Knowledge on Diabetic Retinopathy among Diabetes Mellitus Patients Attending the Colombo South Teaching Hospital, Sri Lanka

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Abstract: INTRODUCTION: Diabetic retinopathy is a chronic, progressive and potentially sight threatening disease and the most commonly diagnosed complication of diabetes. Its incidence increases with prolonged duration of diabetes and accounts for a significant amount of morbidities that are directly related to diabetes as it is one of the leading causes of visual handicap. This study was conducted to assess the knowledge of diabetic retinopathy among diagnosed diabetic patients, attending clinics at the Colombo South Teaching Hospital (CSTH). OBJECTIVES: (1) To assess the knowledge of diabetic retinopathy among diabetic patients at CSTH. (2) To assess the association between the duration of diabetes and the knowledge on diabetic retinopathy. (3) To assess the association between the education level and the knowledge on diabetic retinopathy. (4) To assess the association between the socio-economic background and the knowledge on diabetic retinopathy. METHODOLOGY: The data collection was carried out over a period of 12 weeks, during which an interviewer administered questionnaire was distributed among 200 respondents attending clinics at CSTH. Systematic random sampling was used as the sampling technique and data was analyzed using SPSS version 15.0. Descriptive data was presented as numbers and percentages and the difference between the categories was decided with the chi square test. RESULTS: Analysis of data revealed that 31% (62) of the study population had a good knowledge of diabetic retinopathy while 69.0% had poor knowledge, implying that a significant proportion of patients have a poor knowledge on diabetic retinopathy (DR). A significant association between the level of knowledge and the duration of the disease (< 5 years or = > 5 years), was identified in the present study. Level of education and level of income had a significant association with knowledge. Educational level of the spouse too was a significant factor ($P < 0.05$) under the category of family support. Sources of information had a significant association with the level of knowledge. CONCLUSION: The knowledge of diabetic retinopathy (DR) in the study population was found to be poor. A statistically significant association between knowledge of diabetic retinopathy and the following variables, which included the duration of diabetes, socio-economic background, family support and the sources of information was identified.

Key words: Diabetic retinopathy, diabetes mellitus.

1. Introduction

Diabetes mellitus is defined as a metabolic disorder of multiple etiologies characterized by chronic hyperglycaemia with disturbances of carbohydrate, protein and fat metabolism resulting from absolute deficiency of insulin, insulin resistance or both. The International Diabetes Federation (IDF) published data in 2006 which showed that diabetes affects 346 million people worldwide, with 46% of all those affected in the 40-59 working age group. This data also predicts that the total number of people living with diabetes will rise to 552 million by 2030 (Fig. 1).

Diabetic retinopathy is a chronic, progressive, disease of the retinal microvasculature associated with the prolonged hyperglycaemia and other conditions linked to diabetes mellitus. It is the most commonly diagnosed complication of diabetes and its incidence increases with the duration of diabetes.

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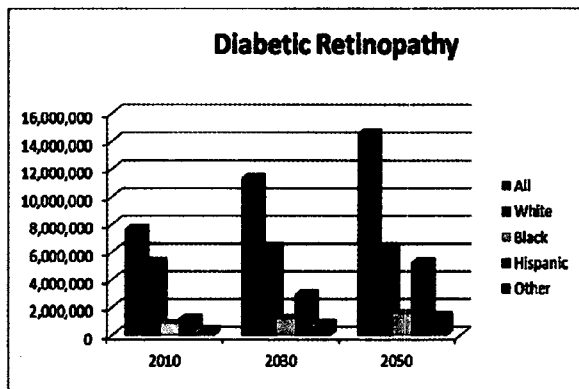
Fig. 1 Diabetic retinopathy.
(Source: International   diabetes   federation;
MedmarketDiligence,LLC, report #D500).

Poorly controlled diabetes affects the eye, mainly in two ways: the growth of new vessels leading to intraocular hemorrhage and possible retinal detachment with profound global sight loss, and localized damage to the macula of the eye with loss of central visual acuity. Prolonged diabetes results in the death of intramural pericytes as well as the thickening of the basement membrane of the small blood vessels of the retina. This in turn causes incompetence and increased permeability of these vessels initially, and completes occlusion later on in the disease process. The effects of retinopathy differ according to the area of the retina which is involved.

In the peripheral retina, vessel changes result in the formation of micro aneurysms which later when breached become a source of hemorrhage into the superficial layers of the retina. Leakage of fluid into the retina results in the formation of hard exudates which are deposits of proteins and lipids. Occlusion of vessels as described above cause microinfarcts in the peripheral retina known as cotton wool spots. Ischemia in these areas stimulate the release of growth factors such as vascular endothelial cell growth factor (VEGF) that cause the proliferation and growth of new blood vessels in the retina. These new vessels may be intraretinal or can be placed on the surface of the retina. Normal shearing stresses to these poorly supported delicate vessels can result in preretinal or vitreous hemorrhage, with subsequent sudden loss of vision.

Collagen bands that grow along the margins of these new vessels may contract and result in retinal detachment.

Reduced clearance of fluid leakage in the macular area results in macular oedema, subsequent distortion and thickening of the retina. This results in a characteristic loss of vision centrally as seen in advanced diabetic retinopathy.

Therefore, diabetic retinopathy can be classified according to the presence or absence of abnormal new vessels as: (1) Non-proliferative retinopathy; (2) Proliferative retinopathy.

Raising awareness of diabetic retinopathy has been shown to be a key element for early diagnosis and treatment of this blinding disease. However, there is only very limited data about the knowledge level, attitude, and behavior of diabetic patients regarding diabetic retinopathy. Thus, this research aims to assess the knowledge regarding diabetic retinopathy among diabetic patients in Sri Lanka.

2. Justification

As stated above, diabetes is the most common endocrine disease in the world, affecting 346 million people globally, with an alarming prevalence rate of 17% in Sri Lanka. Among its various complications, diabetic retinopathy accounts for a significant amount of morbidities that are directly related to diabetes, as it is one of the leading causes of visual handicap.

Being equipped with a sound knowledge about the diabetic eye complications will most definitely lead to better utilization of preventive measures and screening processes, which in turn will promote early detection leading to reduced morbidities.

Studies have been done globally to assess the level of knowledge and awareness on diabetic retinopathy, but in Sri Lanka, studies which have been done in the recent years are more focused on determining the prevalence rates of DR than on the topic studied under this project. Therefore, proper analysis of the current level of knowledge becomes an absolute necessity in

order to determine better ways of educating the diabetic population.

The final results, whether positive or negative, can be added to the knowledge base regarding the awareness of diabetic retinopathy and its complications in Sri Lanka. Results can be subjected for further studies and in the event that the study yields an outcome that identifies a clear deficit in the knowledge on diabetic retinopathy among diabetic patients, further research could be directly implemented on the same research topic at a much advanced level with a much larger study sample size.

3. Literature Review

Diabetic retinopathy is one of the major complications of diabetes worldwide and its occurrence is rapidly increasing hand in hand, with the increase of diabetes in developed as well as developing countries. All over the world, studies have been conducted regarding the prevalence, the screening process, and the effects of diabetic retinopathy. A few studies have been conducted regarding the knowledge and awareness about diabetic retinopathy among the diabetic population.

Prevalence of retinopathy among the diabetic population is found to be significantly high. A recent study conducted in August 2014 (performed as a cross sectional community based study among 5000 adults over 18yrs) regarding the prevalence of retinopathy among adults with self-reported diabetes mellitus, has revealed that nearly 1/3 of Sri Lankan adults with self-reported diabetes are having retinopathy. Prevalence of any degree of diabetic retinopathy was found to be 27.4% and the patients with diabetic retinopathy had a significant longer duration of being diagnosed as diabetics [1].

Another study conducted by Fernando et al. on the prevalence of retinopathy in Sri Lankan diabetic clinics in September 1993 also revealed that 31.3% out of 1003 patients were suffering from retinopathy [2].

Owing to the high prevalence rates, many studies have been conducted globally to assess the level of knowledge and awareness regarding diabetic retinopathy among diagnosed diabetic patients. A study has been conducted regarding the assessment of awareness of diabetic retinopathy among the diabetics attending the peripheral diabetic clinics in Melaka, Malaysia, during the period from January to December 2007. A study sample of 351 was used out of which a pleasing percentage of 87.2% was aware that diabetes can give rise to eye complications. However, the study also stated that only 50% of the patients who were aware about eye complications took interest in undergoing ophthalmological evaluation [3].

A study regarding demographics and awareness of diabetic retinopathy, among diabetic patients attending the vitreo-retinal clinic at a tertiary eye care center in Nepal showed that the lack of awareness contributes to the lack of early recognition and intervention with the disease process, thereby resulting in an advanced stage of diabetic retinopathy in a large number of cases. It was also revealed that people with a higher level of literacy were more aware of retinopathy that arises as a complication of diabetes [4].

A similar study conducted in Singapore in 2009 demonstrated that poor awareness of diabetic retinopathy had a direct association with an improper control of its risk factors. Of the 3280 study participants, 768 were diabetics, out of which 272 were detected as having diabetic retinopathy [5].

In contrast to the above results, an assessment of awareness of diabetic retinopathy and utilization of eye care services, done among the Turkish diabetic patients in 2013, revealed that even though most patients were aware that diabetes has ocular complications, there was a lack of appropriate knowledge and behavior regarding the management of diabetic retinopathy. In a study population of 437 patients, 88.1% were aware of eye complications and 77.3% has had previous eye examinations for a focus of diabetic retinopathy. 41.9% had stated that annual eye examinations were necessary. It was also evident that patients with an educational level of middle school or higher, duration of diabetes

longer than 5 years and with previous diabetes mellitus education were associated with a better awareness of diabetic retinopathy [6].

A cross sectional survey has been conducted among the diabetics attending the diabetics clinic of Korle-Bu, Teaching Hospital in Ghana, regarding the knowledge of diabetes and its associated ocular manifestations. Results have revealed that the knowledge on occular effects was significantly low [7].

There are no studies done in Sri Lanka on the knowledge of diabetic retinopathy, among diabetic patients. Thus it is clear that there is much space for advanced research on this important topic.

4. Methodology

4.1 Study Design

Descriptive cross sectional study design.

4.2 Study Setting

The study setting was Colombo South Teaching Hospital, Kalubowila, Sri Lanka.

The CSTH is the 2nd largest government hospital in Sri Lanka which provides treatment to about 150,000 inward patients and 75,000 out patients per year. Diabetic patients all over the country attend the clinics for follow up and further management. As a result, the information for the study was obtained from a study population which represented the whole island.

4.3 Study Population

The study population included diagnosed diabetic patients attending clinics at CSTH, within the period of December 1st, 2014—March 1st, 2015.

4.4 Exclusion Criteria

Patients who are below 18 and above 80 years of age and those with ill-literacy in both Sinhala and English were excluded from the study.

4.5 Study Sample

Study sample composed of diagnosed diabetic

patients attending, medical surgical, endocrine and ophthalmology clinics at CSTH, within the period of December 1st, 2014—March 1st, 2015.

4.6 Sampling Technique

Systematic random sampling was used as the sampling technique for the study.

Four clinics at Colombo South Teaching Hospital were selected.

About 600 diabetic patients visit the above mentioned clinics at CSTH, monthly. Data collection was done for 3 months. The calculated sample size was 422 and according to the "skip interval = population size/sample size" formula, the skip interval was four.

Thus a random number between 1 to 4 was selected and every 3rd diabetic patient who came to the clinic was systematically selected.

There was no literature with regard to knowledge of diabetic retinopathy among diabetic patients in Sri Lanka. So the knowledge on diabetic retinopathy among diabetic population in Sri Lanka was considered as 50%.

Sample size

$$n = \frac{Z^2 \times P\,(1\text{-}P)}{d^2}$$

n—Sample size

Z—with a 95% confidence level (1.96)

P—Expected proportion

d—Precision

n = 384 (according to the calculation)

With a 10% of non-response n = 422.

However, due to the limitations of resources and time, data was collected only from a total of 200 respondents.

5. Results

In this study, employment of the participants, level of education and level of income were considered as socio economic factors affecting the level of knowledge. Accordingly the study revealed that there is a significant association between level of education

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and knowledge ($P < 0.05$) as well as between level of income and knowledge ($P < 0.05$) (Tables 1 and 2).

Table 1 Socio demographic information.

Variable		n	%
Sex	Male	84	42%
	Female	116	58%
Age (years)	21-40	8	4%
	41-60	120	60%
	61-80	72	36%
Ethnicity	Sinhalese	174	87%
	Tamil	13	6.5%
	Muslims	13	6.5%
Level of education	Not attended school	8	4%
	Grade 1-5	28	14%
	Grade 6-10	65	32.5%
	Passed O/L	48	24%
	Passed A/L	36	18%
	Higher education	15	7.5%
Employment	Employed	73	36.5%
	Unemployed	102	51%
	Retired	25	12.5%
Marital status	Married	181	90.5%
	Single	16	8%
	Widowed	3	1.5%
Monthly income	< 5000	29	14.5%
	5000-10000	28	14%
	10001-25000	84	42%
	25001-50000	45	22.5%
	> 50000	14	7%

Table 2 Awareness of diabetic retinopathy.

Variable	n	%
Diabetes causes eye problems		
Yes	162	81%
No	38	19%
Can be controlled without regular medication		
Yes	52	26%
No	137	68.5%
Don't know	11	5.5%
Duration of DM is related to eye disease		
Yes	106	53%
No	37	18.5%
Don't know	57	28.5%
Dietary control & life style modifications are important		
Yes	152	76%
No	23	11.5%
Don't know	25	12.5%
Diabetes causes retinopathy		
Yes	43	21.5%
No	63	31.5%
Don't know	94	47%
Diabetes causes Glaucoma		
Yes	86	43%
No	47	23.5%
Don't know	67	33.5%
Diabetes predisposes to cataract		
Yes	130	65%
No	35	17.5%
Don't know	35	17.5%
Awareness regarding the symptoms of diabetic eye disease		
(a) Blurred vision		
Yes	131	65.5%
No	69	34.5%
(b) Floating black dots/lines		
Yes	55	27.5%
No	145	72.5%
(c) Fluctuation of vision		
Yes	50	25%
No	150	75%
(d) Dark or empty spaces in the visual field		
Yes	49	15.5%
No	151	84.5%
(e) Difficulty in perception of image		
Yes	32	16%
No	168	84%
(f) Double vision		
Yes	37	8.5%
No	163	81.5%
(g) Eye pain		
Yes	59	29.5%
No	141	70.5%
(h) Blindness		
Yes	131	65.5%
No	69	39.5%
Awareness of the effects of diabetic retinopathy		
(a) Thinning & dilatation of capillary walls		
Yes	15	7.5%
No	185	92.5%
(b) Bleeding into eye tissues		
Yes	12	6.5%
No	188	94%
(c) Swelling of the retina		
Yes	4	2%
No	196	98%
(d) Retinal detachment		
Yes	1	0.5%
No	199	99.5%
Awareness about the preventive measures for diabetic eye disease		
(a) Regular control of blood sugar		
Yes	176	88%
No	24	12%
(b) Early diagnosis		
Yes	128	64%
No	72	36%
(c) Regular eye checkup		
Yes	88	44%
No	112	56%
(d) Awareness about frequency of eye check up		
Once a month	31	15.5%
Once in 6months	78	39%
Once a year	62	31%
Once in 2 years	12	6%
Once in 5 years	3	1.5%
Not necessary	14	7%

Whether the participants were employed or not was not a significant factor according to the study ($P > 0.05$).

Considering the frequency distribution of the marks obtained by the study population, a numeric value of 50 was taken as the cut off value to determine the level of knowledge. Accordingly, 62 (31%) participants obtained marks above 50 and was categorized as having good knowledge and the remaining 138 (69%) obtained less than 50 and was categorized as having poor knowledge (Tables 3 and 4).

The association between knowledge on diabetic retinopathy and the duration of diagnosis of disease was found to be significant with a P value less than 0.05 (Tables 5 and 6).

With regard to the family support received by patients; educational level of the spouses of the selected study population was found to have a significant relationship with the level of knowledge on

diabetic retinopathy ($P < 0.05$).

However, the variables such as, the marital status of the selected patients and the employment of the spouse did not prove to have any significance, with regard to the level of knowledge of the patients (Table 7).

Above sources of information were selected for this study to describe any possible association with the level of knowledge of the selected study population.

Table 3   Categories of marks.

Categories	n	%
0-25 marks	39	19.5%
26-50 marks	99	49.5%
51-75 marks	55	27.5%
76-100 marks	7	3.5%

Table 4   Categories of knowledge.

Knowledge grade	N	%
Good knowledge	62	31%
Poor Knowledge	138	69%

Table 5   Association between knowledge and socioeconomic background.

Socioeconomic factors	Good knowledge	Poor Knowledge	Total (n)	Chi	Df	P value
Employment						
Yes	24.7%	75.3%	73			
No	34.6%	65.4%	127	2	1	0.141
Level of education						
Good	49.5%	50.5	99			
Poor	12.9%	87.1%	101	31	1	0.000
Level of income						
High	37.1%	62.9%	143			
Low	15.8%	84.2%	57	8	1	0.003

Table 6   Association between knowledge and duration of the disease.

Factors	Good knowledge	Poor knowledge	Total	Chi	Df	P value
Duration						
< 5 yr	23.7%	76.3%	118	7.11		
= > 5yr	41.5%	58.5%	82	4	1	0.008

Table 7   Association between knowledge and family support.

Factors	Good knowledge	Poor Knowledge	Total (n)	Chi	Df	P value
Marital status						
Married	30.9%	69.1%	181			
Unmarried	31.6%	68.4%	19	0.003	1	0.954
Level of education of the spouse						
Good	46.2%	53.8%	91			
Poor	17.2%	82.8%	93	17.858	1	0.000
Employment of the spouse						
Yes	30.9%	69.1%	68			
No	31.9%	68.1%	116	0.020	1	0.886

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Table 8 Association between knowledge and sources of information.

Information source	Good knowledge	Poor Knowledge	Total (n)	Chi	Df	P value
Medical advice						
Yes	35.3%	64.7%	136			
No	21.9%	78.1%	64	3.664	1	0.056
Television /radio						
Yes	40.6%	59.4%	106			
No	20.2%	79.8%	94	9.649	1	0.002
Internet						
Yes	54.2%	45.8%	24	7.098		
No	27.4%	72.6%	176		1	0.008
Newspapers/articles / books						
Yes	56.1%	43.9%	66			
No	18.7%	81.3%	134	28.923	1	0.000
Through family						
Yes	50.0%	50.0%	76			
No	19.4%	80.6%	124	20.688	1	0.000
Through other patients						
Yes	44.9%	55.1%	98			
No	17.6%	82.4%	102	17.352	1	0.000

Utilization of the following sources, namely; television/radio, internet, newspapers/articles/books and communication with other patients and family members were found to have a significant association with the level of knowledge of the patients as suggested by the P values given above (Table 8).

The association between the medical advice given by the clinics to the patients and their level of knowledge was found to have a P value of 0.056, which is marginally higher than 0.05.

6. Discussion

Diabetes is the most common endocrine disorder in the world, affecting 346 million globally with a prevalence rate of 17% here in Sri Lanka. Of the many complications arising in direct relation to diabetes, retinopathy was identified as a major cause of significant visual handicap. A recent study conducted in Sri Lanka among 5000 adults over 18 years of age, regarding the prevalence of retinopathy, had revealed that nearly 1/3 of adult Sri Lankans with self-reported diabetes were suffering from retinopathy. The prevalence of any degree of diabetic retinopathy was found to be 27.4% [1]. Another study conducted by D. J. Fernando, S. Siribaddana, De Silva and Z. Subasinghe, on the prevalence of retinopathy in Sri

Lankan diabetes clinics in September 1993 had also revealed that 31.3% out of 1003 patients were suffering with retinopathy [2].

The aim of our study was to identify the level of knowledge on diabetic retinopathy among diabetics attending CSTH clinics, and correlate with the sources of information utilized by patients in obtaining the said knowledge and to identify the association between knowledge and factors such as socio-economic background, level of education, duration of diabetes and family support. We believe that sound knowledge regarding retinopathy, would influence the patients to seek early detection, promote better utilization of preventive measures and screening processes.

6.1 Knowledge on Diabetic Retinopathy

From our study population consisting of 200 diabetic patients attending clinics at CSTH, only 31% ($n = 62$) obtained a test score of 50 marks or more. Yet a majority of 69% ($n = 138$) was found to have a poor knowledge with a test score of less than 50 marks.

A number of studies [1, 2] has been conducted among the Sri Lankan diabetic population to assess the prevalence of DR, but the level of knowledge

regarding DR had not been assessed in these studies.

6.2 Association between Knowledge and Duration of Diagnosis

In the current study, conducted among 200 diagnosed diabetics at CSTH, 118 patients were suffering from diabetes for less than 5 years and remaining 82 had been living with the disease for 5 years or more. Of those with a disease duration of less than 5 years, only 23.7% ($n = 28$) had a good knowledge whereas the majority of 76.3% ($n = 90$) were found to have a poor knowledge regarding diabetic retinopathy. From the patients with a disease duration of 5 years or more, 41.5% ($n = 34$) were identified as having a better knowledge of diabetic retinopathy. There is a statistically significant association with a P value of 0.008 ($P < 0.05$, $X^2 = 7.114$, df = 1), between the longer duration of diabetes and better knowledge.

The reason for comparatively better knowledge among those who had been suffering from diabetes for a longer duration, than those who had been recently diagnosed, is probably because the former has had more time to learn about diabetes and its ocular manifestations from various sources, including medical officers and other diabetic patients.

A recent study conducted in Sri Lanka [1] has found that patients diagnosed with diabetic retinopathy had been having the disease for a longer duration, but the results do not specify whether the knowledge of patients had an association with the duration of the disease.

There are no previous studies conducted among the Sri Lankan population to identify the association between the knowledge regarding diabetic retinopathy and the duration of the disease for comparison.

6.3 Association between Knowledge and Educational Level of the Patient

In our study population, 99 diabetic patients were identified as having a good education (passed O/L or above) level in contrast to the remaining 101 patients who had a poor level of education. Among those with a good level of education, 49.5% ($n = 49$) had a good knowledge regarding diabetic retinopathy. In contrast, only 12.9% ($n = 13$) were found to have a good knowledge among the 101 patients with a poor level of education. Therefore, it is statistically significant with a P value of 0.000 ($P < 0.05$, $X^2 = 31.350$, df = 1) that a good level of education contributes to a better knowledge regarding diabetic retinopathy. It is apparent that an educational level of up to O/L or above is crucial for patients to understand how diabetes affects the eye and results in diabetic retinopathy. In our study population, the majority of patients had only received a primary education up to grade 5 or had not attended school at all.

It was also identified in the study conducted among Turkish diabetics [6], that those with an educational level up to middle school or above had a better knowledge regarding diabetic retinopathy compared to those with a poor level of education.

6.4 Association between Knowledge and Family Support

To assess the level of family support received by the patients in our study population, we considered the marital status of the patient, the level of education and the status of employment of the spouse. The idea behind considering the marital status to gauge the level of family support, was that if the patient is married he or she would receive a significant amount of family support compared to a patient who is single. If the patients' spouse had a good education and was employed, it is likely that he or she will actively contribute to improve the patients' knowledge regarding diabetes and its complications.

6.5 Marital Status

In our study population, 181 patients were married and the remaining 19 were single. Of the 181 patients who were married, only 30.9% ($n = 56$) had a good

knowledge regarding diabetes and diabetic retinopathy whereas the remaining 69.1% (n = 125) had a poor knowledge. Of those who were unmarried, 31.6% (n = 6) had good knowledge but the majority of 68.4% (n = 13) had poor knowledge regarding diabetic retinopathy. This data was found to be statistically insignificant as the P value was 0.954 (P > 0.05, X^2 = 0.003, df = 1). There is no significant association between the marital status and the level of knowledge.

6.6 Educational Level of the Spouse

Out of the 181 diabetic patients who were married, 91 patients had spouses with a good educational level (educated up to O/L or above) whereas the remaining 39 had spouses with a poor level of education.

Out of the 91 patients with an educated spouse, 46.2% (n = 42) had a good knowledge about diabetic retinopathy, in contrast to the 17.2% (n = 16) with good knowledge among the 93 patients who had spouses with a poor level of education.

Therefore, there is a statistically significant association between the knowledge and educational level of the spouse with a P value of 0.000 (P < 0.05, X^2 = 17.858, df = 1).

This result is because an educated spouse is able to offer better support to the patient and more likely to utilize his or her knowledge, to the well-being of the patient.

6.7 Employment of the Spouse

Out of the married patients, 68 patients said their spouse was employed and 116 patients said their spouse was unemployed. Of the category of patients with an employed spouse only 30.9 (n = 27) had a good knowledge regarding diabetic retinopathy. Of the patients whose spouse is unemployed only 31.9% (n = 37) were found to have a good knowledge regarding diabetic retinopathy. Therefore, there is no statistically significant association between the knowledge regarding diabetic retinopathy and the employment of the spouse as the P value is 0.886 (P >

0.05, X^2 = 0.020, df = 1).

There were no previous studies conducted in Sri Lanka or at a global level to assess the relationship between the knowledge regarding diabetic retinopathy and factors related to family support such as marital status, the educational level and employment of the spouse, for us to compare our results.

6.8 Association between the Knowledge & the Socio-economic Background

Factors such as the educational level of the patient, status of employment and monthly income, were taken to assess the socio-economic background. Patients with a higher level of education, who were employed and with a higher income were considered as having a significantly better socio-economic background than the others, and was expected to have a better knowledge regarding diabetes and diabetic retinopathy. This is justified as those with a good socio-economic background have significantly better access to obtain knowledge through sources such as electronic media (television, internet). They would also have a higher capacity to understand about their disease and its complications because of the higher educational level.

6.9 Employment of the Patient

Of 200 diabetic patients considered in this study, 73 patients were employed and the remaining 127 were unemployed. From the patients who were employed, only 24.7% (n = 18) had a good knowledge regarding diabetic retinopathy, whereas the remaining 75.3% (n = 55) had a significantly poor knowledge. Out of the patients who were unemployed 34.6% (n = 44) had a good knowledge but a majority of 65.4% (n = 83) of diabetics had a poor knowledge about diabetic retinopathy. We found that there is no significant statistical association between the employment of the patient and knowledge regarding diabetic retinopathy, with a P value of 0.141 (P > 0.05, X^2 = 2.162, df = 1).

This finding can be accepted because although 73

patients of our study population was employed, majority of them were either manual labourers or engaged in self- employment.

6.10 Monthly Income of the Patient

Out of the 200 diabetic patients in our study, 143 patients were found to have a high income (Rs.10000 or more) with only 57 being identified as having a low income. Of the above mentioned 143 patients with a high income, 37.1% ($n = 53$) was found to have a good knowledge. In contrast, only 15.8% ($n = 9$) patients had a good knowledge in the low income category of 57 patients. Thus, there is a statistically significant association between the level of income with the level of knowledge regarding diabetic retinopathy, with a P value of 0.003 ($P < 0.05$, $X^2 = 8.623$, df = 1).

The need to formulate aggressive and comprehensive awareness models to educate the rural population on diabetes and diabetic retinopathy was emphasized from a study conducted in India in 2008. This conclusion was based on the results obtained from a study population of 1938 individuals from various ethnic and socio- economic backgrounds [9]. In comparison, our study also found that a good socio-economic background contributes to an improved knowledge regarding diabetic retinopathy, among patients.

6.11 Sources of Information Utilized by Patients to Obtain Knowledge

The main sources of information to obtain knowledge, were namely medical advice from qualified doctors, electronic media such as television, radio and internet, books newspapers, advice from family members and finally the information from other diabetic patients.

As depicted in Table 8, sources such as television/radio, internet, newspaper articles/books, information from family members and other diabetic patients was considered by patients as valuable

sources of information and was found to have a statistically significant association with the level of knowledge regarding diabetic retinopathy. In contrast, advice given by medical professionals was found to be statistically insignificant, with a P value of 0.056 which was marginally more than the cut off P value of 0.05, thus becoming insignificant. Even though in this study the result was found to be insignificant because the P value is only marginally higher than the cut off, medical advice probably contributes to a higher knowledge regarding DR in the general population.

In the study population, 106 patients confirmed using television and radio as a source of knowledge while the remaining 94 patients disagreed. Of those who were utilizing television and radio as a source of information, 40.6% ($n = 43$) were found to have a good knowledge whereas from the 94 patients who did not utilize television or radio only 20.2% ($n = 19$) had a good knowledge regarding diabetic retinopathy. Therefore, there is a statistically significant association between the level of knowledge and the utilization of television or radio, with a P value of 0.002 ($P < 0.05$, $X^2 = 9.649$, df = 1). Even though the majority of patients had identified television or radio as a source of knowledge, only 40.6% had been able to obtain knowledge regarding DR through special programs conducted to educate the public.

Only 24 patients of our study population confirmed the use of internet as a source of knowledge, out of which 56.1% ($n = 13$) patients were identified as having a good knowledge regarding DR. Of the remaining 176 patients, only 27.4% ($n = 48$) was found to have a good knowledge and the remaining 72.6% ($n = 128$) had a poor knowledge regarding DR. Thus we can conclude that there is a significant association between the utilization of internet and level of knowledge, with a P value of 0.008 ($P < 0.05$, $X^2 = 7.098$, df = 1). A significantly low proportion of patients had been able to utilize the internet as a source of knowledge, probably due to lack of resources. Majority of those who had access to

internet, had a good knowledge.

Of the 200 diabetics that participated in our study, 66 confirmed the use of newspapers and books to gather knowledge, out of which 56.1% ($n = 37$) were found to have a good knowledge. From the remaining 134 patients who did not utilize newspapers or books only 18.7% ($n = 25$) had a good knowledge regarding DR. This association was found to be statistically significant with a P value of 0.000 ($P < 0.05$, $X^2 = 28.923$, df = 1).

The number of patients who were identified as having obtained knowledge through family members was 76 but the majority of 124 patients mentioned that they did not do so. Of those who confirmed, 50% ($n = 38$) were found to have good knowledge. Of the 124 who gave a negative response only 19.4% ($n = 24$) had a good knowledge. Therefore, we can say that there is a statistically significant association between the knowledge regarding DR and the information obtained from family members as the P value was 0.000 ($P < 0.05$, $X^2 = 20.668$, df = 1).

Of our study population, only 98 patients said they gathered knowledge from other diabetic patients. Of these patients, 44.9% ($n = 44$) were found to have a good knowledge regarding DR whereas from the 102 patients who did not obtain information from other diabetic patients, only 17.6% ($n = 18$) had a good knowledge. Therefore, we can conclude that there is a statistically significant association between the knowledge regarding DR and the information obtained from other diabetic patients as the P value was found to be 0.000 ($P < 0.05$, $X^2 = 17.352$, df = 1).

There were no similar studies conducted in Sri Lanka to identify the sources of information utilized by diabetics to obtain knowledge.

7. Conclusion

Diabetic retinopathy is the most commonly diagnosed complication of diabetes and its incidence increases with the progression of the duration of the disease. Poorly controlled DM affects the eye and causes a significant amount of morbidities [8]. It is also recognized as one of the leading causes of visual handicap. Being equipped with a sound knowledge on diabetic eye complications leads to better utilization of preventive measures and screening processes, ultimately leading to better quality of life in diabetic patients [9].

This study was implemented to describe the knowledge on diabetic retinopathy among diagnosed diabetic patients at CSTH. According to the results, a significant proportion of the study population had a poor knowledge with regard to diabetic retinopathy (only 31%, $n = 62$ obtained a test score > 50 marks and the majority (69%) was found to have a poor knowledge). It was also found that there is a statistically significant association between the duration of the disease, socio-economic background, family support and sources of information with the level of knowledge on diabetic retinopathy.

Through this study, a clear deficit in the knowledge of diabetic retinopathy among diabetic patients was identified. If the limitations of this study can be improved, further studies could be directly implemented on the same research topic at a much advanced level to evaluate the level of knowledge on diabetic retinopathy among the diabetic patients in Sri Lanka.

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