

## Knowledge, Attitude and Practices about Diabetes Mellitus and Diabetic Retinopathy among Patients Attending Eye Opd at Tertiary Eye Care Centre in Central Rajasthan, India

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### Abstract

**Purpose:** To assess knowledge, attitude and practice about DM and Diabetic Retinopathy & to find out the correlation of socio-demographic and underlying risk factor of DM & DR

**Method:** Prospective observational study by fix formed questionnaire regarding knowledge attitude and practice about DM & DR.

**Results:** Most of the study subjects were between the age group of 56-65 years (35.4%) followed by 46-55 years (29.1%). Of the 1414 patients, 1179 (83.3%) had good knowledge of diabetes, 925 (65.4%) had positive attitude towards diabetes, while only 334 patients (23.6%) were found to have good practice patterns. In more than one-fifth (21.8%) of study subjects diabetes retinopathy was present, out of these 16.6% have mild-moderate NPDR and 5.2% have severe NPDR-PDR.

**Conclusion:** Knowledge, attitude and practice have a lot of impact in the disease like diabetes mellitus and diabetic retinopathy since we know that diabetic retinopathy is one of most leading cause of legal blinders worldwide between 20-70yrs of age so to decrease blinders due to this disease there is a strong need of awareness programme, & screening programme for diabetic retinopathy, so that we can start appropriate treatment timely.

**Key Words:** DM, Diabetic Retinopathy, KAP

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### I. Introduction

Diabetes mellitus, particularly type II, is a major public health concern worldwide. According to WHO, there will be an alarming increase in the population with type II diabetes mellitus, both in the developed and developing countries over the next two decades. In the developed world, the estimated increase is approximately 46%, from 55 million in 2000 to 83 million in 2030; whereas, among developing nations, the estimated increase is approximately 150%, from 30 million in 2000, to 80 million in 2030<sup>1</sup>.

India is already home to 9-12 million blind people in the world which amounts to ¼ of the world's blind population. In India, DR is becoming an important cause of visual impairment. It is estimated that in India there will be 195% increase in persons with diabetes by 2025, from 19 million in 1995 to 57 million in 2025<sup>2</sup>

Diabetic retinopathy usually occurs following a long standing and/or poorly controlled disease with hypertension and lipid disorders as co-morbidities<sup>3</sup>.

Individuals with diabetes have a high potential for visual loss, especially those with more than 35 years of diabetes. With the present modalities of treatment available, more than 98% of visual loss and blindness due to severe DR can be prevented if intervened at the right time.<sup>4</sup> However lack of awareness regarding available treatment options, poor referral from physicians and a laid back attitude in individuals has led to poor utilization of these facilities.

The well-known complications of diabetes include cataract which is 2 - 5 times more likely to occur in diabetics and also more likely occur earlier. Diabetic retinopathy is the most common cause of visual loss among people with diabetes and the leading cause of visual impairment and blindness among working-age adults. It may be complicated by diabetic maculopathy. DR usually occurs in longstanding diabetes or poorly controlled diabetes due to vascular changes as a result of chronic high blood sugar.<sup>5</sup>

In spite of the availability of technology which aids in early detection of DR in the developed countries, prevention and management are still emphasized.

In poor resource countries such as India, prevention and management are very crucial. But this largely depends on the knowledge the patients possess, the effect of this knowledge on their psyche and their attitude towards eye care

### **Knowledge, attitude and practice on diabetes mellitus & diabetic retinopathy**

A KAP survey is a representative study of a specific population to collect information on what is known, believed and done in relation to a particular topic. The understanding by a community of any given topic is the Knowledge possessed. Attitude refers to their feeling towards this subject, as well as any preconceived ideas that they may have towards it.

Practice is the ways in which they demonstrate their knowledge and attitude through their actions. Prevention of a serious visual loss in a diabetic patient depends on the awareness of the disease process, complication, and regular follow-ups. Assessing the level of knowledge, attitude and practice regarding diabetes and diabetic retinopathy will allow the health service giving body to tailor the care according to the needs of the community. The level of knowledge of diabetes and diabetic retinopathy varies widely across different countries and communities. The figures also vary on whether the study done is a population study or a hospital based one.

### **Knowledge on diabetes mellitus & diabetic retinopathy**

A hospital based study done in South India among type II diabetes patients showed a higher level of knowledge about DR at 72.5%. However knowledge of risk factors and treatment modalities was low; only 29% were aware that uncontrolled blood sugar was a risk factor and 54% of them know that diabetic retinopathy can be treated<sup>6</sup>. In a population based study done in the rural part of India, the knowledge on diabetic retinopathy was 37.1% which was significantly higher in those of upper socioeconomic status, compared with extreme lower socio-economic status.

