

Adherence of general practitioners of competency role of caring of patient with diabetes Miletus type II at KSA

Mohammed Abdulaziz Albaggar¹, Mohannad Abdulaziz alBajjar¹, Khalid Abdullah Alghamdi², Osama Abdulaziz Khalaf albaqqar³, Fatimah Hassan Mohammad qurun⁴, Sukinah Attyan Alamri⁵, Doaa Abdulrasheed Mansouri⁶, Salwa Mnsor Abu Alnasour⁷, Yousef Khader Alsobhi⁸, Saud Musaed Alsobhi⁸, Reem Shalan Alotaibi⁹

1Family Medicine Consultant, Albaha health cluster, Saudi Arabia.

2Cardiology and Echocardiography Consultant, Jeddah 2nd Health Cluster, Saudi Arabia.

3Family medicine Senior Registrar, Albaha health cluster, Saudi Arabia.

4Nursing Specialist, Executive Nursing Management in Primary Health Care, Saudi Arabia.

5Nurse, King Fahad hospital, Saudi Arabia.

6Staff nurse, King Fahd General Hospital, Saudi Arabia.

7Staff nurse, KING Hospital Jeddah, Saudi Arabia.

8Nursing technician, Al-Wasta Health Center, Saudi Arabia.

9Nursing specialist, Rafai Algemsh General hospital, Saudi Arabia.

Abstract :

Background: Although diabetes diagnosis and treatment have advanced significantly, there is still a large discrepancy between the best management objectives and results. The inability to meet management objectives may be mostly attributed to physicians' malpractice, incorrect attitudes, and outdated understanding regarding diabetes control. Aim of the study: The current study's goals were to evaluate general practitioners' knowledge, attitudes, and practices with Diabetes in KSA and to emphasize their suggestions for bettering diabetes care. Methods: All PHC facilities and units in the Jeddah area of Saudi Arabia were included in a descriptive cross-sectional study. There were essentially five sections to a pre-made, pre-tested interview questionnaire. In the first, the participating physicians' sociodemographic and professional information were gathered; in the second, third, and fourth sections, their competence in treating diabetic patients was assessed; and in the last section, their thoughts on how to enhance diabetic treatment were solicited. Results: According to the data, 60.2, 63.6, and 68.9% of GPs, respectively, lacked information, had unsuitable attitudes, and engaged in poor practices regarding the diagnosis and treatment of diabetes. The two most important predictors of inadequate KAP were having fewer than five years of work experience and simply having a bachelor's or master's degree. To address this issue, educational initiatives aimed at general practitioners are required. In conclusion, general practitioners' competency, attitude, and practice scores regarding diabetes are subpar. GP doctors' knowledge of screening, effective treatment, preventing complications from diabetes, and teaching diabetics has to be improved.

Introduction:

Diabetes is one of the top 10 causes of death worldwide, making it a major global health concern in the twenty-first century. Around the world, it is responsible for 10.7% of all-cause mortality in those aged 20 to 79. Diabetes was especially common in Egypt in 2016, with a frequency of 16.2%. 1. People with poorly controlled diabetes are more likely to experience long-term micro- and macro-vascular problems that can harm critical organs such as the kidneys, brain, eyes, and heart. This lowers general quality of life and has an impact on healthcare expenses. 2. In order to minimize the risk of long-term problems, optimal glucose control depends on good adherence to dietary recommendations, prescription medication, and lifestyle modifications. Adherence to

medicine is essential for attaining excellent therapeutic outcomes in the context of chronic diseases such as diabetes.

Chronic abnormally high blood glucose levels, or hyperglycemia, together with disruptions in the metabolism of carbohydrates, fats, and proteins, are hallmarks of diabetes mellitus (DM), a metabolic disorder. Defective insulin secretion, insulin action (resistance), or both are associated with it.¹ In 2021, around 537 million adults aged 20-79 have been diagnosed with diabetes. By 2030, there will be 643 million people with diabetes worldwide, and by 2045, there will be 783 million. Three out of four diabetic adults reside in low- and middle-income nations. Additionally, diabetes will be the cause of 6.7 million fatalities in 2021, or one every five seconds. In the Middle East and North Africa (MENA), 1 in 6 persons (73 million) have diabetes, and that number is predicted to rise to 95 million by 2030 and 136 million by 2045.²

