

Knowledge, attitude and practice regarding diabetic retinopathy screening and its management among diabetic patients at a private hospital of Riyadh, Saudi Arabia

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Abstract:

PURPOSE: We present the KAP levels and the determinants for diabetic retinopathy (DR) screening and management at a private hospital in Riyadh, Saudi Arabia.

METHODS: A chart review was performed of DM patients to collect the demographics and diabetes related information in June to December 2017. A close ended questionnaire was used that queried knowledge (7), attitude (5) and practice for DR screening (7).

RESULTS: Two hundred participants were interviewed half from endocrinology unit and half from the eye clinic. An excellent knowledge of the ophthalmic effects of diabetes was noted in 91 [45.5% (95% Confidence Interval CI 38.6–52.4)] of participants. Thirty-eight [19% (95% CI 13.6–24.4)] participants had a positive attitude. None had an excellent grade of practice and poor practice was noted in 168 [74% (95% CI 78.9–89.1)] participants. Longer duration of DM ($P = 0.07$) and systemic complications ($P = 0.06$) were associated with good knowledge. Attitude was not significantly associated with any determinants. Good practice was associated with the presence of systemic complications of DM ($P < 0.01$) and those recruited to the eye clinic ($P = 0.06$). Only 35% of patients had undergone an annual DR screening. Only 4 patients had a history of laser treatment.

CONCLUSION: The KAP of diabetic patients regarding DR screening and management is less than desired. Establishing protocols and public health promotion activities directed at early detection and management are urgently needed in private sectors of Saudi Arabia.

Keywords:

Diabetes, diabetic retinopathy, DR screening, laser treatment, KAP

INTRODUCTION

Diabetes is a significant public health problem in Saudi Arabia. By 2022, the prevalence of diabetes in the Saudi population over 25 years old is projected to be 47%.^[1] The rate of diabetic retinopathy is also reported high in community based surveys conducted in different parts of Saudi Arabia targeting 50 years and older populations.^[2-4] Complications of diabetic retinopathy and other ocular comorbidities can cause significant visual impairment among diabetic.^[5] Despite established health care system, patient cooperation and complying to the treatment regimen and follow up visits is

crucial for successful management of diabetic retinopathy (DR).^[6] Proactive patient counselling may motivate patients to be more compliant. However baseline information on the knowledge, attitude and practice (KAP) for DR screening and treatment among patients is required.^[7]

In Saudi Arabia the KAP studies are used to evaluate healthcare providers, clients of Government hospitals and for community-based surveys.^[8-10] In Saudi Arabia, up to 19% of the secondary and tertiary eye care services to Saudi nationals and a large proportion of the 9 million non-Saudis population are provided by the private sector.^[11,12] To the best of our knowledge

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magnitude of diabetes and health behaviour among non-Saudi nationals in gulf countries is not available. The knowledge, attitude and practice (KAP) of diabetes mellitus (DM) patients at private hospitals is also still not known.

The study site Specialised Medical centre (SMC) is a private hospital catering both non-Saudi and Saudi patients covered by insurance. It is located in Riyadh city that has nearly 6.86 Million population; 3.5 million of them are Non-Saudi. A large proportion of them are 25 to 60 years (working age-group).^[11] The health services to them and their family members is through group insurance and our institute is one of the major health providers to them.

A national strategy to address visual disabilities due to diabetic retinopathy for the Saudi Arabia was prepared in 2012.^[13] Due to introduction of tele medicine in ophthalmology, the decision makers in Saudi Arabia need to revise the strategy for early detection. The role of the private health sector in 'Vision 2030- Saudi Arabia' is increasing.^[14] Therefore, the evidence based information of diabetes and its complications among diabetic patients of private sector is always useful. The annual DR screening, primary prevention of diabetes and adherence to the eye care related advices depend on patient's knowledge and attitude. Studies about KAP focusing on patients attending governmental clinics and community have been undertaken.^[8-10] We present the level and determinants of KAP for DR screening and management among diabetics at a private hospital in Riyadh, Saudi Arabia.