In the first phase of a cross-sectional national survey done in India to estimate the prevalence of diabetes and its correlates, the survey compared the knowledge and awareness of diabetes in urban and rural India. Only 43.2% (6160/14,274) of the overall study population had heard about a condition called diabetes. The study revealed that urban residents had higher awareness rates (58.4%) compared to rural residents, (36.8%). The urban dwellers also had more awareness of risk factors, prevention and complications of diabetes.

According to the above study the awareness of diabetes and its complication was expectedly higher in the diabetic population than the general population. Diabetics also showed better practice scores than non-diabetics.

In many studies, level of education has come out as being a key factor in the awareness of diabetes and its complications

Individuals in the older age group (40-49 years) and a high socioeconomic status had higher DR knowledge.

### **Attitude and practice towards diabetes mellitus & diabetic retinopathy**

The effect of knowledge on attitude and practice has been studied in different studies. They show that knowledge doesn't always equate to good attitude or practice. In Kano, Nigeria, 84.3% of the 185 diabetic patients were found to be aware of diabetic retinopathy but there was little or no knowledge of retinopathy risk factors or the need for early detection through screening. Practice towards diabetic retinopathy was also very low with only 15.7% patients having undergone diabetic retinopathy screening. So, what really affects attitude and practice towards diabetic retinopathy? The study by Cheruiyot et al in Kenya clearly showed that there was significant association between practices of eye checkup and higher knowledge of Diabetic retinopathy. Marriage was also a positive factor in increased practice. A comparison between the group with knowledge and the group with no knowledge revealed statistically significant differences in terms of adopting the correct attitude and practices related to DR in the rural India study. Out of those with knowledge on DR, 93% agreed that all diabetics must undergo eye examinations. Most of those with knowledge, 66.5%, said that those with good sugar control cannot avoid eye examinations, compared to 44.5% of those in the no knowledge group. Other positive factors shown to affect practice in different studies are longer duration with the disease and having family members with the disease.

Low level of satisfactory practice toward diabetic retinopathy has been demonstrated in many studies. In the study by Gilbert et al in Kenya, only 7.1% of pregnant diabetic mothers went for an eye examination despite 63% of all participants strongly agreeing that a pregnant diabetic mother should see an eye specialist. It blames the low level of practice on the low level of education, low economic status and low referral rates by physicians. It is shown in other studies that the primary source of knowledge are doctors/health professional, the mass media and fellow diabetic patients.

There was little or no knowledge on the need for early detection through screening. Therefore, a need for increasing this awareness and the provision of access to retinopathy screening services to the patients was pointed out by the authors.

Not many studies have been done in India about awareness of diabetes and diabetic retinopathy. But Nithin Keshav Srinivasan et al (2017)<sup>7</sup> found that Out of the 288 patients in the study, 42% had good knowledge about diabetes, but only 4.5% had good knowledge about retinopathy. Good knowledge about diabetes was significantly associated with positive attitude towards diabetes and good practice patterns regarding retinopathy; awareness of retinopathy was also significantly associated with good practice. A total of 61.1% of patients did not have periodic eye examination; most common barrier identified was lack of awareness about the necessity for this (38.5%) and concluded that Good knowledge about the disease was significantly associated with positive attitude and good practice patterns. Knowledge about diabetic retinopathy was poor among the patients in our study. Lack of awareness concerning the need for screening for retinopathy was a major barrier to regular screening. There is an urgent need to educate diabetic patients about this potentially blinding complication of diabetes.

### **Objectives**

In view of lack of such proper study from our Geographical area we conducted this prospective cross-sectional study to assess knowledge, attitude & practice about DM & DR with finding out the correlation of socio-demographic and underlying risk factors.

## **II. Material & Methods**

### **Study Area:**

This study was done to assess the knowledge attitude and practices about Diabetes mellitus and diabetic retinopathy among patients attending Eye OPD as well as other department of JLN medical college and associated group of Hospitals, Ajmer, Rajasthan, India.

### **Study Design:**

A cross sectional study was done using a structured questionnaire. The questionnaire captured information on the demographic data of the respondents, their medical history, knowledge of diabetes and its complications, their attitude and practice regarding diabetic eye care.

### **Subjects:**

It includes all previously diagnosed (prior to study) patients with diabetes attending eye OPD as well as other department of J.L.N. Medical College and Associated group of hospitals, Ajmer, Rajasthan, India.