In the majority of communities, general practitioners or family doctors serve as the "primary" healthcare providers. They comprise the fundamental framework of the healthcare system and are crucial to the delivery of coordinated primary healthcare (PHC) [1]. According to a 1996 American poll, 62% of respondents said they typically receive care from "primary care physicians" (PCPs), compared to 16% who choose internists and 15% who choose pediatricians [2]. With a frequency of 8.7% in 2014, type 2 diabetes mellitus (DM) has emerged as one of the world's most alarming health issues [3]. By 2030, it is estimated that about 10% of people worldwide would have diabetes [4]. It is believed that pharmaceutical and lifestyle interventions can cut the onset of diabetes mellitus in high-risk patients by half. Timely and effective screening, diagnosis, and treatment are necessary due to the rising incidence of diabetes and its significant cost burden [5].

A significant number of chronic illnesses, such as diabetes mellitus and hypertension, can be treated at the primary care level. Consequently, primary care doctors ought to be sufficiently skilled in treating these chronic conditions [6]. The International Diabetic Federation (IDF) reports that Saudi Arabia had one of the highest rates of diabetes mellitus in the world in 2017 (18.5%) [7]. Studies conducted locally and elsewhere have indicated that about 24% of Saudi individuals have diabetes [8]. A 2013 survey found that more than 6 million Saudis have pre-diabetes or diabetes, which is anticipated to cost the country 36 billion Riyals annually [9].

Many chronic disease clinics have been established at various PHCs in Saudi Arabia as a result of the transition in diabetes patient care from specialist to primary care due to the country's growing diabetic patient burden.

Acute or chronic comorbid conditions in patients with type 2 diabetes force doctors to manage and prioritize the presenting or symptomatic complications. Individuals with severe or uncontrolled diabetes may also exhibit renal, retinal, or neurological problems as well as microvascular or macrovascular complications. Additionally, the inability of primary care services to provide ongoing care and the absence of access to a comprehensive multidisciplinary diabetic care team exacerbate the condition [10].

The wait time for an endocrinologist appointment might range from a few weeks to several months in many different nations. As front-line healthcare professionals, PCPs diagnose and treat the majority of diabetes patients in nations like Israel, as opposed to endocrinologists or diabetologists [11]. Similar to this, the doctors who operate in Kansas' many primary healthcare institutions serve as the first line of treatment for patients, and their expertise, demeanor, and methods are essential to managing diabetes effectively.

Since overcoming patients' psychological obstacles to disease management is thought to be essential for enhancing treatment, PCPs must be able to effectively counsel and educate patients in addition to handling the difficult parts of managing diabetes mellitus in order to provide optimal

care. Primary care physicians must stay up to date on the latest guidelines and practice the skills necessary for effectively managing patients with diabetes mellitus, as these patients may present to them at different phases of the disease process and with a variety of concomitant diseases [13, 14].

Since every healthcare system has its own limitations relating to various factors impacting patient management, such as physician training, referral system strength, etc., the standards of diabetic care established by international diabetic associations may not be implemented in all clinical contexts and environments [14]. People with diabetes can benefit greatly from the primary care physician's influence and management, as well as help them adopt healthier lifestyle choices and avoid complications from their condition [15]. Nonetheless, PCPs have numerous difficulties while providing care for individuals with diabetes mellitus, which are largely comparable across national health care systems [16]. PCPs in Saudi Arabia might encounter some obstacles or restrictions in the patient care system, which could jeopardize diabetes. Major care physicians are the major providers of diabetes care due to the rising prevalence of diabetes mellitus globally. Their practices, knowledge, and attitudes are crucial to achieving diabetes management goals. Assessing GPs' competent knowledge, attitudes, and practices about diabetes in KSA as well as highlighting their suggestions for bettering diabetic treatment were the goals of the current study.

Significant of the study:

The goal Individuals with diabetes and cardiometabolic disorders receive person-centered, comprehensive, and cooperative care and education from diabetes care and education professionals. Reexamining the information, skills, and abilities required for diabetes care and education specialists in the modern, dynamic healthcare environment has become important as a result of the specialty's implementation of the vision. Introducing a new set of competencies that are representative of the profession in this ever-changing healthcare environment is the aim of this essay. In addition to having experience caring for patients with diabetes and related illnesses, diabetes care and education specialists are medical professionals who have attained a core set of knowledge and abilities in the biological and social sciences, communication, counseling, and education. A wide range of medical experts are included in this specialty, such as podiatrists, optometrists, exercise physiologists, doctors, nurses, nutritionists, pharmacists, and mental health specialists. Regardless of subject, the competences are meant to direct practice and promote mastery through mentorship, individual study, and continuous education. In conclusion The competencies needed for diabetes care and education specialists in the fast-paced healthcare environment of today are outlined in this paper as they strive for specialty excellence.

Method:

Research design: A descriptive cross-sectional study was conducted at primary health care centers (PHCs) and units in East Jeddah district KSA, between February and March 2024.

Participants:

All 500 general practitioner physician who were on duty were part of the study group. The purpose of the study was explained to them, and they were invited to share their experiences. 400 people in all filled out the survey. General practitioners, resident physicians, family physicians, and specialists are all PCPs on duty

Data collection :

An anonymous self-administered questionnaire was used to gather data. There were five main sections to the questionnaire:

Section 1. include; Sex, age, practice location (rural or urban), personal and family history of diabetes mellitus, qualifications (GP, family physician, or specialist), length of practice, length of

family medicine experience, and DM training courses were among the sociodemographic and professional characteristics of the participating physicians that were included

Section 2 evaluated doctors' understanding of diabetes risk factors, diagnostic standards, glycemic monitoring, diabetic patient evaluation at diagnosis, treatment, and follow-up, among other topics. In **Section 3**, doctors' attitudes regarding screening, diagnosis, treatment, patient education, and self-assessments of their own competence in treating diabetes mellitus were evaluated.

Section 4.The practice of self-reported doctors in diagnosing, treating, and educating patients with diabetes, among other things, was evaluated

Tool validation: Two internal medicine specialists and three public health specialists reviewed the questionnaire's content. Forty PCPs (20 general practitioners, 12 family physicians, and 8 specialists) pre-tested it for readability, comprehension, design, and content. Important changes were made to this questionnaire to make it easier to complete and deliver accurate results. The final analysis did not use these pre-test results. The questionnaire's internal consistency was assessed using Cronbach's α . The knowledge, attitude, and practice α coefficients were 0.78, 0.75, and 0.69, respectively, confirming that the questions had sufficient internal consistency.

Questions that were answered correctly received a score of one, while those that were answered wrong or that were unclear received a score of zero. The median was used as an artificial cutoff point for knowledge 16, attitude 6, and practice 18 in the quantitative analysis. As a result, the group under study whose results were equal to or below the median was deemed poor, and those whose results above the median were deemed good.

Version 26 of the Statistical Package for Social Science (SPSS) was used to analyze the data. Data normality was tested using the one-sample Kolmogorov-Smirnov test. Numbers and percentages were used to express qualitative data. The Chi-square test or Fisher exact test, if appropriate, was used to evaluate the relationship between categorical variables. The forward Wald approach was used to enter significant factors from the bivariate analysis into a regression model.

Results:

It can be seen in table 1 that nearly two third were in the age group less than 32 years ago. Also 62.5 % of them were female. And 67.5 were married . the majority had bachelor degree (62.5) while only 1.25 had fellowship. More than three quarter of study participants had personal history of diabetes (82.5%), while only 37.5 of them attending training about Diabetes .

Table 1:

	Total	%
	N=400	
Age/years	250	62.5
<32	150	37.5
≥32 (r)		
Gender	150	37.5
Male	250	62.5
Female		
Marital status	270	67.5
Married (r)	130	32.5
Unmarried		
Educational Qualification	250	62.5
Bachelor	100	25
Master	20	5
MD	25	6.25

Diploma	5	1.25
Fellowship (r)		
Personal history of diabetes	330	82.5
-VE	70	17.5
+VE (r)		
Family history of diabetes	200	50
-VE	200	50
+VE (r)		
Working experience	100	25
<5 years	200	50
5-10 years	100	25
>10 years (r)		
Attending any diabetic training course	250	62.5
No(r)	150	37.5
Yes		

Figure 1,2,3. Illustrated that the GPs had low level of each of knowledge, attitude, and practices.(63.6, 62.8, 69.1%)respectively . that indicate that the physician need traing about how to providecompetent care for diabetic patents.

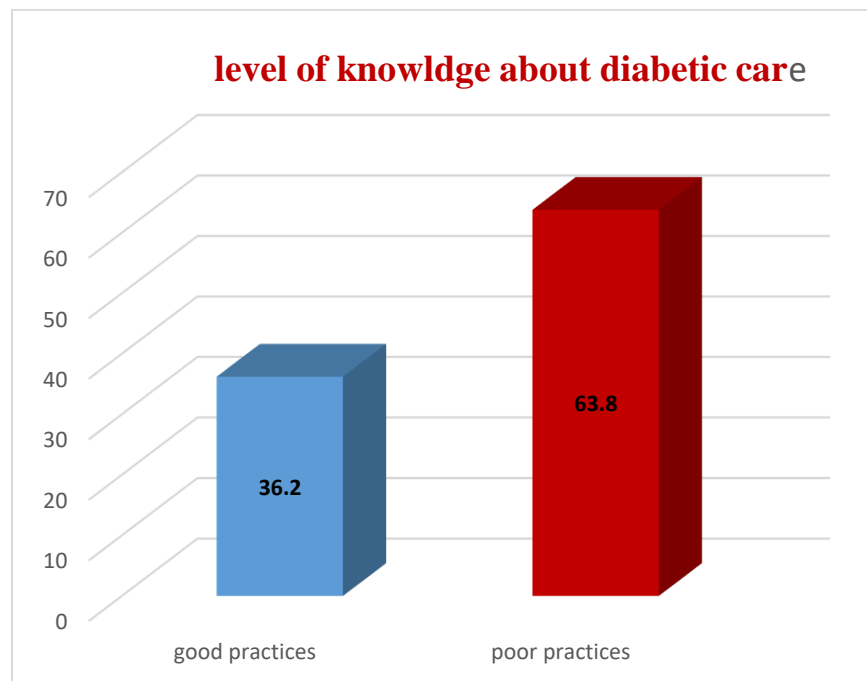


Figure 1 level of competent knowledge for diabetic patients

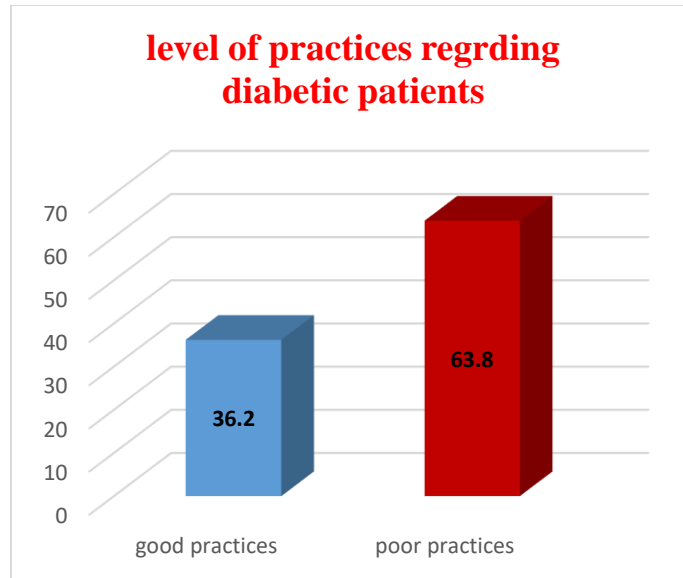


Figure 2 Level of competent practices for diabetic patients

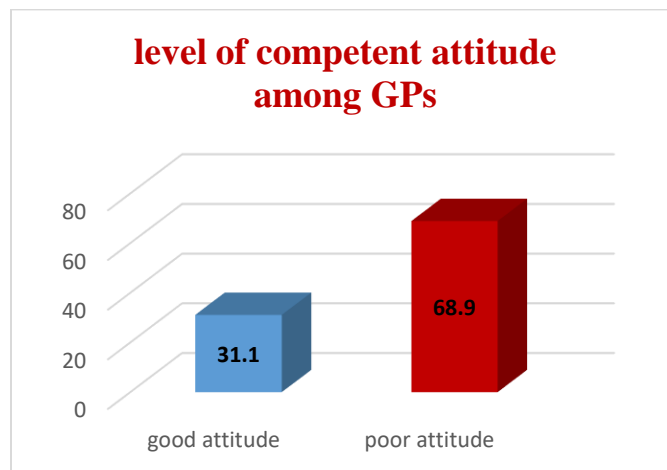


Figure 3: Level of attitude for diabetic patient

Table 2 show the level of competency according to knowledge, practice and attitude regarding Diabetes. This table represented that Figure 1 illustrates that 57.2, 58.2, and 62.6% of the PCPs under study acknowledged ignorance, incorrect attitudes, and inappropriate practices, respectively. Table 1 shows that the following factors were substantially associated with a lack of knowledge: being under 32 years old, single, living in a rural area, having just a bachelor's or master's degree, having a negative family history of diabetes, having fewer than five years of work experience, and working as a general practitioner. The prevalence of poor attitude was also considerably greater among unmarried physicians, those with a negative personal and family history of diabetes, those with only a bachelor's or master's degree, those with less than five years of work experience, and those practicing as general practitioners. Ages under 32, living in a rural area, and possessing only bachelor's or master's degrees were all substantially associated with poor practices.

Table 2 :Frequency distribution of low competent knowledge, attitude, and practices according to their socio demographic data

	Low level of knowledge	Low level of attitudes	Low level of practices
Age/years	(70.8) *	(61.5)	(72.3) *
<32	(42.5)	(54.6)	(52.1)
≥32 (r)			
Gender	(55.3)	(55.3)	(62.1)
Male	(58.4)	(60)	(62.9)
Female			
Marital status	(52)	(52.9)	(60.3)
Married (r)	104 (69.3) *	106 (70.7) *	(68)
Unmarried			
Educational Qualification	(69.4) *	(50.9) *	(77.3) *
Bachelor	(31.4)	(80.4) *	(39.2)
Master	(57.1)	(28.6)	(71.4) *
MD	(47.9)	(67.1)	(43.8) *
Diploma	(28.6)	(21.4)	(7.1)
Fellowship (r)			
Personal history of diabetes	(56.3)	258 (60) *	268 (62.3)
-VE	(62.9)	33 (47.1)	45 (64.3)
+VE (r)			
Family history of diabetes	(68.3) *	151 (68.3) *	131 (59.3)
-VE	(48.4)	140 (50.2)	182 (65.2)
+VE (r)			
Working experience	(72.8) *	(85.3) *	(67.6) *
<5 years	(52.1)	(50)	(70.3) *
5-10 years	(50.6)	(51.7)	(50)
>10 years (r)			
Attending any diabetic training course	(53.4)	(60.8)	(62.9)
No(r)	(65) *	(52.8)	(62)
Yes			

Discussion:

Primary care doctors are essential in helping diabetic people receive treatment and education. The current study evaluated whether PCPs possess the necessary mindset and practical abilities to effectively manage patients with diabetes mellitus. The findings indicate that there are significant shortcomings in the mindset and methods of Saudi Arabia's primary care physicians that require attention.

Every PCP in this study agreed that DM can have major repercussions if left untreated. Nine out of ten participating physicians in a study conducted in Pakistan saw diabetes mellitus as a serious health risk [18]. It is generally recognized that diabetes mellitus (DM) directly and indirectly damages cells and tissues, as well as through microvascular and macrovascular damage. Therefore, maintaining blood sugar levels within an ideal range is crucial to preventing irreparable damage to target organs and lowering DM-related morbidity and death [19]. 84% of respondents indicated that they believe it plays a significant role in DM primary prevention when asked about it, indicating a positive attitude score.

In line with a study conducted in Suez, Egypt, which showed that roughly 51.7% and 56.7% of the enrolled FPs had inappropriate knowledge and practice scores, respectively, regarding diabetes treatment, the current study showed that 57.2, 58.2, and 62.6% of the PCPs under study had poor knowledge, attitudes, and practices regarding DM diagnosis and management.¹³ According to a survey conducted in the KSA's Jazan region, over 25% of PCPs got subpar knowledge marks, while over 50% had subpar practice grades.¹⁴ In addition, a study conducted by researchers in Switzerland and Nigeria found that doctors in Nigeria had inadequate knowledge and practice ratings about diabetes.¹⁶

The percentage is marginally lower than that of the Saudi Arabian Al-Hasa research, which found that 90% of doctors supported primary prevention of diabetes mellitus [20]. Nearly 82% of doctors said that diabetes mellitus should not prevent women from getting pregnant. The findings are much superior to those of a study conducted in Pakistan, where general practitioners were asked the same issue and 42% of them concurred that it is safe for diabetic women to conceive [18]. It is well known that there is no substantial harm to the fetus's health or potential for lasting damage if pregnant diabetic women maintain appropriate blood sugar management [19].

this study also revealed that doctors' attitudes toward insulin injection method were deficient. Merely 55% of them would administer the insulin injection at the proper 90-degree angle. Only 36% of doctors correctly instructed their patients to perform the insulin injection at 90 degrees, whilst 41.3% of doctors said they do not provide instructions for insulin injections in their practice. The findings are comparable to those obtained by the Pakistani study on primary care physicians [18] and the Al-Hasa study [20], which revealed that 37% and 40% of doctors, respectively, used the proper insulin procedure. It is anticipated that primary care doctors who are knowledgeable about the proper subcutaneous insulin injection technique will be able to instruct their diabetic patients in it.

According to the current study, diabetes knowledge and attitude appear to be influenced by a family history of the disease (p -value <0.001). Because individuals with a family history may feel more vulnerable, which may increase their awareness, practitioners with a family history of diabetes mellitus had better diabetes knowledge and attitudes, and those with a positive personal history of the disease had better diabetes attitudes in the current study.¹⁷ A study¹⁸ that found that family history was the most significant factor associated with the perceived risk of developing diabetes mellitus supports these findings. Family members of individuals with type 2 diabetes, however, underestimate their own risk of developing the disease.¹⁹

Among the group under study, being unmarried PCP is strongly connected with poor knowledge and attitude (p -value <0.001). This could be explained by the fact that marriage is typically linked to a reevaluation of views regarding health: Partners reassess their present health attitudes when they embrace new habits. According to Burke et al., couples are more likely to incorporate new information and skills toward healthier lifestyles during this crucial stage.²⁰ According to the current study, PCPs' working experience years had a significant impact on their KAP(knowledge,

attitude, practices) results. A p-value of 0.005, 0.001, and 0.003 indicated that having fewer than five years of experience increased the likelihood of having a poor KAP.

Additionally, Al Saleem et al.¹⁴ in Saudi Arabia demonstrated that older, more seasoned, and well certified PCPs had significantly higher grades of knowledge and practice. Additionally, KSA found that PCPs' age and years of experience had a significantly favorable correlation with their knowledge and practice scores in a study²¹ conducted in the Aseer region. On the other hand, Niroomand et al.²² in Iran discovered that the KAP of the doctors had inverse associations with age. Although there was an inverse association between time since medical and specialty graduation and knowledge and practice, same relationships also occurred with the age of the individual. In Saudi Arabia, Khan et al.²³ shown that physicians with 1–5 years of experience had substantially higher overall ratings than physicians with doctors >5 years of practice ($P < 0.05$).

Conclusion:

This study examined a number of diabetes-related attitudes and behaviors among PCPs employed by Ministry of Health-affiliated primary care facilities. It has acknowledged that their approach to teaching and caring for the DM patients that visit their clinics has to be improved. PCPs should be well qualified to prescribe insulin therapy and provide patients with instructions for it. In addition to improving patient care, this will lessen endocrinologists' total patient load and referrals. To stay current, PCPs should be encouraged to participate in post-graduation training, go to relevant CME events, and read scientific journals.

References:

- Karamanou, M., Protogerou, A., Tsoucalas, G., Androutsos, G. and Poulakou-Rebelakou, E. Milestones in the history of diabetes mellitus: the main contributors. *World J Diabetes* 2016, 10(7): 1.
- International Diabetes Federation. The global burden. In: *IDF Diabetes Atlas, 2021, 10th ed.* Brussels: Available from <http://www.idf.org/diabetesatlas/10e/the-global-burden>.
- Hegazi, R., El-Gamal, M., Abdel-Hady, N. and Hamdy, O. Epidemiology of and risk factors for type 2 diabetes in Egypt. *Annals of global health*, 2015, 81(6), 814-820.
- International Diabetes Federation. The global burden. In: *IDF Diabetes Atlas, 2019, 9th ed.* Brussels. Available from <http://www.idf.org/diabetesatlas/10e/the-global-burden>.
- Herman, W.H., Ye, W., Griffin, S.J., Simmons, R.K., Davies, M.J., Khunti, K., Rutten, G.E., Sandbaek, A., Lauritzen, T., Borch-Johnsen, K. and Brown, M.B. Early detection and treatment of type 2 diabetes reduce cardiovascular morbidity and mortality: a simulation of the results of the Anglo-Danish-Dutch Study of Intensive Treatment in People With Screen-Detected Diabetes in Primary Care (ADDITION-Europe). *Diabetes care*, 2015, 38(8): 1449-1455.
- Willens, D., Cripps, R., Wilson, A., Wolff, K. and Rothman, R. Interdisciplinary team care for diabetic patients by primary care physicians, advanced practice nurses, and clinical pharmacists. *Clinical Diabetes*, 2011 29(2): 60-68.
- Shrivastava, S.R., Shrivastava, P.S. and Ramasamy, J. Role of self-care in management of diabetes mellitus. *Journal of diabetes & Metabolic disorders*, 2013, 12(1), 14.
- Amin, H.S., Alkadhaib, A.A., Modahi, N.H., Alharbi, A.M. and Alkhelaif, A.A. Physicians' awareness of guidelines concerning diabetes mellitus in primary health care setting in Riyadh KSA. *Journal of Taibah University Medical Sciences*, 2016, 11(4): 380-387
- Bani-issa, W., Eldeirawi, K. and Al Tawil, H. Perspectives on the attitudes of healthcare professionals toward diabetes in community health settings in United Arab Emirates. *Journal of Diabetes Mellitus*, 2014, 5(01): 1.

