Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.47750/jptcp.2023.30.08.016

Assessment of ocular services status for diabetic patients in Saudi Arabia

Majid A. Moafa[1*]

[1]Department of Optometry, College of Applied Medical Sciences, Qassim University, Qassim, Saudi Arabia.

***Corresponding author:** Majid A. Moafa, Department of Optometry, College of Applied Medical Sciences, Qassim University, Qassim, Saudi Arabia, Email: mmoafa@qu.edu.sa

Submitted: 05 February 2023; Accepted: 14 March 2023; Published: 16 April 2023

ABSTRACT

Background: Diabetes mellitus is estimated to be the seventh cause of death in the world and it is prevalent in Saudi Arabia about 23.9%. Moreover, individuals with diabetes-related eye complications accounted for about 35.3% of diabetics, and the trend was still on the rise.

Objectives: This study aimed to assess the status of the ocular services for diabetic patients in Saudi Arabia.

Methods: This study adopted a cross-sectional study design among healthcare professionals who provide ocular services including ophthalmologists, opticians, optometrists, and physicians. The study included 63 participants, composed of healthcare providers directly involved in providing ocular services in Saudi Arabia. A random sampling technique was used to select eye care provider clinics in the country. Data collection was done through closed-ended questionnaires and observation techniques. The Data were checked for completeness and analyzed using SPPS version 24.0, and presented using tables.

Results: The findings showed that seventy-one percent of the females disagreed that as long as blood sugars are well controlled, there is no need to worry about complications of diabetes mellitus while 35% of males disagreed with the statement. Most 84% of ophthalmologists stated that preventing visual impairments was a crucial matter that needed public attention. Most eye care providers performed dilated fundus examinations. Among the treatment options for diabetic retinopathy, laser coagulation was the most common treatment approach, accounting for 59%. Intravitreous corticosteroids were the least utilized treatment method for diabetic retinopathy. The choice of test to evaluate the diabetic patient's eye depends on whether a doctor he/she is a physician, optometrist, optician, administration of the hospital, or ophthalmologist ($p = 0.004$). There was not enough evidence to claim that number of patients visiting in a month does not depend on the working place of a doctor ($p=0.003$).

Conclusion: The number of patients who developed eye-related problems as a complication of diabetes was increasing due to missed diagnoses and lack of adequate optical care in Saudi Arabia. In addition, there were few optical clinics and opticians, compared to other eye professionals, and therefore this limits access to essential eye services by diabetic patients in Saudi Arabia.

Keywords: *Diabetes mellitus, diabetes-related eye complications, eye services*

J Popul Ther Clin Pharmacol Vol 30(8):e154–e163; 16 April 2023.

INTRODUCTION

Diabetes mellitus is estimated to be the seventh cause of death worldwide. Studies indicate that diabetes is associated with some significant complications namely stroke, kidney injuries, cardiac conditions, vision loss, and limb amputations due to severe diabetic wounds. [1] A closer look at the global diabetic prevalence shows that Saudi Arabia is ranked seventh in terms of the prevalence of diabetes. The prevalence of diabetes in Saudi Arabia is 23.9% of the population. Individuals with diabetes-related eye complications in the country accounted for about 35.3% of diabetics, and the trend was still on the rise. These above-mentioned statistics showed that the management of diabetes and its complication was essential in Saudi Arabia. One of the most critical ocular complications of diabetes mellitus is diabetic retinopathy. [2]

Furthermore, Diabetic Retinopathy (DR) is thought to be among the most common complications of diabetes that result in blindness. In addition, DR leads to microvascular damage that eventually causes retinal ischemia and elevated levels of vascular permeability. Diabetic retinopathy is classified into No proliferative diabetic retinopathy (NPDR) which forms the preliminary stage and proliferative diabetic retinopathy (PDR) which forms the advanced stage of DR. Furthermore, the classification of NPDR is based on clinical findings such as retinal hemorrhages, microaneurysms, changes in venous caliber. In addition, the PDR pathological feature is pre-retinal

Neovascularization. [1] Both PDR and NPDR are associated with macular edema and it is the most common cause of loss of vision in diagnosed DR patients. [2]

Most individuals with diabetes are complicates to some degree of DR and its incidence doubles with the duration of diabetes. Also, DR development can be promoted by diabetes type, hypertension, poor glycemic control, gender, dyslipidemia, pregnancy, and nephropathy. Since DR is usually asymptomatic, most patients fail to seek medical intervention until they have suffered from advanced vision impairment. For this reason, an effective preventive mechanism involves frequent diabetic retinopathy screening (DRS) and it is believed to prevent advancement to the blindness stage to the tune of around 97%. Also, dyslipidemia and hypertension control report a positive outcome. Ocular services, therefore, revolved around early detection, prevention of progression, and development of blindness.[3]

Due to the high prevalence of diabetes mellitus, the incidence of diabetic retinopathy has also significantly increased in the population. Therefore, we hope to lower such rates by assuring diabetic patients receive the best diagnosis and comprehensive eye examination. in fact, very few studies have been done in Saudi Arabia regarding this issue. Therefore, this study was conducted aimed to assess the status of ocular services for diabetic patients in Saudi Arabia. Specifically, it determined the status of ocular services regarding the number of eye clinics, number, and type of eye professionals, type of eye test done, and nature of management provided.

MATERIAL AND METHODS

Study design, sampling, and setting

This study adopted a cross-sectional study design among healthcare professionals who provide ocular services-ophthalmologists, opticians, optometrists, and physicians. Each health professional had a defined role in diagnosing and management of various types of ocular problems, particularly those that occurred as a complication of diabetes mellitus. The research also focused on scrutinizing how services related to eye problems were offered in Saudi Arabia. In this case, the research was specific on the number and quality of services offered.

This study collected data from 63 participants who were healthcare providers directly involved in providing ocular services in Saudi Arabia. The institutional research and ethics board granted permission to conduct the study. Written informed consent was obtained from the health institutions.

Sampling was done randomly across Saudi Arabia to select the optometry and ophthalmology clinics in the country. The

respondents were hospital administrators, ophthalmologists, opticians, optometrists, and physicians. Exclusion criteria included those facilities that do not have specific eye health professionals.

Data collection procedure

Data was collected using a closed-ended questionnaire. The respondents either physically filled out the form or used an online platform to answer the questions in the questionnaire. All the participants completed the questionnaires. Another method of data collection employed was observation. In this regard, the researcher checked the flow of clients with eye problems who were visiting various facilities. Moreover, the researcher also used the observation approach to determine the availability and accessibility of the equipment for an eye examination.

Data Analysis

Data analysis was carried out using SPPS version 24.0, Data contains 63 respondents from a questionnaire administered online to evaluate eye care services for diabetic patients in Saudi Arabia, there was a total of 25 variables with no case of missing observations from all the respondents

RESULTS

TABLE 1: Does the diabetic patient need special care and the number of diabetics who come to the clinic per month?

Does the diabetic patient need special care?	Number of diabetic who comes to the clinic per month				Total
	0-3 patients	4-10 patients	11-20 patients	21 more	
Always	10	2	10	7	29
Sometimes	2	7	7	18	34
Total	12	9	17	25	63

The summary table [1] above shows descriptive statistics for categorical variables number of diabetic patients that goes to the clinic in a month with whether those patient need special care or sometimes, from total diabetic patients in a month 29 out of 63 always need special care, that corresponds to 46% of a total sample taken, while 54% sometimes need special care

Gender was also an essential variable of assessment in this study. The question of interest was whether the patients were worried about the complications of diabetes mellitus in the presence of reasonable glycemic control. There was a total of 14 females and 49 males. Seventy-one percent of the females disagreed that as long as blood sugars are well controlled, there is no need to worry about complications of diabetes mellitus. For men, 35% did not agree with the statement that one needs not worry about the complications of diabetes as long as sugars are well controlled [Table 2]