### **Inclusion criteria:**

Patients diagnosed with diabetes mellitus attending eye OPD as well as other department of JLN medical college and associated group of Hospitals, Ajmer (Raj.) during the period of study in 2017-18.

### **Exclusion criteria:**

Diabetic patients who refused for verbal or written informed consent for study, not interested in this study and severely ill, immune-compromised diabetic patients were excluded.

### **Data collection:**

Data was collected using a questionnaire administered by the interviewer. The questionnaire is divided into four parts .

- I. Section A: Demographic data of subjects including their age, sex and occupation
- II. Section B: Medical history of the subjects
- III. Section C: Duration and knowledge of patients illness and complications
- IV. Section D : Consisted questions about the subjects attitude and practice regarding diabetic eye care

### **Data Analysis:**

Data collected was analysed using the SPSS version.20 (2012) and presented in tables and charts. The Chi square statistical tool will be used in analysis of result. P Value <0.05 will be considered statistically significant at 95% power.

### **Ethical Consideration:**

Consent was obtained from federal medical centres ethics committee, while informed verbal consent was obtained from the subjects who participates in the study

Patients diagnosed with diabetes mellitus attending Eye OPD as well as other department of JLN medical college and associated group of Hospitals Ajmer will be incorporated in this study. Self administered questionnaires will be used to assess knowledge, attitude and practice of diabetic retinopathy amongst diabetic patients.

This is a health institution based cross sectional study. Verbal informed consent of the enrolled participants will be obtained. A close ended questionnaire was used to collect the response. It was comprised of few questions each on the knowledge about eye complications of diabetes and eye care. Few attitude related questions on primary prevention and eye care of diabetic retinopathy was included. Finally few questions regarding practice being followed by participant to take care of his/her eyes was asked. Personal information like name age, sex, occupation per capita income, residence, duration of diabetes and diabetic retinopathy was recorded. Multiple responses were used for each question. The correct responses of each question were determined by the study investigators prior to the study. If the response of participants to these questions matched with gold standard, it will be considered as correct and 1 mark for that response was awarded. For wrong answer, zero mark was given. The total points of knowledge, attitude and practice related questions were regrouped in four categories. Person with 75% to 100% score was considered to have 'excellent' grade of response. If the score is 50% to 74%, it was considered as satisfactory. Persons scoring 25% to 49% and 0% to 24% was grouped into poor and very poor grades respectively.

The WESDR study showed that in patients diagnosed with diabetes before the age of 30, the prevalence of DR was 8%, 25%, 75% and 97.5% at 2years, 5years, 10years and >15 years.

In younger onset patients PDR was present only in 1.2% of those who had DM for <10years and in 67% of those with >35years duration of disease<sup>8</sup>. Prevalence of macular edema was seen also to increase from 3% to 28% in older onset diabetes patients with disease duration of <5years and >20 years respectively<sup>9</sup>.

We use pretested data collection form. The data from these forms was transformed on spreadsheet using EPI Data software. We use Statistical Package for Social Studies (SPSS version.20 (2012) for the analysis. Univariate analysis was conducted by parametric method. We were calculated frequencies and percentage proportions. To determine the predictors of 'satisfactory' (excellent + good) grade of knowledge, attitude and practice for eye care among persons with diabetes, we were conducted multi-nominal logistic regression analysis. Age, gender, residence and duration of diabetes are independent variables in this study.

Those with poor level of knowledge was counselled about the benefits of primary prevention and laser treatment of DR. The identity of participants was secured from other information to maintain confidentiality.

The mean SD scores of the study population regarding the knowledge, attitude and practice outcomes were evaluated.

We found the KAP scores of the patients. The difference in the findings among different studies may be due to the differences in the literacy of the study patients, the training received by them and availability of information on diabetes. It is well understood that diabetes management requires patient education for a better disease control. Improving knowledge level of the patients regarding the drugs can be done by many ways including group education as well as through patient counselling.

