Awareness about Hba1c - in Diabetics with and without retinopathy.

Vivekanand[1*], Santanu Ray[2], Sunil Kumar[3], Sayani Pal Choudhury[4], Arnab Banerjee[5]

[1*]*Assistant Professor, Dept. of AHS, Optometry, MAHE, India, Orcid id-0000-0002-0921-1491, optomvivekanand@gmail.com*
[2]*Assistant Professor, NSHM College of Management & Technology, Kolkata, Orcid id- 0009-0005-4016-4661 santanu.academia@gmail.com*
[3]*Consultant Optometrist, Advance Eye Care Centre, Deoghar, sunilvisionsaver@gmail.com*
[4]*Assistant Professor, NSHM College of Management & Technology, Kolkata, Orcid id- 0009-0007-7142-3624 palchoudhurysayani@gmail.com*
[5]*Assistant Professor, NSHM Knowledge Campus, Kolkata Orcid id :- 0009-0008-0203-8973, arnab.banerjee@nshm.com /arnab280@gmail.com*

KEYWORDS
Diabetic retinopathy, Hba1c, Awareness

Summary
Purpose: To assess the level of awareness about Hba1c among diabetic patients visiting tertiary Retina/Eye care centre, and to study the factors influencing this awareness.
Methods: A questionnaire based Prospective and Cross-sectional study done on patients in between age thirty to eighty years under treatment of diabetic retinopathy. Followed by Helsinki declaration of 1975. Educational qualification was graded into Illiterate (less than class seven), <Matriculate, Matriculate, Intermediate, Graduate and Post graduate. Diabetic Retinopathy (DR) were graded as No DR, Mild Non-proliferative diabetic retinopathy (NPDR) moderate to severe NPDR, very severe NPDR, and proliferative diabetic retinopathy with lesser chance of High-risk characteristics (PDR <HRC); awareness was corelated with educational qualification and DR at presentation and analysed.
Results: Most of the patients were independently participated in Questionnaire. 84% patients were participated independently and only 16% patients were participated by attendee. Blood sugar monitoring through Glucometer was done by various patients. 14% used to check blood sugar twice in a week. 12.5% believed that Glucometer does not show reliable results. Patients used to check blood sugar level through various Laboratory too in various interval as suggested by clinician. Only 62% patients were known to Hba1c / Glycated haemoglobin / Average sugar test, and 38% were unaware of this test.
Conclusion: There should be a larger scale study with same protocols and because level of awareness of Hba1c testing among new patients was less as compared to old patients, we also recommend activities to improve this awareness among all diabetic patients which could be helpful for better management for Hba1c, will be helpful to better understanding and care regimen for diabetic retinopathy patients.

Introduction

India, being most diverse population staying with diabetes facing challenges in diabetes care.[1] National and Global studies have shown warning situation on prevalence of diabetes. The global prevalence of 366 million is expected to reach 552 million that is 51% increase by 2030. In India, the prevalence of diabetes 61.3 million is about to reach 101.2 million that is 65% increase by 2030. These alarming numbers says that every fifth person with diabetes in the world will be Indian.[2] The larger studies for diabetes care in Asian countries to explain and investigate the glycaemic control and their complication stages. The Diab Care study says nearly 50% patients with diabetes having poor control in Indian population in the same time more prone to get type- II diabetes in early age.[3] The Chennai Urban Rural Epidemiological study (CURES) found prevalence of diabetic retinopathy 17.6%, microalbuminuria 26.9% and peripheral neuropathy 26.1%.[4,5,6]. Diabetes mellitus (DM) is one of important reason for visual impairment (VI), hence sufficient knowledge about this condition and its ocular manifestation is required for diabetic patients care.[7]

For better health care to diabetic patients, it is necessary to have sufficient knowledge about their disease to imply positive attitude. Due to negligence towards recommended eye examination like dilated pupil, fundus examination, diabetic patients show increased tendency of blindness.[8] Lacking of awareness is an important factor, not to maintain Hba1c<7%. Research suggests only 17% patients aware about Hba1c and 49% had heard about Hba1c test. Among young educated patients having better awareness and understanding about Hba1c.[9]

Stages of Diabetic Retinopathy

DR is classified on the basis of proliferation into Non-proliferative diabetic retinopathy (NPDR), earlier known as Background retinopathy or Simple retinopathy and Proliferative diabetic retinopathy (PDR). Progression of vascular permeability is characterized from mild to moderate and then to NPDR identified as vascular closure so to high chance for developing PDR.[9,10] Identified by retinal neovascularization and blood vessels on posterior side of vitreous. Impaired vision in DR is due to diabetic macular edema (DME) and PDR. Retinal swelling and or hard exudates within 500 μm of macular region due to altered/increased permeability of retinal blood vessels is known as DME, which leads macular edema and increased retinal thickness. PDR is also responsible for visual impairment, possibly with sudden vitreous haemorrhage by unstable new vessels leading to partial loss of vision or low vision.

