Epidemiology of Diabetic Retinopathy at Eye Clinic Svjetlost Sarajevo: Two Years Retrospective Single Center Study

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ABSTRACT

Introduction: Diabetic retinopathy (DR) is an important cause of blindness, and occurs as a result of long-term accumulated damage to the small blood vessels in the retina. 2.6% of global blindness can be attributed to diabetes. Disease severity was most often classified by the Early Treatment Diabetic Retinopathy Study (ETDRS) classification for DR severity. Patients are usually categorized based on the severity of DR as having mild nonproliferative diabetic retinopathy (NPDR), moderate NPDR, severe NPDR, or proliferative diabetic retinopathy (PDR).

Aim: To evaluate DR status among patients at Eye Clinic Svjetlost Sarajevo, both, type 1 and type 2 DM patients who presented in our clinic at 2 years period – from June 2016 to June 2018. This is single center study.

Methods: Retrospective analysis of 753 diabetic patients that came for the first check up in our institution during those two years, 363 patients were male and 390 were female. Patients were divided in 3 groups (based on DR changes): a) No changes, b) Nonproliferative DR (with and without Diabetic macular edema–DME), c) Proliferative DR (with and without DME + Advanced PDR).

Results: There were 35% of patients with no ocular changes, 41.2% had NPDR and 24% had PDR. Prevalence of DR in our study was 65.32%. Distribution of NPDR was 66.27%, and PDR was 33.73%. DME was present in 33.70% cases. In NPDR, DME was presented in 51% of the cases, while in PDR was presented in 49% of the cases. In state of advanced PDR, PDR was presented in 50.52% cases, tractional detachment and haemorrhage in 50.2% of cases and neovascular glaucoma in 19.28% of diabetics with proliferative retinopathy and 4.60% in all of diabetics.

Conclusion: Diabetic retinopathy status of patients presenting at Eye clinic Svjetlost Sarajevo, Bosnia and Herzegovina is quite poor. There is a big need for early DR screening measures, good prevention and management of DR risk factors. Adequate and on time management of DM and its vision threatening complications is of major importance.

Keywords: Diabetic retinopathy, nonproliferative retinopathy, proliferative retinopathy, Early Treatment Diabetic Retinopathy Study.

1. INTRODUCTION

According to World Health Organization (WHO) the number of people with Diabetes mellitus (DM) has risen from 108 million in 1980 to 422 million in 2014. The global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014 (1).

Diabetes prevalence has been rising more rapidly in middle- and low-income countries. It is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation. In 2016, an estimated 1.6 million deaths were directly caused by diabetes. Another 2.2 million deaths were attributable to high blood glucose in 2012. Almost half of all deaths attributable to high blood glucose occur before the age of 70 years. WHO estimates that diabetes among adults over 18 years of age.

Disorder of the retinal microvasculature eventually develops to some degree in nearly all diabetic patients. Diabetic retinopathy (DR) is an important cause of blindness, and occurs as a result of long-term accumulated damage to the small blood vessels in the retina. 2.6% of global
Diabetes can be attributed to diabetes (2).

Disease severity was most often classified by the Early Treatment Diabetic Retinopathy Study (ETDRS) classification for DR severity (3).

Usually, patients are categorized based on the severity of DR as having (1) mild non-proliferative diabetic retinopathy (NPDR), (2) moderate NPDR, (3) severe NPDR, or (4) proliferative diabetic retinopathy (PDR).

2. AIM

Aims of the study is evaluation of DR status among patients at Eye Clinic Svjetlost Sarajevo, both, type 1 and type 2 DM patients who presented in our clinic at 2 years period – from June 2016 to June 2018. This is a single center study. Other aims are: analysis and comparison of the study results with literature, assessment of primary health care prevention and attempt to establish an algorithm for diabetic patients ophthalmological prevention/treatment.