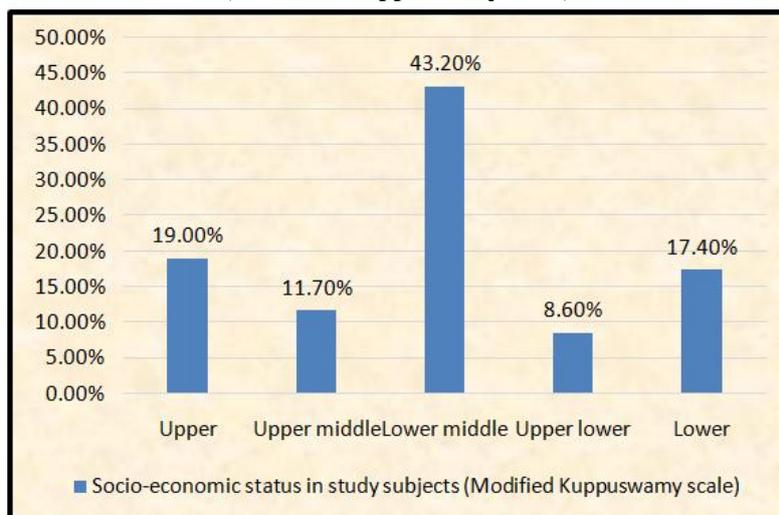
### III. Results

**Table 1: Age wise distribution of study subjects**

Age category	No.	%
18-25 years	37	2.6
26-35 years	43	3.0
36-45 years	193	13.6
46-55 years	411	29.1
56-65 years	500	35.4
66-75 years	176	12.4
>75 years	54	3.8
Total	1414	100.0

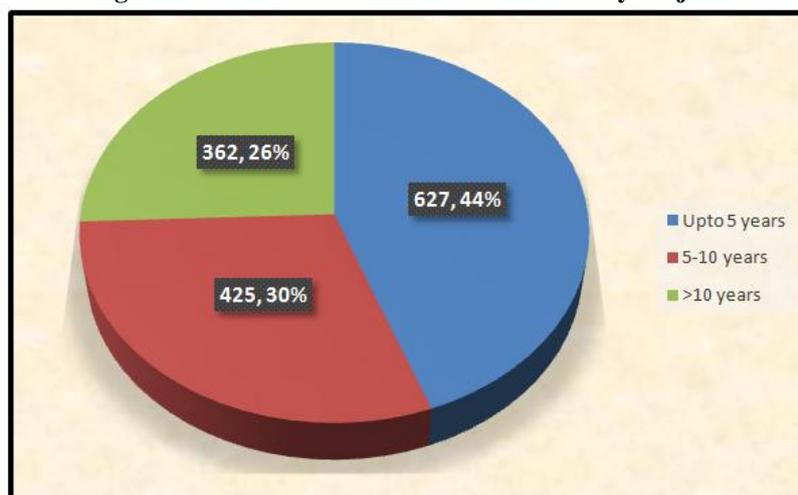
Most of the study subjects were between the age group of 56-65 years (35.4%) followed by 46-55 years (29.1%). Males (54.9%) were more common than female (45.1%). In both males and female, most common age group was 56-65 years followed by 46-55 years.

**Figure 1: Socio-economic status in study subjects (Modified Kuppuswamy scale)**



Most of the study subjects belonged to lower middle socioeconomic status (43.2%) followed by upper class (19.0%).

**Figure 2: Duration of diabetes mellitus in study subjects**



Duration of diabetes was upto 5 years in 627 (44.3%) subjects while in one-fourth of study subjects (25.6%) duration was >10 years

**Table 2: Distribution of study participants according to other co-morbidities**

Other co-morbidities	No.	%
Hypertension	495	35.0
Thyroid	28	1.9
Heart disease	48	3.4
COPD	7	0.5
Blurring/diminution of vision	25	1.7
TB	7	0.5
Speech difficulty	7	0.5

Hypertension was the most common co-morbidities seen in one third (35.0%) of study subjects followed by heart diseases (3.4%).

Family history of DM was observed in more than half (52.7%) of study subjects.

**Table 3: Status of retinopathy in diabetic patients**

Status of retinopathy	No.	%
Absence of retinopathy	1105	78.1
Mild-moderate NPDR	235	16.6
Severe NPDR-PDR	74	5.2

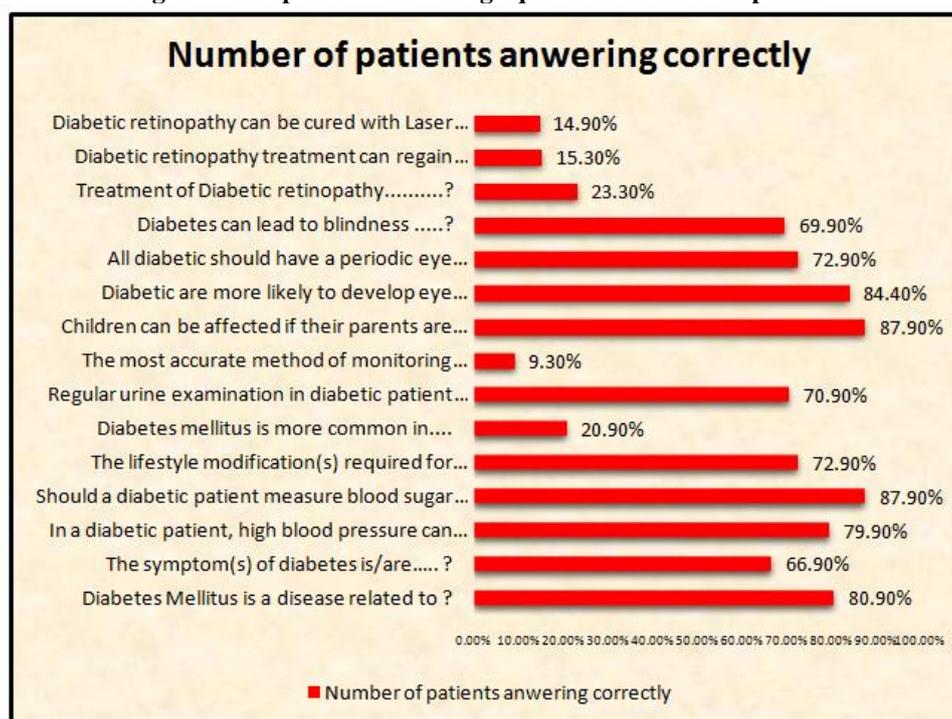
In more than one-fifth (21.8%) of study subjects retinopathy was present.

**Table 4: Response to knowledge questions in diabetic patients**

Questions	Number of patients answering correctly (%)
Diabetes Mellitus is a disease related to ?	1145 (80.9)
The symptom(s) of diabetes is/are..... ?	947 (66.9)
In a diabetic patient, high blood pressure can increase or worsen the disease.... ?	1131 (79.9)
Should a diabetic patient measure blood sugar & blood pressure routinely....?	1244 (87.9)
The lifestyle modification(s) required for diabetic patients is/are..... ?	1032 (72.9)
Diabetes mellitus is more common in....	295 (20.9)
Regular urine examination in diabetic patient will help in knowing prognosis of disease..?	1003 (70.9)
The most accurate method of monitoring diabetes is... ?	132 (9.3)
Children can be affected if their parents are diabetic....?	1244 (87.9)
Diabetic are more likely to develop eye problems than non-diabetic..... ?	1194 (84.4)
All diabetic should have a periodic eye examination by an ophthalmologist once in a year.... ?	1032 (72.9)
Diabetes can lead to blindness .....?	989 (69.9)
Treatment of Diabetic retinopathy.....?	330 (23.3)
Diabetic retinopathy treatment can regain normal vision.....?	216 (15.3)
Diabetic retinopathy can be cured with Laser treatment.....?	210 (14.9)

Only 132 (9.3%) study subjects gave correct answer regarding most accurate method of monitoring diabetes.

**Figure 3: Response to knowledge questions in diabetic patients**

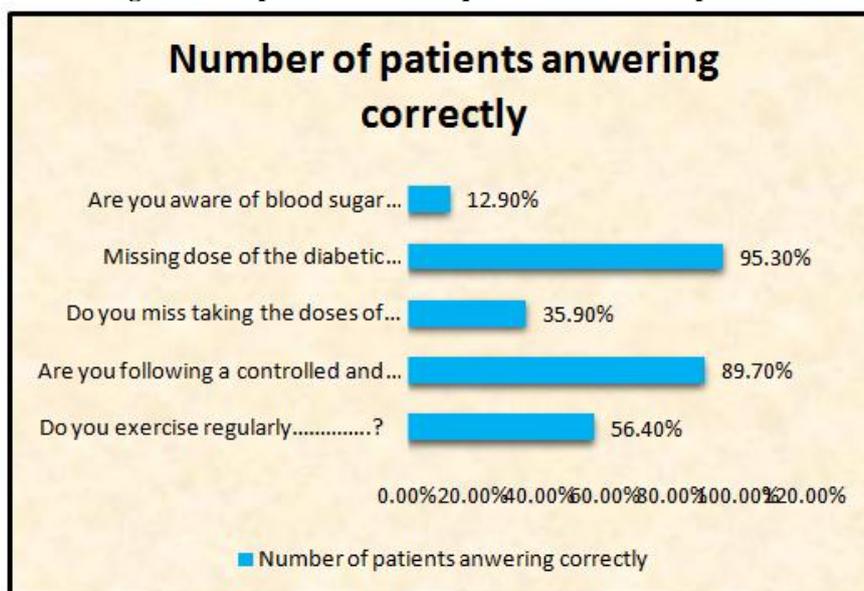


**Table 5: Knowledge about diabetes in study subjects**

Knowledge	Male		Female		Total	
	No.	%	No.	%	No.	%
Good	660	84.9	519	91.5	1179	83.3
Poor	117	15.1	118	8.5	235	16.7

Of the 1414 patients recruited, 1179 (83.3%) had good knowledge of diabetes, while only 235 (16.7%) had poor knowledge.