Methods

A questionnaire based Prospective and Cross-sectional study done on patients in between age 30 to 80 years under treatment of diabetic retinopathy. Study conducted was as per Declaration of Helsinki, Informed consent was obtained from participants prior to enrolled in this study. Diabetic patients visiting Super-speciality Retina institute were included in this study. After preliminary workup once it was decided to dilate the pupil, Questionnaire and consent were explained before dilatation and once agreed, the questionnaire was presented. Informed consent was taken from each patient before enrolment in the study, the same was presented to the patient before dilatation. Questionnaire was presented to either patients or their attendee (in few cases). Questionnaire was presented during dilatation because patients are more relaxed in this period. Diabetic retinopathy (DR) grading and Macular edema status was graded by single Vitreo-retinal surgeon. All questionnaire and DR grading were converted into Likert scale. The factors which would have influenced the awareness of Hba1c (Age, Gender, Educational qualification, Duration of Diabetes, New versus old patients. Grade of DR were correlated with Question number five and Question number six. These Questions are (Do you know what is Hba1c / Glycated haemoglobin/average sugar test? And. Have you ever undergone Hba1c test?) there were meant to directly assess the patient's awareness of Hba1c testing. All other questions were useful to obtain the good quality data. Whenever the two eyes had different grades of DR, the DR grade of more severely affected eye was taken for analysis.

Statistical analysis

Statistical analysis was done by applying Pearson correlation. The level of significance for P-value was assigned at P<o.o1. Multivariate analysis was applied to evaluate the influencing factors.

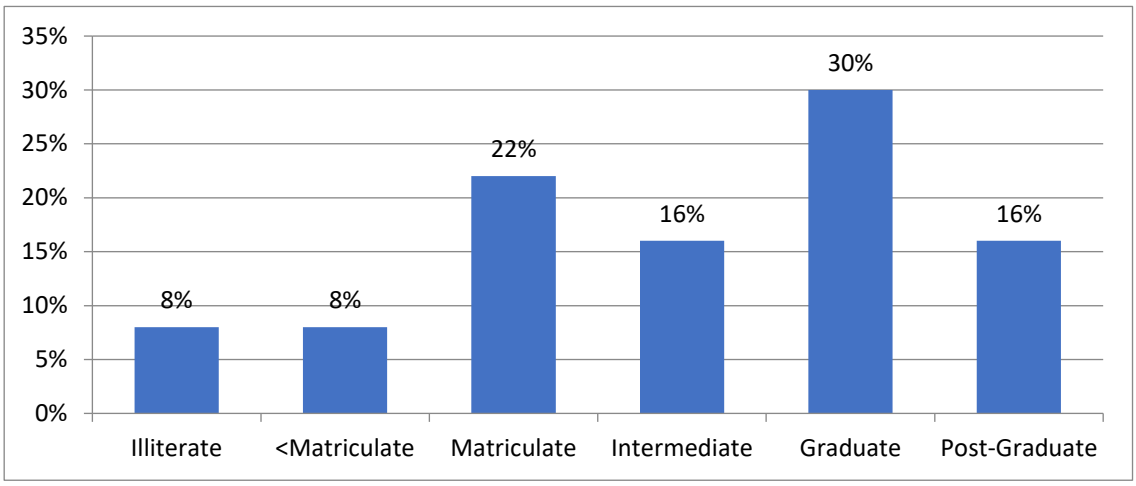
Results

A total 58 patients were enrolled in study. Out of which 50 patients (86%) were included and 08 patients (14%) were excluded. Out of 50 patients 26 were male (52%) and 24 were female (48%). Age ranges from 30-80 years, mean age 58.42 years (± 20.50) in which 3 patients (6%) were in between 30-40years, 6 patients (12%) were in between 40-50 years, 17 patients (34%) were in 50-60years, 21 patients (42%) were in 60-70 years and only 3 patients (6%) were in between 70-80 years. Since all Diabetic patients coming to study centre were enrolled so, 29 patients (58%) were new patients, first time visiting to Retina clinic (tertiary eye care centre) and 21 patients (42%) were for follow up (old patients) Visit. Most of the patients were independently participated in Questionnaire.