TABLE 2: Gender vs worry about diabetic complications if kept under control

		Gender		Total
		Female	Male	
As long as the diabetes is kept under control, there is no need to worry about diabetic complications	Agree	1	16	17
	Disagree	10	17	27
	Neutral	3	16	19
	Total	14	49	63

The case summary table[2] shows cross-tabulation of Gender and the feeling about diabetic complications, 71% of the females disagreed that as long as diabetes is kept under control, there was no need to worry about diabetic complications, 7% agreed while 12% of females have no idea, for the case of males out of 63 samples taken 16 agreed, 16 are neutral while 17 disagreed that as long as diabetes is kept under control, there was no need to worry about diabetic complications

Regarding the importance of preventing visual impairments among diabetic patients, most (84%) ophthalmologists noted that it was a crucial matter that needed public attention. The bar graph below demonstrates the findings.

Data Presentation (Charts and Graphs)

Graphs and charts were essential in visualizing and presenting data quickly and easily Someone can understand and interpret graphs easily through visualization compared to data in tables. In my analysis, I used Graphs and charts to summarize data and display statistics that could be easily comprehended. There was a quite number of charts used to visualize including (Bar, Histogram, Pie chart, Line chart, Peanut, and area chart) among others, below are graphs analyzed in SPPS for different variables

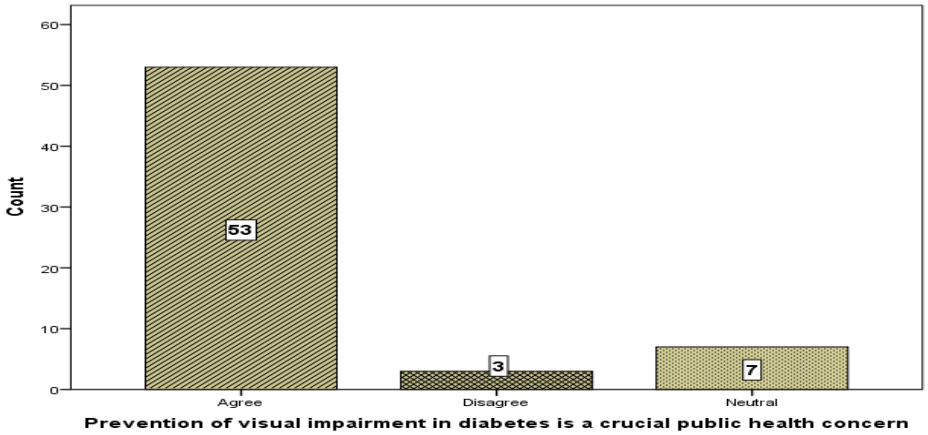

FIG 1: Bar chart

The visualization graph above shows that 84% of respondents agreed that the prevention of visual impairment in diabetes was a crucial public health concern in Saudi Arabia, while 5% disagreed and the rest 11% did give their stand but rather remain neutral on their thoughts [Figure 1].

All the respondents were also asked about their approach to the care of ocular services. This was to enable the study to determine if the patients were indeed concerned about the eye problems since most were only concerned about the blood sugar levels being controlled, the majority being females hence the ocular services need arises. The focus, in this case, was the equipment or technique commonly used to diagnose the various visual complications of diabetes mellitus. The majority of the optometrists and physicians' providers reported that they performed dilated fundus examinations. An important variable for this study to ascertain the status of ocular services is the treatment options for diabetic retinopathy. Various eye clinics and doctors use different approaches. Laser coagulation is, however, the most common treatment approach utilized by the respondents, accounting for 59%. Intravitreous corticosteroids were the least utilized treatment method for diabetic retinopathy. The pie chart below shows detailed findings on the treatment options for diabetic retinopathy in Saudi Arabia.