**Figure 4: Response to attitude questions in diabetic patients**



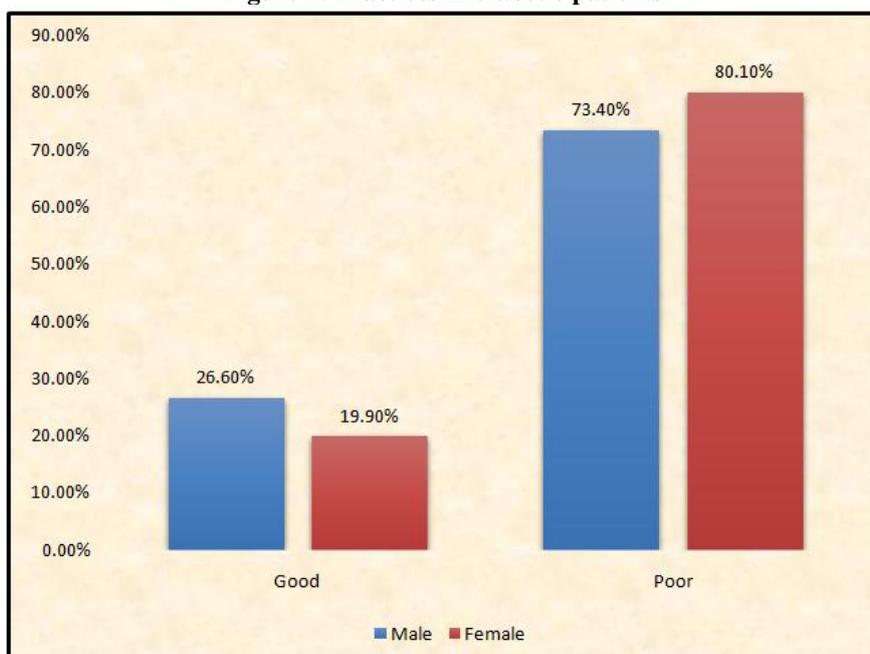
On response to attitude questions 89.7% subjects said that they were following a controlled and planned diet while 56.5% subjects were doing exercise regularly.

**Table 6: Attitude towards diabetes in study subjects**

Attitude	Male		Female		Total	
	No.	%	No.	%	No.	%
Positive	581	74.8	344	54.0	925	65.4
Negative	196	25.2	293	46.0	489	34.6

Of the 1414 patients recruited, 925 (65.4%) had positive attitude towardsdiabetes, while only 489 (34.6%) had negative attitude towards diabetes.

**Figure 5: Practices in diabetic patients**



Of the 1414 patients recruited, only 334 patients (23.6%) were found to have good practicepatterns.

**Table 7: Knowledge about diabetic retinopathy in study subjects**

Knowledge	Male		Female		Total	
	No.	%	No.	%	No.	%
Good	564	72.5	436	68.4	1000	70.7
Poor	213	27.5	201	31.6	414	29.3

Out of 1414 study subjects, good knowledge about diabetic retinopathy was seen in 1000 (70.7%) study subjects.

**Table 8: Association of mean KAP score with family history of DM**

	Family history of DM				P value
	Present		Absent		
	Mean	SD	Mean	SD	
Knowledge score	9.41	1.61	9.21	1.72	0.45
Attitude score	3.06	1.32	2.61	1.19	0.04
Practice score	1.65	1.29	1.46	1.19	0.04

Mean attitude and practice score were significantly higher in those patients in which family history was present (p<0.05) compare to those in which family history was absent.