42 patients (84%) were participated independently and only 8 patients (16%) were participated by attendee because of Low Level of education (3 patients), Lack of confidence (3 patients) and Dependent on attendee (2 patients).

Educational qualification

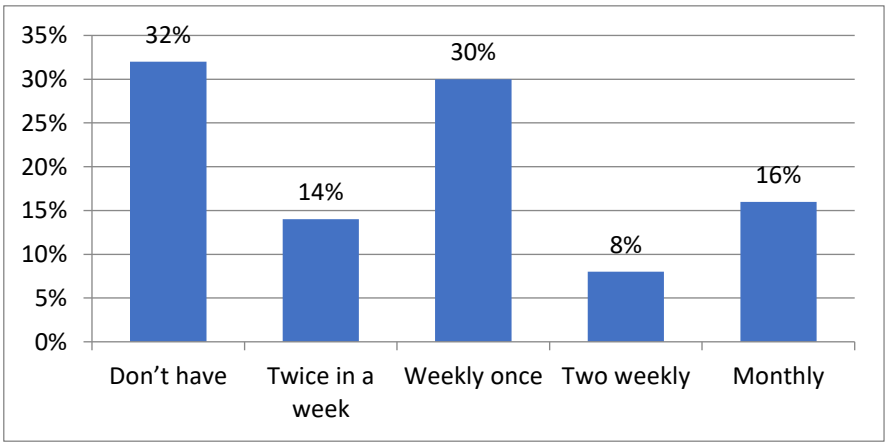
Illiterate	8%
<Matriculate	8%
Matriculate	22%
Intermediate	16%
Graduate	30%
Post-Graduate	16%



Educational qualification was graded into Illiterate (less than class seven), <Matriculate, Matriculate, Intermediate, Graduate and Post graduate. In this Study there were 4 illiterates (8%), 4 Literates but Non-matriculates (8%), 11 Matriculate (22%), 8 Intermediate (16%), 15 Graduate (30%), and 8 Post-Graduate (16%) were included. There were 12 patients (24%) who were Diabetic since less than 5 years, 2 patients (4%) were having Diabetic more than 5 years but less than 10 years. And 36 patients (72%) were having diabetic more than 10 years. 18 patients (36%) were previously diagnosed as Diabetic retinopathy, 6 patients (12%) were not diagnosed as any insult of Diabetic Retinopathy, while 26 patients (52%) didn't known about their diagnosis.

Frequency of blood sugar testing (FBS/PPBS) with Glucometer.

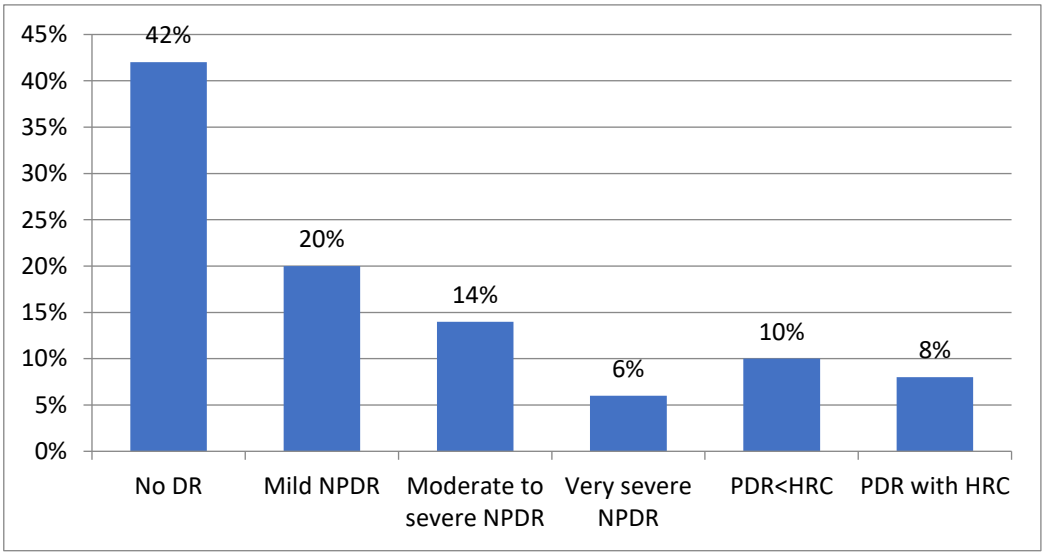
Don't have	32%
Twice in a week	14%
Weekly once	30%
Two weekly	8%
Monthly	16%