METHODS

This cross-sectional survey was performed between June and December 2017 at endocrinology and ophthalmology departments of a private multidisciplinary hospital in central Saudi Arabia. The institutional research board of Specialised Medical Centre (SMC) Hospital, Riyadh, Saudi Arabia approved this study. This study adhered to the tenets of the declaration of Helsinki. Adult diabetics presenting to our hospital were invited to participate in this survey. Written informed consent was obtained from all patients who participated in the survey. Two patients were excluded from the study as they were unable to communicate due to advanced health issues. Consecutive patients in morning eye clinics and evening diabetes clinics were invited to participate till required number of participants were recruited from two study sites.

To calculate the sample size for a cross-sectional study covering nearly 10,000 diabetic patients registered at our hospital, we assumed that the level of good practice for eye care among diabetics was 52.2%.^[15] The level of good eye care practice was defined as 'reporting for annual eye screening for diabetic retinopathy for last two years and adherence to doctor's advice for laser intervention, or intravitreal injections of anti- VEGF for DR management.' To achieve 95% confidence interval (CI), 8% acceptable margin of error and a clustering effect of 1.2, 180 diabetic patients were required. To compensate for nonparticipation the final sample size was increased to 200

patients. As patients were recruited from one of the three eye clinics and one of the two diabetic clinics; we added factors to compensate for clustering.

Three medical students, three ophthalmologists and an epidemiologist were the study investigators. They were trained in interviewing the participants and using simple medical terminology that could be understood by the patients. A questionnaire in Arabic and English was used on five diabetic patients first and then required changes were made to make it suitable for patients to understand. Data were collected on patient's demographics including age, gender, residence and education. The information regarding diabetes included duration of DM, mode of DM management, presence of other systemic diabetic complications such as nephropathy, cardiovascular and other diseases. They were collected from the computerised case records of the patient.

Seven questions were queried knowledge and responses were based on a five point Likert scale.^[16] Three questions were related to the underlying causes of DR, two questions were related to treatment modalities for sight threatening DR (STDR) and two questions were related to early detection of DR. (Appendix: A) The response that matched the expert panel reply was graded as 2. If it partly matched it was graded as 1 and if it was completely unmatched it was graded as -2 s. If there was no response or a response of "don't know", the grade was 0. The sum of all seven question was further graded in the following manner: 'Excellent' grade of knowledge if the score was 75% or higher; 'Good' if it was between 51% to 75%, and; 'Poor' if it was less than 50%.

There were five questions related to attitude. The attitude was considered positive if the sum of all the responses in this section was greater than 50% while the anything below this level was considered a negative attitude towards DR screening and management.

The response to the seven questions related to practice was compared with the gold standard. If it matched the gold standard it was graded as 2. If the response was I don't know or not attempted, a 0 grade was recorded, the wrong answer was awarded -2 score. The sum of score of all practice related responses was further graded as 'Excellent' practice if it was 75% or higher. A score of 50 to 74% was considered as 'Good'. A cumulative response of less than 50 was considered 'Poor' practice for DR screening and management.

The data were collected on pretested forms and transferred to an Excel spread sheet (Microsoft Corp., Redmond, WA, USA). Parametric, univariate analysis was performed. For qualitative variables, frequencies and percentage proportions were estimated. For quantitative variables, histograms were plotted and if distribution of the variable was normal, the data are presented as mean and standard deviation. For non-normal distribution, the median and 25% quartile values were presented. The student -T test and chi-square values were used for testing the association/ correlation to independent variables such as gender, age, duration of diabetes, systemic

complications to the outcome variables. A two sided ‘P’ value was considered statistically significant.

RESULTS

We interviewed 200 diabetic patients. The study sample was comprised of 60 (30%) Saudi and the rest were non-Saudis residing in the Kingdom of Saudi Arabia. Among 99 diabetic recruited at endocrinology clinic, 20 were Saudi and rest were Non-Saudis. Of the 101 diabetic patients recruited at ophthalmic clinic, 40 were Saudi. The demographic and diabetic profile of the participants is given in Table 1.

The KAP regarding DR screening and management among participants is presented in Figure 1. The excellent level of knowledge of the eye in diabetes and its management was noted for 91 [45.5% (95% Confidence Interval 38.6–52.4) patients. Positive attitude (excellent + good) versus negative attitude (poor + very poor) was noted in 38 [19% (95% CI 13.6–24.4). None had excellent grade of practice while bad practice (poor + very poor) was noted in 168 [74% (95% CI 78.9–89.1) patients.

The factors related to the level of knowledge regarding DR screening and management are presented in Table 2. Longer duration of DM ($P = 0.03$) and presence of systemic complication of diabetes ($P = 0.05$) were associated to excellent grade of knowledge.

The determinants of positive attitude for DR screening and management among diabetic patients was reviewed. Table 3. Positive attitude was not significantly associated to the older

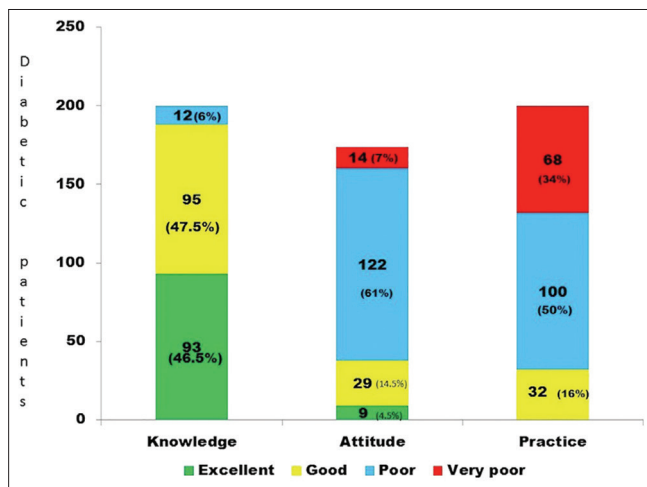


Figure 1: The Knowledge, Attitude and Practice regarding Diabetic Retinopathy screening and management among diabetic patients of a private hospital of central Saudi Arabia. Y axis shows number of diabetic patients. One hundred and seven (53.5%) diabetics were college graduates. There were 190 (95%) residents of Riyadh. Diabetes was controlled by oral medications in 93 (46.5%), insulin in 50 (25%) and combination of both injection and oral medication in 28 (14%) patients. The remaining 8 cases were on diet control only. Nephropathy and cardiovascular complications of diabetes were present in 25 (12.5%) and 21 (10.5%) patients. DR was noted in 12 (6%) patients. Two (1%) patients underwent laser treatment and 4 (2%) patients underwent retinal surgery

age ($P = 0.2$), longer duration of diabetes (Mann Whitney $P = 0.9$), male gender ($P = 0.3$), higher education ($P = 0.1$), site of recruitment ($P = 0.6$) and presence of complications of diabetes ($P = 0.1$).

The responses to practice related to DR screening and management by diabetics were associated to the determinants. Table 4. Excellent grade of practice was positively associated to the presence of systemic complication of DM ($P < 0.01$) and those recruited from the eye clinic ($P = 0.03$).

Table 5 presents the previous studies in the literature on KAP of diabetic patients in the region and in other countries. The level of knowledge among diabetic patients varies but level of practice for DR screening is far less than desired.

DISCUSSION

The outcomes of the current study indicate an excellent level of knowledge regarding DR screening and management in less than half of diabetics. Attitude was positive in one-fifth and poor practice was noted in 75% of the diabetic patients. The presence of systemic complications of diabetes seems to positively influence good eye care practices among diabetics.

In this study, two-thirds of the diabetic population were expatriate residing in Saudi Arabia. Lower proportions of expatriates are reported in other published literature from the Gulf region. The diabetic population in our study had a median duration of diabetes of 12 years and there was a 6% prevalence of DR among non-Saudi which is unique. The data generated from the present study could complement similar information generated from government institutions and community based surveys focusing mainly on the Saudi population. Thus, the World Health Organization member countries goal of universal eye health that not only includes nationals but foreign workers also, could be achieved if we first evaluate the eye care currently provided to them.^[16,17]

The KAP level among our study population is compared to other studies in Table 4^[8,15,18-25] The level of knowledge ranged in literature from as low as 4.5% to as high as 86.7%. 45%

Table 1: Demographic and diabetes profile of the diabetic patients

		Number	Percentage
Age	Mean	52.8	
	Standard deviation	14.5	
Duration of diabetes (years)	Median	12	
	25% quartile	6	
Gender	Male	130	65
	Female	70	35
Site of recruitment	Diabetes clinic	99	49.5
	Eye clinic	101	51.5
Nationals	Saudi	60	30
	Non-Saudi	140	70
Education level	School	83	41.5
	College	107	53.5
	Other	10	5

Table 2: Determinants of knowledge regarding diabetic retinopathy screening and management among diabetic patients

Quantitative variables		'Excellent' knowledge (n=91)		'Not excellent' knowledge (n=109)		Validation
Age	Mean	52.8		52.2		P=0.8
	SDV	14.6		15		
Duration of DM	Median	15		10		M WP=0.03
	25% quartile	7.25		5		
Qualitative variables		Number	Percentage	Number	Percentage	
Gender	Male	61	67	69	63.3	P=0.8
	Female	30	33	37	33.9	
Education	School	35	38.5	48	44	P=0.5
	College	51	56	56	51.4	
	Other	5	5.5	5	4.6	
Clinic	Diabetes	44	48.4	55	50.5	P=0.6
	Eye	49	53.8	52	47.7	
Mode of treatment	Diet control	2	2.2	4	3.7	P=0.5
	Oral Medication	29	31.9	45	41.3	
	Insulin	25	27.5	21	19.3	
	Mixed	13	14.3	19	17.4	
Systemic complications	Yes	48	52.7	42	38.5	P=0.05
	No	43	47.3	67	61.5	
Eye complications	Yes	7	7.7	5	4.6	P=0.4
	No	84	92.3	104	95.4	

Table 3: Determinants of positive attitude regarding diabetic retinopathy screening and management among diabetic patients

Quantitative variables		'Positive' attitude (n=38)		'Negative' attitude (n=162)		Validation
Age	Mean	55.3		51.9		P=0.2
	SDV	14.3		14.8		
Duration of DM	Median	11		12		M W P=0.9
	25% quartile	7.5		6		
Qualitative variables		Number	Percentage	Number	Percentage	
Gender	Male	22	57.9	108	67.5	P=0.3
	Female	16	42.1	52	32.5	
Education	School	20	52.6	63	39.4	P=0.1
	College	16	42.1	91	56.9	
	Other	2	5.3	8	5	
Clinic	Diabetes	21	55.3	78	48.8	P=0.4
	Eye	17	44.7	84	52.5	
Mode of treatment	Diet control	2	5.3	4	2.5	P=0.8
	Oral Medication	13	34.2	61	38.1	
	Insulin	8	21.1	38	23.8	
	Mixed	10	26.3	41	25.6	
	Missing	5	13.2	18	11.1	
Systemic complications	Yes	21	55.3	68	42.5	P=0.1
	No	17	44.7	94	58.8	
Eye complications	Yes	3	7.9	9	5.6	P=0.6
	No	35	92.1	153	95.6	

of the patients in our study had excellent knowledge. The adherence to medical treatment and the healthcare provider's advice for management depend on the level of knowledge about the health issue.^[26]

The attitude towards DR screening and management in our study was positive in only 20% of patients. Recommendations for an annual DR screening without supporting health literacy could result in higher attendance for screening in the first two years. Additionally if there is no feedback on the status of DR from the healthcare provider, negative

attitudes can develop among diabetic patients against regular DR screening.^[27]

The practice of annual DR screening was as low as 25% in our study. This rate was higher than in Bangladesh, Brazil and Indonesia,^[20,25,24] but was much lower than that reported in Oman,^[18] and even in another study in Saudi Arabia.^[23,9] In a country with adequate resources, such a deficiency in addressing visual disabilities due to complications of diabetes is serious. Initiatives should be implemented urgently to improve the levels of practice.

Table 4: Determinants of poor practice regarding diabetic retinopathy screening and management among diabetic patients

Quantitative variables		Good practice (n=32)		Poor practice (n=168)		Validation
Age	Mean	56.1		51.8		P=0.14
	SDV	11.7		15.3		
Duration of DM	Median	15.5		11		M W P=0.26
	25% quartile	8.25		6		
Qualitative variables		Number	Percentage	Number	Percentage	
Gender	Male	23	71.9	107	63.7	P=0.4
	Female	9	28.1	58	36.3	
Education	School	14	43.8	69	41.1	P=0.1
	College	17	53.1	90	53.6	
	Other	1	3.1	9	5.4	
Clinic	Diabetes	10	31.2	88	52.4	P=0.03
	Eye	22	68.8	80	47.6	
Mode of treatment	Diet control	0	0	6	3.6	P=0.8
	Oral Medication	12	37.5	62	36.9	
	Insulin	7	21.9	39	23.2	
	Mixed	11	34.4	40	23.8	
Systemic complications	Yes	26	81.3	63	37.5	P<0.001
	No	6	18.8	105	62.5	
Eye complications	Yes	3	9.4	7	4.2	P=0.25
	No	29	90.6	161	95.8	

Table 5: Publications on Knowledge, Attitude and Practice of diabetic retinopathy among diabetic patients

Year	Author	Sample	Country	Main findings	Reference
2016	Al Alawi <i>et al.</i>	45	Saudi Arabia	Knowledge of DR - 64%, +ve attitude 13% practice DR screening 25%	8
2016	Niroomand <i>et al.</i>	200	Iran	Knowledge of DR - 61.4%, +ve attitude 50.4% practice DR screening 52.3%	15
2010	Khandekar <i>et al.</i>	750	Oman	Knowledge - 79%, +attitude - 30% and practice DR screening-52% laser treatment 79%	18
2013	Cetin <i>et al.</i>	473	Turkey	Knowledge - 77% to 86.7%, +attitude - 41.9% and practice DR screening-77.3%	19
2017	Ahmed KR <i>et al.</i>	122	Bangladesh	Knowledge - 50%, practice good 22%	20
2017	Srinivasan <i>et al.</i>	288	South India	Knowledge of DR- 4.5%, practice DR screening-61%	21
2016	Das T <i>et al.</i>	232	India	Knowledge of DR- 66%, +ve attitude 50% practice DR screening-82%	22
2016	Al Zarea <i>et al.</i>	439	Saudi Arabia	Knowledge of DR- 73.8%, practice DR screening-95%	23
2013	Adriono <i>et al.</i>	196	Indonesia	Practice DR screening 15.3%, lack of knowledge a barrier	24
2010	Dias AF <i>et al.</i>	357	Brazil	Knowledge of DR- 33%, practice DR screening 3.6%	25
2017	Present study	200	KSA	Knowledge of DR- 45.5%, +ve attitude 19% practice DR screening 26%	-

Age and gender were not significantly associated to KAP in our study. This was also noted in Iran and in Nigeria.^[15,28] This suggests that uniform package for health counselling could be useful for diabetics of all ages and both genders.

The level of education of diabetic patients was not associated to the level of knowledge, attitude and practice in our study. Das *et al* had noted a significant association between higher education and high level of KAP in India.^[22] Health studies related to healthy life style have clearly shown the differences between educational level and health literacy.^[29] This compliments our observation of overall poor KAP even among college educated Saudi diabetics.

In our study, duration of diabetes was not associated to the level of KAP. Niroomand *et al* and Hussain *et al* noted a significant association of the duration of diabetes to the level of KAP in Iran and India.^[15,7] Perhaps the diabetics in our study could have been detected early instead of silent elderly diabetic sufferers that is common in developing countries with limited resources.

Interestingly KAP about diabetes varied significantly by the recruitment site. It is understandable that patients attending an eye unit for DR screening or management of STDR would have a higher KAP than those recruited and interviewed at diabetic clinics.

The diabetic patients who already had systemic complications had better KAP levels compared to those without these complications. It could reflect health promotion to these advanced and complicated cases of diabetes. This may be by self-education using internet or due to active interventions by care providers of other subspecialties.

Counselling diabetic patients during hospital/ primary health centre visits is the most common intervention strategy that shows a positive impact.^[30] The special clinics in all PHCs of Saudi Arabia deal with chronic non-communicable diseases. Health education material in form of video, brochures and group discussion are held during these visits. In addition on the 'World diabetes day' and 'World Sight day' experts discuss using mass media communication about the primary prevention

and complications of diabetes. However concern is highlighted on education and health care delivery to diabetic patients in Saudi Arabia.^[31] Technologic advances such as web-based software, use of smart phone have been successfully used for health promotion for chronic diseases and they need to be applied in the kingdom.^[32,33]

The level of KAP among diabetic patients of private sector health institution noted in present study if compared to the similar findings from government institutions it is evident that practice of annual eye screening is lower than desired in both sectors. In one study that was targeting one of the family members being eye care professional, the level of KAP was far more than studies focusing on primary health centre registered diabetics.