10. Babelgaith. S., Alfadly, S. and Baidi, M. Assessment of the Attitude of Health Care Professionals towards Diabetes Care in Mukalla, Yemen. *International Journal of Public Health Science*, 2013, 2, 159-164.
11. Jingi, A.M., Nansseu, J.R.N. and Noubiap, J.J.N. Primary care physicians' practice regarding diabetes mellitus diagnosis, evaluation and management in the West region of Cameroon. *BMC endocrine disorders*, 2015, 15(1): 18.
12. Sales, I., Babelgaith, S.D., Wajid, S., Mahmoud, M.A., Alsaleh, S.S., Alfadly, S., Mancy, W.H., Al-Arifi, M.N. and Anaam, M.S. Impact of diabetes continuing education on health care professionals' attitudes towards diabetes care in a Yemeni city. *Tropical Journal of Pharmaceutical Research*, 2018, 17(1): 143-149
13. Mabrouk, N., Abdou, M., Nour-Eldin, H., El-Foly, A.A.S., Omar, S.A. and Sliem, H.A. Knowledge, attitude, and practice of family physicians regarding diabetic neuropathy in family practice centers: Suez Canal University. *International Journal of Medicine and Public Health*, 2013, 3(4).
14. Alsaleem, M. A., Aldarbi, M. A., Alsaleem, S. A. and Alsamghan, A. S. The variance of knowledge and practices about diabetes mellitus in primary health care physicians of Jazan region, Kingdom of Saudi Arabia. *Biomedical Research*, 2018, 29(10), 2083-2089.
15. Trepp, R., Wille, T. and Wieland, T. Diabetes-related knowledge among medical and nursing house staff. *Swiss medical weekly*, 2010, 140(2526).
16. Onyiriuka, A. N., Oluwayemi, I. O., Achonwa, C. J., Abdullahi, M., Oduwole, A. O., Oyenusi, E. E. and Fakeye-Udeogu, O. B. Nigerian physicians' knowledge, attitude and practices regarding diabetes mellitus in the pediatric age group. *Journal of Community Medicine and Primary Health Care*, 2016, 28(1), 52-58.
17. Walter, F. M. and Emery, J. Perceptions of family history across common diseases: a qualitative study in primary care. *Family practice*, 2006, 23(4), 472-480.
18. Harwell, T. S., Dettori, N., Flook, B. N., Priest, L., Williamson, D. F., Helgersson, S. D. and Gohdes, D. Preventing type 2 diabetes: perceptions about risk and prevention in a population-based sample of adults ≥ 45 years of age. *Diabetes Care*, 2001, 24(11), 2007-2008.
19. Pierce, M., Ridout, D., Harding, D., Keen, H. and Bradley, C. More good than harm: a randomized controlled trial of the effect of education about familial risk of diabetes on psychological outcomes. *Br J Gen Pract*, 2000, 50(460), 867-871.
- Burke, V., Giangiulio, N., Gillam, H. F., Beilin, L. J., Houghton, S. and Milligan, R. A. K. . Health promotion in couples adapting to a shared lifestyle. In *Health Education Research, Theory and Practice*. 1999, 14(2).
21. Alsaleem, M. A. S. Assessment of primary health care physicians' knowledge and practices about diabetes mellitus in Aseer Region, Kingdom of Saudi Arabia. *King Khalid University Journal of Health Sciences*, 2017, 2(1), 1.
22. Niroomand, M., Ghasemi, S. N., Karimi-Sari, H. and Khosravi, M. H. Knowledge, Attitude, and Practice of Iranian Internists Regarding Diabetes: A Cross Sectional Study. *Diabetes and metabolism journal*, 2017, 41(3), 179-186.
23. Khan, A. T., Lateef, N. A., Khamseen, M. A. B., Alithan, M. A. A., Khan, S. A., and Ibrahim, I. Knowledge, attitude and practice of ministry of health primary health care physicians in the management of type 2 diabetes mellitus: A cross sectional study in the Al Hasa District of Saudi Arabia, 2010. *Nigerian journal of clinical practice*, 2011, 14(1).

- Khan A, Lateef N, Khamseen M, et al. Knowledge, attitude and practice of ministry of health primary health care physicians in the management of type 2 diabetes mellitus: a cross sectional study in the Al Hasa District of Saudi Arabia, 2010. *Niger J Clin Pract* 2011; 14(1): 52–59.
21. Jingi AM, Nansseu JRN, Noubiap JJN. Primary care physicians' practice regarding diabetes mellitus diagnosis, evaluation and management in the West region of Cameroon. *BMC Endocr Disord* 2015; 15(1): 18.
22. Morishita Y, Miki A, Okada M, et al. Exercise counseling of primary care physicians in metabolic syndrome and cardiovascular diseases is associated with their specialty and exercise habits. *Int J Gen Med* 2014; 7: 277–283.
23. Fogelman Y, Goldfracht M, Karkabi K. Managing diabetes mellitus: a survey of attitudes and practices among family physicians. *J Community Health* 2015; 40(5): 1002–1007.
24. Murray S, Lazure P, Schroter S, et al. International challenges without borders: a descriptive study of family physicians' educational needs in the field of diabetes. *BMC Fam Pract* 2011; 12(1): 27.
25. Rushforth B, McCrorie C, Glidewell L, et al. Barriers to effective management of type 2 diabetes in primary care: qualitative systematic review. *Br J Gen Pract* 2016; 66(643): e114–e127.
26. Reboussin DM, Allen NB, Griswold ME, et al. Systematic review for the 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/ PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol* 2018; 71: 2176–2198.
27. Aghili R, Malek M, Peyvandi AA, et al. General Practitioners' knowledge and clinical practice in management of people with type 2 diabetes in Iran; the impact of continuous medical education programs. *Arch Iran Med* 2015; 18(9): 582–585.