Blood sugar monitoring through Glucometer was done by various patients. 7 patients (14%) used to check blood sugar twice in a week. 15 patients (30%) used to check weekly. 4 patients (8%) used Glucometer two weekly. While 8 patients (16%) used to check monthly. 16 patients (32%) did not use Glucometer, Out of 16 patients (Not having Glucometer) 2 patients (13%) believed that Glucometer does not show reliable results. Patients used to check blood sugar level through various Laboratory too in various interval, 7 patients (14%) used to check blood glucose level less than a month or according to physician advise. 15 patients (30%) were getting check blood sugar monthly. 12 patients (24%) were getting checked by Quarterly. 13 patients (26%) were getting checked bi-annually and only 3 patients (6%) were getting checked yearly once. Only 31 patients (62%) were known to Hba1c / Glycated haemoglobin / average sugar test, and 19 patients (38%) were unaware of this test. There were 27 patients (54%) who all had undergone Hba1c, seven patients (14%) had not undergone Hba1c, and 16 patients (32%) didn't know whether this test was done for him/her, these 16 patients were saying that if physician had written then might be he/she had undergone this test. Out of 27 patients,18 patients (67 %) were showing well controlled Hba1c, 5 patients (19%) were showing poor control on Hba1c, and only 04 patients (15%) didn't know their Hba1c current status. Out of 31 patients, 14 patients (70%) preferred quarterly Hba1c to be done, 6 patients (15%) preferred bi-annually and 6 patients (15%) preferred once in a year to be checked Hba1c. There were 17 patients (34%) who all were using insulin to control their blood sugar level while 33 patients (66%) are having controlled without insulin (with Tablets and Exercise). Subjects came to tertiary eye care institute of Retina having various reasons. 23 patients (46%) had come because of visual or other problems, 15 patients (30%) had come by physician referral and only 12 patients (24%) had come by self-motivation (awareness). 35 patients (70%) were aware; these patients were known that Diabetes affects their eyes. While 15 patients were unaware about eye diseases associated with Diabetes. Post dilatation examination of Right eye(OD), there were 21 patients (42%) who all were not having any grade of DR (Diabetic Retinopathy). 10 patients (20%) were having Mild NPDR(Non proliferative diabetic retinopathy), 7 patients (14%) were graded as moderate to severe NPDR, 3 patients (6%) were graded as very severe NPDR, 5 patients (10%) were graded as PDR<HRC(proliferative diabetic retinopathy with lesser chance of High risk characteristics), any only 4 patients (8%) were graded as PDR with HRC.

Grade of DR at presentation (OD)

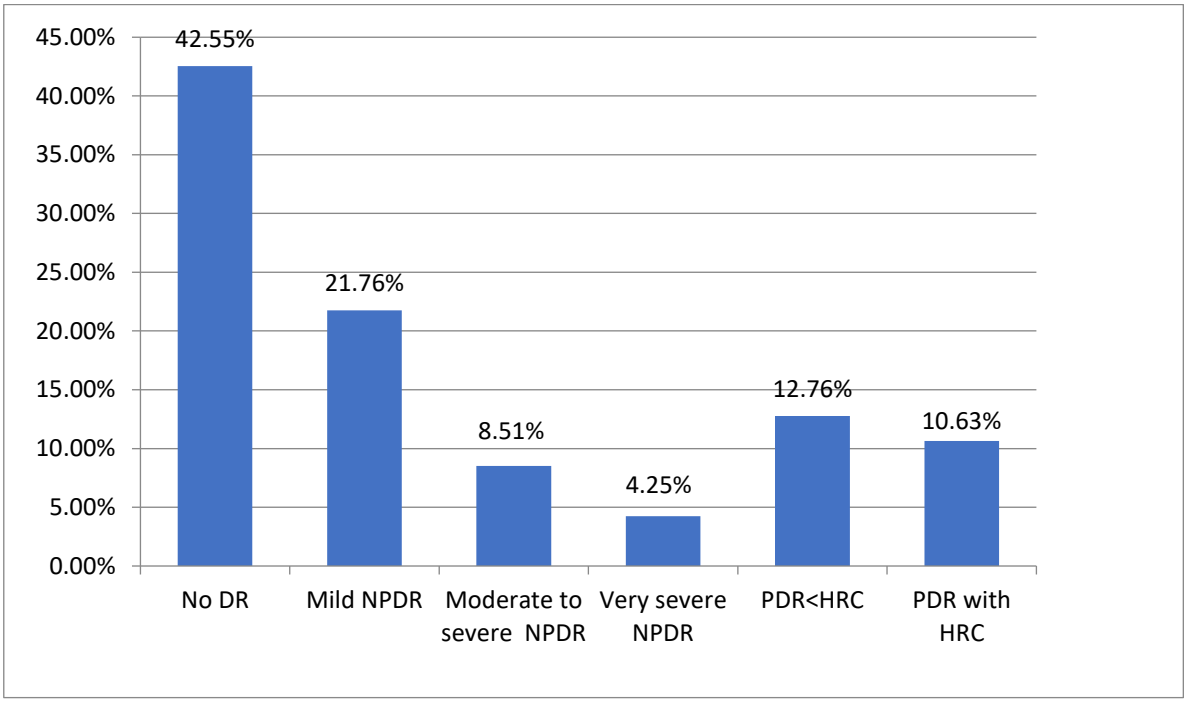
No DR	42%
Mild NPDR	20%
Moderate to severe NPDR	14%
Very severe NPDR	6%
PDR<HRC	10%
PDR with HRC	8%



Post dilation examination of Left eye (OS), out of 47 eyes (one was hazy media, one was absolute eye and one was one eyed patient) 20 patients (42.55%) were graded as No DR,10 patients (21.27%) were graded as Mild NPDR, 4 patients (8.51%) were graded as moderate to severe NPDR, 2 patients (4.25%) were graded as very severe NPDR, 6 patients (12.76%) were graded as PDR<HRC and only 5 patients (10.63%) were graded as PDR with HRC.

Grade of DR at presentation (OS)

No DR	42.55%
Mild NPDR	21.76%
Moderate to severe NPDR	8.51%
Very severe NPDR	4.25%
PDR<HRC	12.76%
PDR with HRC	10.63%



Right eye of 38 patients (76%) were not having CSME (clinically significant macular edema), 10 patients (20%) were CSME and 2 patients (4%) were uncertain to confirm CSME. Out of 47 eyes (OS) 34 eyes (72.34%) were not having CSME, 11 eyes (23.40%) were having CSME and only 2 eyes (4.25%) were uncertain to comment CSME.

Discussion

Type -II diabetes is a major health problem and an escalating prevalence is seen in developing countries such as India.[10,11] The patients with type II diabetes are at high risk of developing vascular complications. Several studies have reported that improved glycaemic control can reduce the development and/or progression of diabetic complications. Maintenance of Hba1c levels as close as possible to the near normal range results in considerable reduction in long-term complications of diabetes[12,13]. The Glycosylated haemoglobin (Hba1c) test has been the most widely accepted, reliable outcome measure for evaluating long-term glycaemic control and this test provides an index of average blood glucose level during the past three months.[14,15] This test provides important feedback to both health care professionals and patients. Patient's understanding of Hba1c and its target goal will definitely have a positive impact on long-term health.[16] Even after multiple efforts by various organization to create awareness on the role of Hba1c in complication related to diabetes, most of the diabetic patients have never heard the word Hba1c and don't aware about their current Hba1c and their target goal. It has been found that physician missed the opportunities for providing awareness

about diabetes and optimizing glucose control.[17-20] Ocular complication like DR is associated in both the type -I and type-II diabetes will develop DR after 15 years duration of diabetes. [21,22]
The level of awareness of Hba1c testing among diabetic patients is likely to affect their level of self-education and self-monitoring. Two major factors for improving diabetes care and reducing complications. Although in our study only higher educational status correlated with better awareness of HbA1c testing, we expected better socio-economic status and absence of retinopathy to also correlate with this awareness. The small sample size can be one of the reasons for these factors not being statistically significant.

Also, since a large number (58%) of these patients were following up with Retina clinic, the level of awareness of Hba1c testing (62%) among this group of patients might be higher than general population.

We recommend a larger scale study with same protocols and because level of awareness of Hba1c testing among new patients was less as compared to old patients (58% versus 66%), we also recommend activities to improve this awareness among all diabetic patients which could be helpful for better management for Hba1c, will be helpful to better understanding and care regimen for diabetic retinopathy patients. Community based awareness activity need to be increased about Hba1c for better management of Diabetic retinopathy

References

1. Wangnoo SK, Maji D, Das AK, Rao PV, Moses A, Sethi B et al Barriers and solutions to diabetes management: An Indian perspective. Indian J Endocrinol Metab. 2013
2. Raheja BS, Kapur A, Bhoraskar A, Sathe SR, Jorgensen LN, Moorthi SR, et al. DiabCare Asia – India study: Diabetes care in India - Current status. J Assoc Physicians India. 2001
3. Rema M, Premkumar S, Anitha B, Deepa R, Pradeepa R, Mohan V. Prevalence of diabetic retinopathy in urban India: The Chennai urban rural epidemiology study (CURES) eye study, I. Invest Ophthalmol Vis Sci. 2005
4. Unnikrishnan RI, Rema M, Pradeepa R, Deepa M, Shanthirani CS, Deepa R, et al. Prevalence and risk factors of diabetic nephropathy in an urban South Indian population: The Chennai urban rural epidemiology study (CURES 45) Diabetes Care. 2007
5. Pradeepa R, Rema M, Vignesh J, Deepa M, Deepa R, Mohan V. Prevalence and risk factors for diabetic neuropathy in an urban south Indian population: The Chennai urban rural epidemiology study (CURES-55) Diabet Med. 2008
6. Knowledge of diabetes and its associated ocular manifestations by diabetic patients: A study at Korle-Bu Teaching Hospital, Ghana
7. Mumba M, Hall A, Lewallen S. Compliance with eye screening examinations among diabetic patients at a Tanzanian referral hospital. Ophthalmic Epidemiol. 2007
8. Department of Ophthalmology and Visual Sciences, Khoo Teck Puat Hospital, Singapore
9. King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025: Prevalence, numerical estimates, and projections. Diabetes Care. 1998
10. Mohan V, Deepa M, Deepa R, Shanthirani CS, Farooq S, Ganesan A, et al. Secular trends in the prevalence of diabetes and impaired glucose tolerance in urban South India - the Chennai Urban Rural Epidemiology Study (CURES 17) Diabetologia. 2006
11. UK Prospective Diabetes Study (UKPDS) Group. Intensive bloodglucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33).Lancet. 1998
12. The Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long term complications in insulin dependent diabetes mellitus. N Engl J Med. 1993
13. Gonen B, Rubenstein A, Rochman H, Tanega SP, Horwitz DL. Hemoglobin A1: An indicator of the metabolic control of diabetic patients. Lancet. 1977

14. Singer DE, Coley CM, Samet JH, Nathan DM. Tests of glycemia in diabetes mellitus: Their use in establishing a diagnosis and treatment. Ann Intern Med. 1989
15. Levetan CS, Dawn KR, Robbins DC, Ratner RE. Impact of computer generated personalized goals on HbA1c. Diabetes Care. 2002
16. Clark MM, Abrams DB, Niaura RS, Eaton CA, Rossi JS. Self efficacy in weight management. J Consult Clin Psychol. 1991
17. Centers for Disease Control and Prevention (CDC)..Diabetes-specific preventive care practices among adults in a managed care population: Colarado, Behavioral Risk Factor Surveillance System, 1995. MMWR Morb Mortal Wkly Rep. 1997
18. Centers for Disease Control and Prevention (CDC) Trends in the prevalence and incidence of self reported diabetes mellitus – United States – 1980-1994.MMWR Morb Mortal Wkly Rep. 1997
19. Clement S. Diabetes self management education. Diabetes Care. 1995
20. Klein R, Klein BE, Moss SE, Davis MD, DeMets DL. The Wisconsin Epidemiologic Study of Diabetic Retinopathy. II. Prevalence and risk of diabetic retinopathy when age at diagnosis is less than 30 years. Arch Ophthalmol 1984
21. Klein R, Klein BEK, Moss SE, Davis MD, DeMets DL. The Wisconsin epidemiologic study of diabetic retinopathy III. Prevalence and risk of diabetic retinopathy when age at diagnosis is 30 or more years. Arch Ophthalmol 1984
22. Agardh E, Agardh CD. Diabetic retinopathy. In: Defronzo RA, Ferrannini E, Keen H, Zimmet P, editors. International textbook of diabetes mellitus. 3rd ed. Vol. 2. Chichester, England: John Wiley; 2004