3. METHODS

Out of 753 diabetic patients that came for the first check up in our institution during those two years, 565 patients were male and 390 were female. Patients were divided in 3 groups (based on DR changes): a) No changes; b) Non-proliferative DR (with and without Diabetic macular edema - DME); c) Proliferative DR (with and without DME + Advanced PDR). There were 35% of patients with no ocular changes, 41.2% had NPDR and 24% had PDR. Prevalence of DR in our study is 65.32%.

4. RESULTS

Distribution of NPDR was 66.27%, and PDR was 33.73%. DME was present in 33.70% cases. In NPDR, DME was presented in 51% of the cases, while in PDR was presented in 49% of the cases.

In state of advanced PDR, PDR was presented in 50.52% cases, tractional detachment and haemophthalmus in 50.20% of cases and neovascular glaucoma in 19.28%.

Sixty-three patients ended up with vitreoretinal surgery (8.4%) while in other studies that number is up to 3%. Out of that number 9 patients were patient with virgin eyes (14.28%).

Neovascular glaucoma occurred in 19.28% of diabetics with proliferative retinopathy and 4.60% in all of diabetics.

5. DISCUSSION

While treatment options such as pan-retinal laser photocoagulation can largely control neovascularization and prevent blindness, these treatments cannot restore vision, and in fact can produce vision-imparing effects of their own. Intravitreal agents such as anti-vascular endothelial growth factor (VEGF) agents do not fully restore vision in all patients, and require frequent and costly doses for effective treatment. Vision loss from DR or DME is hence a significant healthcare burden (4). Wisconsin Epidemiologic Study of Diabetic Retinopathy, WESDR in the USA, the Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR) found that among patients with insulin-dependent diabetes with onset before the age of 30, who are presumed to have type 1 diabetes, the 4-year cumulative incidence of DR was 59.0% (5).

Population-based studies have reported the prevalence of DME in type 1 diabetic patients as 4.2–7.9%, while the rate for type 2 diabetes patients ranges from 1.4–12.8% (6-29). Most popular studies are Beaver Dam Eye Study (30), Exeter Diabetic Retinopathy Screening Program (EDRS) (31), Blue Mountains study (32), Visual Impairment Project (VIP) (33), Arhus County Study (34), Casteldaccia Eye Study (35), Australian Diabetes Obesity and Lifestyle study (AusDiab) (36) and Multiethnic Study of Atherosclerosis (MESA) (37). Neovascular glaucoma occurred in 2.1% of all diabetics and in 21.3% of diabetics with proliferative retinopathy (38). These studies were conducted from 1988 to 2012 in the USA, Australia and Europe. A total of eight studies provided prevalence data for DR, including PDR and DME. Studies included the Beaver Dam Eye Study, Exeter Diabetic Retinopathy Screening Program(EDRS), Blue Mountains study, Visual Impairment Project (VIP), Arhus County Study, Casteldaccia Eye Study, Australian Diabetes Obesity and Lifestyle study (AusDiab) and Multiethnic Study of Atherosclerosis (MESA). All were population-based studies conducted in the USA, Australia and Europe (United Kingdom, Denmark, Italy) using the reference examination for DR diagnosis. Prevalence of in our study showed DR much higher comparing to studies in the Western world. At the same time there was higher rate of PDR and lower rate of NPDR compared to other studies, higher rate of diabetic macular oedema, similar results compared to other studies regarding distribution of DME, higher rate of advanced PDR in need of surgical treatment, extremely high rate of non-treated eyes in need of surgical treatment and similar rate of NVG in DR.

6. CONCLUSION

Diabetic retinopathy status of patients presenting at Eye clinic Svjetlost Sarajevo, Bosnia and Herzegovina is quite poor. Compared to other studies the DR is more advanced in our patients, with higher rate of complication and need for surgical treatment. There is a big need for early DR screening measures, good prevention and management of DR risk factors. Adequate and ON TIME management of DM and its vision threatening complications is of major importance.

• Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms.
• Author’s contribution: A.P. gave substantial contribution to the conception or design of the work and in the acquisition, analysis and interpretation of data for the work. Each author had role in drafting the work and revising it critically for important intellectual content. Each author gave final approval of the version to be published and they agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.
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REFERENCES
1. Sarwar N, Gao P, Seshasai SR, Gobin R, Kaptoge S, Di Angelantonio et al. Lancet. 2010; 26; 375: 2215-2222.
2. Causes of vision loss worldwide, 1990-2010: a systematic anal-
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3. Fundus photographic risk factors for progression of diabetic retinopathy. ETDRS report number 12. Early Treatment Diabetic Retinopathy Study Research Group. Ophthalmology. 1991; 98(Suppl): 823-833.

4. Cheung N, Mitchell P, Wong TY. Diabetic retinopathy. Lancet. 2010; 376(9755): 124-136. doi: 10.1016/S0140-6736(09)62144-3.

5. Klein R, Klein BK, Moss SE, Davis MD, DeMets DL. The wisconsin epidemiologic study of diabetic retinopathy: Ix. four-year incidence and progression of diabetic retinopathy when age at diagnosis is less than 30 years. Arch Ophthalmol. 1989; 107(2): 237-243. doi: 10.1001/archopht.1989.010002430503.

6. Pedro RA, Ramon SA, Marc BB, Juan FB, Isabel MM. Prevalence and relationship between diabetic retinopathy and nephropathy, and its risk factors in the north-east of Spain, a population-based study. Ophthalmic Epidemiol. 2010; 17: 251-265. doi: 10.3109/09286586.2010.498661.

7. Bertelsen G, Peto T, Lindekleiv H, Schirmer H, Solbu MD, Toft I, Sjølie AK, Njalstad I. Tromsø eye study: prevalence and risk factors of diabetic retinopathy. Acta Ophthalmol. 2015; 93: 716-721. doi: 10.1111/j.1755-3768.2012.02542.x.

8. Knudsen LL, Lervang HH, Lundbye-Christensen S, Gorst-Rasmussen N. The North Jutland county diabetic retinopathy study: population characteristics. Br J Ophthalmol. 2006; 90: 1404-1409. doi: 10.1136/bjo.2006.093395.

9. Roy MS, Klein R, O'Colmain BJ, Klein BE, Moss SE, Kempen JH. The prevalence of diabetic retinopathy among adult type 1 diabetic persons in the United States. Arch Ophthalmol. 2004; 122: 546-551. doi: 10.1001/archopht.122.4.546.

10. Kempen JH, O’Colmain BJ, Leske MC, Haffer SM, Klein R, Moss SE, Taylor HR, Hamman RF, Eye Diseases Prevalence Research Group. The prevalence of diabetic retinopathy among adults in the United States. Arch Ophthalmol. 2004; 122: 552-563. doi: 10.1001/archopht.122.4.552.

11. Zhang X, Saaddine JB, Chou CF, Cotch MF, Cheng YJ, Geiss LS, Gregg EW, Albright AL, Klein BE, Klein R. Prevalence of diabetic retinopathy in the United States, 2005–2008. JAMA. 2010; 304: 649-656. doi: 10.1001/jama.2010.1111.

12. Jee D, Lee WK, Kang S. Prevalence and risk factors for diabetic retinopathy: the Korea National Health and nutrition examination survey 2008-2011. Invest Ophthalmol Vis Sci. 2013; 54: 6827-6833. doi: 10.1167/iovs.13-12654.

13. Raman R, Rani PK, Reddi Rachpalle S, Gannamoorthy P, Uthra S, Kumaramanickavel G, Sharma T. Prevalence of diabetic retinopathy in India: Sankara Nethralaya diabetic retinopathy epidemiology and molecular genetics study report Ophthalmology. 2008; 116: 311-318. doi: 10.1016/j. ophtha.2008.09.010.

14. Zhong Y, