ORIGINAL RESEARCH

Role of early screening for diabetic retinopathy in patients with diabetes mellitus

[1]Dr.Vijay Garg, [2]Dr.Poorvi Garg

[1]Professor, Department of Medicine, R.D. Gardi Medical College, Ujjain, Madhya Pradesh, India
[2]Assistant Professor, Department of Ophthalmology, R.D. Gardi Medical College, Ujjain, Madhya Pradesh, India

Corresponding Author
Dr. Poorvi Garg
Assistant Professor, Department of Ophthalmology, R.D. Gardi Medical College, Ujjain, Madhya Pradesh, India
Email: purvigarg22@ gmail.com

Received: 10 February, 2023 Accepted: 15 March, 2023

ABSTRACT
Background: Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia. It may be due to impaired insulin secretion, resistance to peripheral actions of insulin, or both. According to the International Diabetes Federation (IDF), approximately 415 million adults between the ages of 20 to 79 years had diabetes mellitus in 2015. DM is proving to be a global public health burden as this number is expected to rise to another 200 million by 2040. **Aims & objectives:** The present study was conducted for evaluating the role of early screening for diabetic retinopathy in patients with diabetes mellitus. **Materials & methods:** A total of 200 patients were enrolled. Among them, 100 patients were of periodic screening while 100 patients were of non-periodic screening. Only diabetic patients were included. Many different modalities of screening were depending on the availability of local facilities. Scanning and ophthalmic examination of all the patients was done. Comparison was done. Statistical analysis was done. **Results:** Diabetic retinopathy on examination was seen in 10 percent of the patients of the periodic screening group and 23 percent of the patients of the non-periodic screening group. Diabetic retinopathy treatment was seen in 9 percent of the patients of the periodic screening group and 3 percent of the patients of the non-periodic screening group. **Conclusion:** India needs DR screening programs for early identification of the condition, supported by hierarchical referral structure to provide appropriate timely treatment to reduce the burden of blindness due to diabetes.

Key words: Diabetic retinopathy, Diabetes mellitus, screeninig

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia. It may be due to impaired insulin secretion, resistance to peripheral actions of insulin, or both. According to the International Diabetes Federation (IDF), approximately 415 million adults between the ages of 20 to 79 years had diabetes mellitus in 2015. DM is proving to be a global public health burden as this number is expected to rise to another 200 million by 2040.[1-3] Diabetic retinopathy (DR) is a major complication of diabetes mellitus (DM), which remains a leading cause of visual loss in working-age populations. The diagnosis of DR is made by clinical manifestations of vascular abnormalities in the retina. Clinically, DR is divided into two stages: non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR). NPDR represents the early stage of DR, wherein PDR increased vascular permeability and capillary occlusion are two main observations in the retinal vasculature.[4]

IMPORTANCE OF SCREENING

Screening is a process by which unrecognized diseases or defects are identified by means of rapidly applied tests in apparently healthy individuals.

The four cardinal principles for screening recommended by the WHO are as follows:

1. The condition should be an important health problem with a recognizable presymptomatic state.
2. An appropriate screening procedure which is acceptable both to the public and health care professionals should be available.

3. Treatment for patients with recognizable disease should be safe, effective and universally agreeable.
4. The economic cost of early diagnosis and treatment should be considered in relation to total expenditure on health care, including the consequences for leaving the disease untreated.

DR conforms well to these principles. In DR, early detection and treatment is of vital importance as it may prevent vision loss and blindness.

CRITERIA FOR REVIEW AND REFERRAL

1. ANNUAL REVIEW BUT REFERRAL IS NOT APPROPRIATE

- Normal fundus
- Mild background diabetic retinopathy (BDR) with small hemorrhages and/or small hard exudes more than one disc diameter from fovea

2. ROUTINE REFERRAL TO OPHTHALMOLOGISTS

- BDR with large circinate exudates within the major temporal arcades but not threatening the fovea
- BDR without maculopathy but with reduced visual acuity to determine causes of visual impairment

3. EARLY REFERRAL TO OPHTHALMOLOGIST

- BDR with hard exudates and/or hemorrhages within one diameter from the fovea
- Maculopathy
- Pre-proliferative DR

4. URGENT REFERRAL TO OPHTHALMOLOGIST

- Proliferative DR
- Pre-retinal or vitreous hemorrhage
- Rubeosis iridis
- Retinal detachment

AIMS & OBJECTIVES

The present study was conducted for evaluating the role of early screening for diabetic retinopathy in patients with diabetes mellitus.

MATERIALS & METHODS

The present study was conducted for evaluating the role of early screening for diabetic retinopathy in patients with diabetes mellitus. A total of 200 patients were enrolled. Among them, 100 patients were of periodic screening while 100 patients were of non-periodic screening. Only diabetic patients were included.Many different modalities of screening were depending on the availability of local facilities.Scanning and ophthalmic examination of all the patients was done. Comparison was done. Statistical analysis was done.

RESULTS

Mean age of the patients of the periodic screening group and non-periodic screening group was 59.2 years and 52.3 years. There were 42 males and 58 females among periodic screening group while there were 49 males and 51 females in non-periodic screening group. Diabetic retinopathy on examination was seen in 10 percent of the patients of the periodic screening group and 23 percent of the patients of the non-periodic screening group. Diabetic retinopathy treatment was seen in 9 percent of the patients of the periodic screening group and 3 percent of the patients of the non-periodic screening group.

Table 1: Baseline characteristics

Variable		Periodic screening	Non-periodic screening	p-value
Mean age (years)		59.2	52.3	0.011 (S)
Gender (n)	Males	42	49	0.001 (S)
	Females	58	51	
Diabetic retinopathy (n)	Yes	10	23	0.002 (S)
	No	90	77	

S: Significant

Table 2: Stratified analysis

Diabetic retinopathy treatment	Periodic screening	Non-periodic screening	p- value
Yes	9	3	0.001 (S)
No	91	97	
Total	100	100	

S: Significant

DISCUSSION

Diabetes mellitus (DM), also known simply as diabetes is a complex metabolic disorder characterized by hyperglycemia, a physiologically abnormal condition represented by continued elevated blood glucose levels. Hyperglycemia results from anomalies in either insulin secretion or insulin action or both and manifests in a chronic and heterogeneous manner as carbohydrate, fat, and protein metabolic dysfunctions. Diabetes follows a progressive pattern with complex pathogenesis and varied presentation.[5-8]Diabetic retinopathy (DR) is a microvascular disorder occurring due to the long-term effects of diabetes mellitus. Diabetic retinopathy may lead to

vision-threatening damage to the retina, eventually leading to blindness. It is the most common cause of severe vision loss in adults of working age groups in the western world. Early detection and timely intervention are the keys to avoiding blindness due to diabetic retinopathy. The number of patients with diabetic retinopathy in America is estimated to reach 16.0 million by 2050, with vision-threatening complications affecting around 3.4 million of them. The usefulness of strict glycemic control was clearly seen in clinical trials like the UK Prospective Diabetes Study (UKPDS) and Diabetes Control and Complication Trial (DCCT).[8- 10]Hence; the present study was conducted for evaluating the role of early screening for diabetic retinopathy in patients with diabetes mellitus.

Mean age of the patients of the periodic screening group and non-periodic screening group was 59.2 years and 52.3 years. There were 42 males and 58 females among periodic screening group while there were 49 males and 51 females in non-periodic screening group. Diabetic retinopathy on examination was seen in 10 percent of the patients of the periodic screening group and 23 percent of the patients of the non-periodic screening group. Diabetic retinopathy treatment was seen in 9 percent of the patients of the periodic screening group and 3 percent of the patients of the non-periodic screening group. Diabetologia et al determined the prevalence of diabetic retinopathy in patients with newly diagnosed (screening-detected) type 2 diabetes. The Gutenberg Health Study is a population-based study with 15,010 participants aged between 35 and 74 years. We determined the weighted prevalence of diabetic retinopathy by assessing fundus photographs. Screening-detected type 2 diabetes was defined as an HbA1c concentration of 6.5% (47.5 mmol/mol) or more, no medical diagnosis of diabetes and no intake of insulin or oral glucose-lowering agents. Of 14,948 participants, 1377 (9.2%) had diabetes mellitus. Of these, 347 (25.2%) had newly diagnosed type 2 diabetes detected by the screening. Overall, the weighted prevalence of screening-detected type 2 diabetes was 2.1%. Fundus photos were evaluable for 285 (82.1%) participants with newly diagnosed diabetes. The weighted prevalence of diabetic retinopathy in screening-detected type 2 diabetes was 13.0%; 12% of participants had a mild non-proliferative diabetic retinopathy and 0.6% had a moderate non-proliferative diabetic retinopathy. Diabetic retinopathy was proliferative in 0.3%. No cases of severe non-proliferative diabetic retinopathy or diabetic maculopathy were found. Thirty (14.9%) of 202 and six (7.2%) of 83 individuals with and without concomitant arterial hypertension, respectively, had diabetic retinopathy. Visual acuity did not differ between individuals with and without diabetic retinopathy.In their large European study, the prevalence of diabetic retinopathy in screening-detected type 2 diabetes was 13%.[11-14]

Lisa Crossland et alconducted a study to assess the role of diabetic Retinopathy Screening and Monitoring of Early Stage Disease in Australian General Practice. An open controlled trial design was used. Five intervention practices in urban, regional, and rural Australia partnered with ophthalmologists via telehealth undertook DR screening and monitoring of type 2 diabetes patients and were compared with control practices undertaking usual care 2011–2014. Recorded screening rates were 100% across intervention practices, compared with 22–53% in control practices. 31/577 (5%) of patients in the control practices were diagnosed with mild-moderate DR, of whom 9 (29%) had appropriate follow-up recorded. This was compared with 39/447 (9%) of patients in the intervention group, of whom 37 (95%) had appropriate follow-up recorded. General practice-based DR screening via Annual Cycle of Care arrangements is effective across differing practice locations.[15-17]

CONCLUSION

India needs DR screening programs for early identification of the condition, supported by hierarchical referral structure to provide appropriate timely treatment to reduce the burden of blindness due to diabetes.

SOURCE OF SUPPORT

Nil

CONFLICT OF INTEREST

None declared.

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