The study outcomes in our study were based on scores of patient perceived responses and grading them into percentiles. The validation of responses could be done using Rasch analysis.^[34] Our study included diabetic patients attending one private hospital of central Saudi Arabia. Extrapolation of the study outcomes to the diabetic population beyond study area could have limited application. The outcomes of any comparison of our study to those using different method should be interpreted with caution.

CONCLUSION

The awareness of DR screening and need for prompt management of STDR among diabetic patients attending a private sector of Saudi Arabia was low. There is an urgent need for improving their KAP. This is applicable for both patients seeking healthcare in the private sector and the government sector. Strengthening resources from caregivers may not yield favourable outcomes if patients do not understand the importance of early detection. Timely interventions for STDR and addressing visual disabilities due to DR could be a distant goal in countries like Saudi Arabia with epidemic proportion of diabetes and diabetic retinopathy.

Advances in knowledge

- Diabetic patients who attend private clinics seem to have poor knowledge and attitudes for screening and management of DR.

Application to patient care

- Health promotion for periodic DR screening and prompt treatment of DR could be targeted to diabetic patients of both private and public sector of Saudi Arabia.

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Conflicts of interest

There are no conflicts of interest.

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APPENDIX A

Appendix: A. The questionnaire to collect response of diabetic patients regarding Knowledge, attitude and practice diabetic retinopathy screening and its management

(A) Demography and diabetes related questions:

MR#: _____ Date of Birth: _____ (DD/MM/YYYY) Gender: ____ M/F

Residence: ____ (Rural/ Urban) Education: ____ (illiterate/school, college/higher education)

Diabetes detected: _____ (DD/MM/YYYY) Treated with: diet/medication/ injection

Kidney complication: Yes/No/I don't know cardiovascular complication: yes/No/I don't know

Other complications of diabetes: yes/No/I don't know Interviewed by: _____

(B) Eye related questions

1. Did you go to eye doctor in last one year for eye check-up of diabetes? Yes/No/I don't know
2. Did you go to eye doctor in last one year for any other eye problem? Yes/No/I don't know
3. Did you visit optical shop in last one year Yes/No/I don't know
4. When did you visit eye doctor for checking diabetic retinopathy? Yes/No/I don't know
5. Was any photograph of inside of eye taken for diabetes in last one year? Yes/No/I don't know
6. Did your physician advise you to consult eye doctor for eye complications of diabetes?
Yes/No/I don't know
7. Did your eye doctor advise you for eye check-up at least once every year? Yes/No/I don't know
8. Have you undergone retina surgery for diabetes in last two years? Yes/No/I don't know
9. Have you undergone laser treatment for diabetes in last two years? Yes/No/I don't know

(C) Knowledge related questions: (five graded responses)

Please select anyone response from: I strongly agree = 2, I agree = 1, I don't know =0, I disagree =-1, I strongly disagree =-2

1. A person with diabetes can lose his/her eyesight due to complications.
2. Control of blood sugar can help a diabetic to avoid/delay complications in eye.
3. Early changes in eye due to diabetes can be without defective vision.
4. Retina (shabakia) examination after putting eye drops to dilate pupil by expert and by using special equipment is essential for early detection of diabetic retinopathy.
5. Once vision is damaged in diabetes, it is often late to restore eyesight.
6. Laser treatment delays serious damage due to diabetic retinopathy.
7. Even after eye treatment for diabetic retinopathy, one should control diabetes. Otherwise, the vision can further deteriorate.

(D) Attitude related questions

Please select anyone response from: I strongly agree = 2, I agree = 1, I don't know =0, I disagree =-1, I strongly disagree =-2

1. Damage to eye in diabetes is not important till it starts affecting your eyesight.
2. Frequent eye check up by expert for diabetic retinopathy is waste of time for patient
3. My physician is responsible for taking care of my diabetes including eye complication.
4. A diabetic patient should focus on complications of kidney and heart instead of eyes
5. Treatment of diabetic retinopathy is not benefiting diabetic patients.

(E) Practice related questions.

Please select one of the option. Yes/ No/I don't know

1. I take care of my diet as I am diabetic
2. I check my blood sugar regularly
3. I check my blood pressure regularly
4. I check my weight regularly
5. I visit my eye doctor for DR screening every year or more frequently if my eye doctor has advised.
6. I have been treated for diabetic retinopathy by laser.
7. I was operated for diabetic retinopathy in the past.