Continuous medical education was the final variable assessed in this study. The respondents

were asked how they get updates about diabetes. The latest research information guides guidelines and protocols for managing diabetes and its complications. Some ways the respondents get updated are through seminars and conferences that offer continuing medical education. Most of them use seminars, the internet, and journals to get the latest data on diabetes. However, it is essential to note that many respondents do not get updated on current practices in managing diabetes and its complications.

A four-by-five cross-tabulation below shows an association between the record updates for diabetes (in seminars, journals, the internet, medical books, and those who never update information) and checking patients' ability to manage diabetes.

Pie chart showing the proportion on a test of choice to evaluate diabetic patient eye

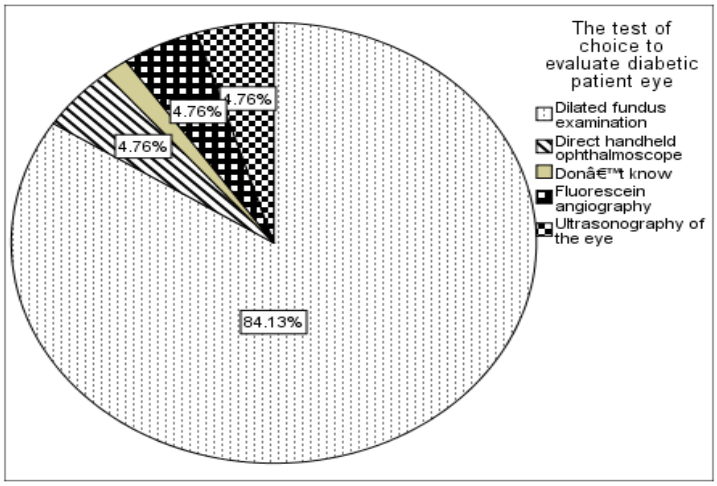

FIG 2: Pie chart

It was evident that a good number of doctors prefer dilated fundus examination to evaluate diabetic patient eye, 2 % didn't have an idea on which test to take, while 5% for each fluorescein angiography, Direct handled ophthalmoscope and Ultrasonography of the eye[Figure 2].

Histogram underline the normal curve for the age of doctor workers in Saudi Arabia

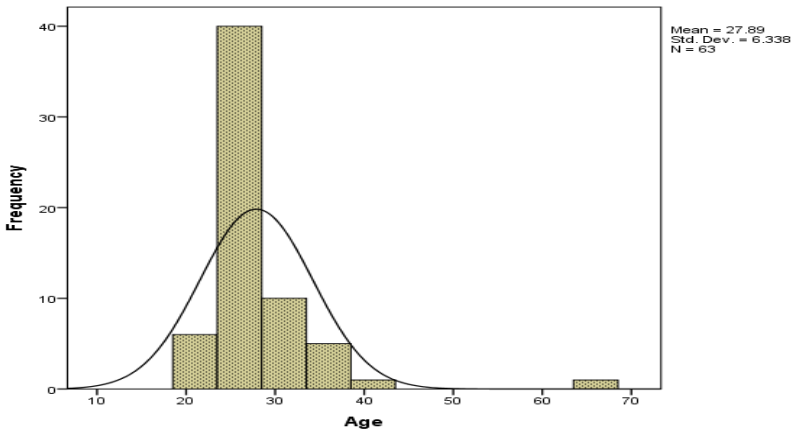

FIG 3: Histogram

J Popul Ther Clin Pharmacol Vol 30(8):e154–e163; 16 April 2023.

The histogram underlined with a normal curve showing the symmetry of the distribution of age with a mean of 27.85 with a standard deviation of 6.384 for N= 62, The visualization graph shows the presence of an outlier, a high number of doctors workers in Saudi Arabia clinics lies in between the age of 20 and 35 years [Figure 3].

TABLE 3: Frequency table

Treatment Option for Diabetic	Frequency	Percent	Cum Percent
Intravitreous anti-VEGF	21	33.3	33.3
Intravitreous Corticosteroids	1	1.6	34.9
Laser Photocoagulation	37	58.7	93.7
Vitrectomy	4	6.3	100.0
Total	63	100.0	

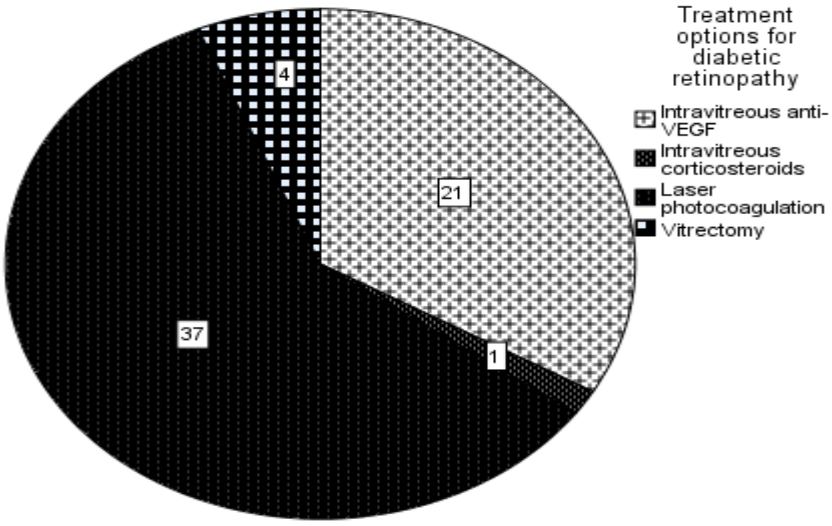

FIG 4: Pie Graph

TABLE 4: How do you update information about diabetes?

Checking patients' ability to manage their diabetes	How do you update information about diabetes					Total
	Conferences seminars	Internet	Journals	Medical books	Never update	
More often	9	10	9	7	1	36
Never	0	0	0	1	2	3
Onetime	3	4	2	3	0	12
Rarely	1	3	5	2	1	12

A 4 by 5 cross-tabulation above shows an association between the record updates for diabetes in (seminars, journals, the internet, medical books, and those who never update information) and checking patients' ability to manage diabetes [Table 4].

Chi-square test of independence

Chi-squared tests of independence determine whether a relationship exists between two categorical variables. Do the values of one categorical variable depend on the value of the other categorical variable? If the two variables are independent, knowing the value of one

variable provides no information about the value of the other variable.

TABLE 5: Summary Statistic

Checking patients' ability to manage their diabetes	Test of choice to evaluate diabetic patient's eye					Total
	Dilated fundus	Direct handled	Don't know	Fluorescein angiography	Ultrasonography Of the eye	
Administration of hospital	1	0	0	0	0	1
Ophthalmologist	6	0	0	0	0	6
Optician	0	1	0	0	2	3
Optometrist	45	2	1	3	1	52
Physician	1	0	0	0	0	1

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	34.665[a]	16	.004
Likelihood Ratio	18.624	16	.289
N of Valid Cases	63		

a. 23 cells (92.0%) have expected count less than 5. The minimum expected count is .02.

From the above test of association table since the value 0.004 is less than the hypothesized value null hypothesis was rejected and concluded that there is an association between the two categorical variables. Therefore, the choice of test depends on whether a doctor he/she is a Physician, Optometrist, Optician, Administration of the hospital, or Ophthalmologist [Table 5].

TABLE 6: Chi summary report

Checking patients' ability to manage their diabetes	Number of patients visits per month				
	0-3 patients	4-10 patients	11-20 patients	21 and more	Total
Eye care center	5	1	1	2	9
Government hospital	0	4	13	9	26
Optical shop	0	1	1	2	3
Optometry student	0	0	1	0	1
Phc	0	1	0	0	1
Privet hospital	5	0	1	0	1
Student in Qassim	1	2	1	12	20
University	1	0	0	0	1
Undergraduate student	1	0	0	0	1

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	47.036[a]	24	.003
Likelihood Ratio	47.655	24	.003
N of Valid Cases	63		

a. 32 cells (88.9%) have expected count less than 5. The minimum expected count is .14.

At 5% significance level there was not enough evidence to claim that number of patients visiting in a month does not depend on the working place of a doctor.

DISCUSSION

The findings discussed in the results section vividly show the demand for eye services for individuals with diabetes mellitus. Such a finding concurs with [3], who observed a higher rate of hospital visits due to complications of diabetes mellitus. According to [5], the currently observed increased visits to special clinics for complications of diabetes are a result of a significant increase in the prevalence of diabetes in the general population. Whether the rise in the incidence of complications of diabetes is a result of poor sugar control or other unknown factors is subject to debate. However, most studies posit that one of the most significant causes of the progression of diabetes mellitus is poor sugar control. [6,7] There has been a significant rise in type 1 diabetes compared to type 2 diabetes in Saudi Arabia. [8] Such a finding denotes that many individuals live with the condition for longer than they would if they had type 2 diabetes. For this reason, complications are more likely to arise among people with diabetes. [9] Concluded that Saudi Arabia needs more special clinics to meet the needs of diabetic patients in the country, hence justifying the importance of ocular services as one of the essential health services.

An individual's attitude to knowledge about diabetes also determines health-seeking behavior.[10] The results presented herein show that majority of the respondents disagreed with the statement that one needs to worry about the complications of diabetes mellitus as long as there is reasonable glycemic control. Concerning chronic illness, patients' health status positively promotes good health-seeking behavior.[11] Based on the findings of this study, most Saudi Arabians worry about the progression of diabetes mellitus. It would therefore mean that there is an associated good uptake of health services that address the complications of diabetes in the country.

Note that preventing complications of any chronic illness is a critical aspect of managing such conditions. Moreover, it is a vital determinant of the health status of a country. The results presented in this paper show that 84% of diabetic patients think that preventing ocular complications of diabetes is a crucial public health concern. Such a response depicts the significance of the problem in the community. Adequate management of diabetes and its complications is one of the critical objectives of the country's ministry of health. Many stakeholders are involved in addressing the burden of diabetes in Saudi Arabia. [12]

Diagnosing ocular conditions is vital for appropriate management to reduce morbidity and mortality. [13] Posit that equipment or technique influences the accuracy of diagnoses made by doctors. One of the elements used to determine the quality of services is patient satisfaction which is a factor in the outcome of the treatment strategy employed. Most ophthalmologists recommend dilated fundus examination as an initial diagnostic test for ocular conditions. [14] By so doing, timely diagnosis is made, and early treatment is initiated, thereby significantly lowering morbidity associated with diabetes mellitus. [15] It is worth noting that dilated fundus examination is the test of choice in most eye care facilities in Saudi Arabia.

The ability of patients to manage their diabetes is pretty well among Saudi Arabians. [16] Such an observation stems from good services offered to patients, including effective patient education. Moreover, healthcare workers in Saudi Arabia have a good culture of incorporating evidence-based practice in the management of patients. [17] It is, therefore, evident that diabetic patients in Saudi Arabia benefit from doctors who are updated with the latest information on the management of diabetes. [18,19] Posts that well-informed patients positively influence the quality of health services rendered to them.

CONCLUSION

The number of patients who developed eye-related problems as a complication of diabetes was increasing. The researcher could conclude that patients' ignorance played a significant role

in developing these complications. However, patient ignorance was commonly found in male patients who rarely visited the clinics after developing such complications. In addition, there were not enough optical services for all the needed patients. Besides, it was noted that there were few optometry clinics and optometrists, and other eye professionals. It was also discovered that the number of patients was increasing; hence health actions needed to be taken.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest

FUNDING

No funding was received for this study.

REFERENCES

1. Al Taisan A, Al Owaifeer AM, Al Osaif N, Al Saeed AA, Al Furaikh BF, AlJamaan LF. Assessment of Diabetic Patients' Adherence to Diabetic Retinopathy Screening and the Influencing Factors in Al-Ahsa, Saudi Arabia. Cureus. 2022;14.
2. Alharbi AM, Alhazmi AM. Prevalence, risk factors, and patient awareness of diabetic retinopathy in Saudi Arabia: a review of the literature. Cureus. 2020;12.
3. AlMudhaiyan T, AlAmry M, Khandekar R, Al-Ghadeer H. Ocular emergencies visits after corneal transplantation at a Tertiary Eye Care Hospital of Saudi Arabia. Research Square. 2022;1: 1-14.
4. Alqifari SF, AlMharwal B, Aldawish R, Almokhlef SA. Impact of Pharmacist-Led Clinics on Health Outcomes of Patients With Diabetes at a Ministry of Health Diabetes & Endocrinology Center, Saudi Arabia: A Retrospective Study. Cureus. 2022;14.
5. Rakic S, Albalawi S, Alsukait R, Alqunaibet A. Prevalence and risk factors of NCDs in Saudi Arabia. Noncommunicable Diseases in Saudi Arabia: Toward Effective Interventions for Prevention.2012;1: 7-40.
6. Burki TK. Sugar: the prime suspect in poor health. The Lancet Diabetes & Endocrinology. 2018;6:16.
7. Bempah OA. Study on Diabetes Complications: A New Perspective on the Mechanism of Their Development. Emerging Trends in Disease and Health Research. 2021; 20:1-5.
8. Robert A, Al-Dawish A, Mujammami M, Dawish, M. Type 1 diabetes mellitus in Saudi Arabia: A soaring epidemic. International Journal of Pediatrics. 2018;1: 1-9.
9. Makeen, H. A. Clinical pharmacists as medication therapy experts in diabetic clinics in Saudi Arabia – not just a perception but a need. Saudi Pharmaceutical Journal. 2017; 25:939–943.
10. Le Cam, Y., Bolz-Johnson, M. (2019). Expert by experience: Valuing patient engagement in Healthcare. Patient Engagement. 2018;1: 233–267.
11. Kupcewicz E, Szypulska A, Doboszyńska A. Positive orientation as a predictor of health behavior during chronic diseases. International Journal of Environmental Research and Public Health. 2019;16:3408.
12. Yen V. Prevention of Microvascular Complications of Diabetes–General Overview. Principles of Diabetes Mellitus. 2010:749-53.
13. Hoda M, Hemaiswarya S, Doble M. Diabetes: Its Implications, Diagnosis, Treatment, and Management. In Role of Phenolic Phytochemicals in Diabetes Management 2019 (pp. 1-12). Springer, Singapore.
14. Bastion M, Bressler N M, yuhana M, Mohamad, Y. A., Madhaavi, K. M., Phillip, G. J. T., & Norshamsiah, M. D. Comparison of non-mydriatic fundus photography and optical coherence tomography with dilated fundus examination for detecting diabetic retinopathy, including diabetic macular edema. Medicine and Health. 2022; 17:, 88-104.
15. Goorts K, Dizon J, Milanese S. The effectiveness of implementation strategies for promoting evidence-informed interventions in allied healthcare: a systematic review. BMC health services research. 2021 ;21:1-11.
16. Mohammed, A. The knowledge of diabetes and driving recommendations among healthcare providers in Saudi Arabia. Saudi Medical Journal. 2018; 39: 386-394.
17. Lu, Y.-C., & Li, Y.-C. . How doctors practice evidence-based medicine. Journal of Evaluation in Clinical Practice. 2011; 19, 44-49.
18. Khatri N. Crony Capitalism in US Health Care: Anatomy of a Dysfunctional System. Routledge; 2021 Jul 13.
19. Moafa MA, Alrasheed SH. Status of Childhood Eye Care Services in the Kingdom of Saudi Arabia: Eye Care Professionals' Perspectives. The Open Ophthalmology Journal. 2022;16:1-7.