017). Knowledge, attitude, and practice of foot care in patients with diabetes at central rural India. *Journal of Family Medicine and Primary Care*, 6(2), 284. <https://doi.org/10.4103/2249-4863.219994>
- Tao, Z., Shi, A., & Zhao, J. (2015). Epidemiological Perspectives of Diabetes. *Cell Biochemistry and Biophysics*, 73(1), 181–185. <https://doi.org/10.1007/s12013-015-0598-4>
- Tork, H. M. M., & Elgazzar, S. (2020). Diabetic patients' awareness regarding foot care and its associated factors in QASSIM region Saudi Arabia. *International Journal of Novel Research in Healthcare and Nursing*, 7(1), 664–674.
- Yücel, F., & Sunay, D. (2016). Assessment of Knowledge, Attitudes and Behaviours of Diabetic Patients About Diabetic Foot and Foot Care. *Ankara Medical Journal*, 16(3). <https://doi.org/10.17098/amj.53438>
- Zhang, P., Lu, J., Jing, Y., Tang, S., Zhu, D., & Bi, Y. (2017). Global epidemiology of diabetic foot ulceration: a systematic review and meta-analysis†. *Annals of Medicine*, 49(2), 106–116. <https://doi.org/10.1080/07853890.2016.1231932>