**Table 9: Association of knowledge of Diabetes Mellitus (DM) with different factors**

Factors	Attitude towards DM				Adjusted analysis	
	Negative		Positive		Odds ratio	P value
	No.	%	No.	%		
<b>Duration of DM</b>						
Upto 5 years	245	39.1	382	60.9	1.18 (0.76-1.94)	0.37
>5 years	244	31.1	543	68.9		
<b>Gender</b>						
Male	196	25.2	581	74.8	2.15 (1.16-3.42)	0.04
Female	293	46.0	344	54.0		
<b>Knowledge</b>						
Good	377	31.9	802	68.1	3.95 (2.34-5.64)	<0.01
Poor	169	72.9	66	28.1		
<b>Socioeconomic status</b>						
Upper/upper middle/lower middle	491	46.9	555	53.1	3.01 (1.45-5.68)	<0.01
Upper lower/lower	57	14.5	311	84.5		

The odds of patients with good knowledge of diabetes having positive attitude towards diabetes were 3.95 (2.34-5.64) times those of patients with poor knowledge of diabetes, after adjusting for socio-economic status, duration of diabetes and gender, with p <0.01 [Table 9].

Similarly, the odds of patients in the higher socio-economic status group having positive attitude towards diabetes were 3.01 (1.45-5.68) times those of patients in the lower socio-economic status group, after adjusting for duration of diabetes, gender and knowledge of diabetes, with p <0.01 [Table 9].

**Table 10: Association of practices regarding Diabetes Mellitus (DM) with different factors**

Factors	practices regarding Diabetes Mellitus				Adjusted analysis	
	Poor		Good		Odds ratio	P value
	No.	%	No.	%		
<b>Duration of DM</b>						
Upto 5 years	464	74.0	163	26.0	1.67 (0.45-2.68)	0.17
>5 years	619	78.3	171	21.7		
<b>Gender</b>						
Male	570	73.4	207	26.6	1.14 (0.73-1.95)	0.07
Female	510	80.1	127	19.9		
<b>Knowledge</b>						
Good	885	75.7	294	24.3	2.12 (1.56-3.42)	0.01
Poor	203	86.3	32	13.7		
<b>Socioeconomic status</b>						
Upper/upper middle/lower middle	790	75.5	256	24.5	1.09 (0.89-1.87)	0.27
Upper lower/lower	290	78.8	78	21.2		

The odds of patients with poor knowledge of diabetes having poor practices regarding diabetes were 2.12 (1.56-3.42) times those of patients with good practices regarding diabetes, after adjusting for socio-economic status, duration of diabetes and gender, with  $p < 0.01$  [Table 10].

#### IV. Discussion

This study had 1414 participants with majority of the respondents, 777(54.9%), being males and 637(45.1%) being females. Most of the study subjects were between the age group of 56-65 years (35.4%) followed by 46-55 years (29.1%). Our findings are similar to a study conducted on diabetes in a health facility in North India by Siraj Ahmad et al (2015)<sup>10</sup> who also reported low number of female participants (37.9%), while maximum number of patients were from age group 50-59 years and mean age of participants was  $54.42 \pm 7.14$ .

In our study most of the study subjects belonged to lower middle socioeconomic status (43.2%) followed by upper class (19.0%).

In present study, most of the participants had duration of disease between 1 to 5 years, 627(44.3%) followed by 425(30.1%) and 362(25.6%) who had duration of disease between 5 to 10 years and more than 10 years, respectively. Ranbir Singh Pura, Jammu, J&K, in which 41.73% patients had duration of disease below 5 years followed by 36.52%, 15.65%, and 6.08% who had duration of disease between 6 - 10 years, 11 - 15 years and more than 15 years, respectively.

In our study most common co-morbidity associated was hypertension alone 495(35%) followed by ischemic heart disease 48(3.4%). Our findings are similar to the finding of the study conducted by **AmitGujrati et al.**<sup>11</sup> in diabetic patients residing in slum of Mumbai, in which more than half of the patients (56.62%) had associated co-morbidities with hypertension (37.13%) being the commonest followed by ophthalmic problems, ischemic heart diseases. In present study, 746(52.7%) participants had positive family history of diabetes. Our observations are similar to a study conducted by **AmitGujrati et al.**<sup>11</sup> in diabetic patients residing in slum of Mumbai, 29.78% patients had positive family history for diabetes.

However, in the study done in South India by Mahesh G et al.<sup>12</sup>, 36.31% felt that they were well educated about retinopathy, while 30.9% of the patients in the study done in North India by Koshy J et al.<sup>13</sup>, knew that diabetes could lead to retinal disease.

In our study 66.9% patients were aware about symptoms of diabetes, 79.9% patients having knowledge about hypertension were worsen in a diabetic patients, 87.9% patients having knowledge for monitoring of blood sugar level routinely, 72.9% patients were aware about modification required in lifestyle of diabetic patient, 70.9% patients having knowledge about routine examination of urine for prognosis of disease, only 9.3% patients having knowledge about most accurate method of monitoring diabetes, 87.9% patients having knowledge that children can be affected if their parents are diabetic, 84.4% patients knowing that diabetes are more common to develop eye problem than non-diabetic, 72.9% patients done periodic eye examination once in a year by ophthalmologist, In this study 69.9% of diabetic patients had the knowledge that diabetic retinopathy can cause blindness.

In Myanmar where retinopathy awareness rate amongst diabetic outpatients was 86%<sup>14</sup>, 23.3% patients was aware about treatment of diabetic retinopathy while only 15.3% patients having knowledge that diabetic retinopathy treatment can regain normal vision, 14.9% patients having knowledge that DR can be cured with laser treatment.

In our study, Good knowledge was higher in male participants (660) while in female participants (519). Of the 1414 patients recruited, 1179 (83.3%) had good knowledge of diabetes, while only 235 (16.7%) had poor knowledge.

In our study on response to attitude questions 89.7% subjects said that they were following a controlled and planned diet while 56.5% subjects were doing exercise regularly.

In our study of the 1414 patients recruited, 925 (65.4%) had positive attitude towards diabetes, while only 489 (34.6%) had negative attitude towards diabetes and only 334 patients (23.6%) were found to have good practice patterns and good knowledge about diabetic retinopathy was seen in 1000 (70.7%) study subjects. Mean knowledge score in study subjects was  $9.13 \pm 1.56$  and attitude score was  $2.92 \pm 1.08$ . Mean attitude score and practice score was significantly ( $p < 0.05$ ) higher males compare to female while in knowledge score no significant difference was observed. Mean attitude and practice score were significantly higher in those patients in which family history was present ( $p < 0.05$ ) compare to those in which family history was absent.

In contrast to this, 37.1% had 'knowledge' of retinopathy in the study by Rani PK et al.,<sup>15</sup>. Srinivasan NK et al<sup>7</sup>. found that awareness of diabetic retinopathy ( $p = 0.01$ ) and good knowledge of diabetes ( $p < 0.01$ ) were significantly associated with good practice patterns regarding diabetic retinopathy.

In our study mean knowledge score was 9.21, Attitude score was 3.02 and Practice score was 1.71 found in Upper or Upper middle while in Upper lower and lower was found 9.11, 2.82 and 1.63 respectively. There was no significant association was found between KAP and socioeconomic status.

The odds of patients with good knowledge of diabetes having positive attitude towards diabetes were 3.95 (2.34-5.64) times those of patients with poor knowledge of diabetes, after adjusting for socio-economic status, duration of diabetes and gender, with  $p < 0.01$ .

Similarly, the odds of patients in the higher socio-economic status group having positive attitude towards diabetes were 3.01 (1.45-5.68) times those of patients in the lower socio-economic status group, after adjusting for duration of diabetes, gender and knowledge of diabetes, with  $p < 0.01$ .

The odds of patients with poor knowledge of diabetes having poor practices regarding diabetes were 2.12 (1.56-3.42) times those of patients with good practices regarding diabetes, after adjusting for socio-economic status, duration of diabetes and gender, with  $p < 0.01$

Srinivasan NK et al.<sup>7</sup> found a statistically significant association between good knowledge of diabetes and positive attitude towards diabetes. The odds of patients with good knowledge of diabetes having positive attitude towards diabetes were 4.2 (2.21-7.82) times those of patients with poor knowledge of diabetes, after adjusting for educational status, socio-economic status, duration of diabetes and gender, with  $p < 0.01$ . This shows that, as the knowledge that a patient has about his or her disease increases, the attitude towards the disease also becomes positive.

Mahesh G et al.<sup>12</sup>, also found a statistically significant association between awareness of retinopathy and good practice regarding retinopathy. The odds of patients with good knowledge of diabetes having good practice patterns regarding retinopathy were 3.9 (1.97-7.94) times those of patients with poor knowledge of diabetes, after adjusting for educational and retinopathy status, with  $p < 0.01$ . Knowledge about the disease and its complications is a powerful tool, which helps patients in developing good practice patterns that will ultimately help them in keeping the disease under good control.

So, we conclude that knowledge, attitude and practice have a lot of impact in the disease like diabetes mellitus and diabetic retinopathy since we know that diabetic retinopathy is one of most leading cause of legal blinders world wide between 20-70yrs of age so to decrease blindness due to this disease there is a strong need of awareness programme, & screening programme for diabetic retinopathy, so that we can start appropriate treatment timely.

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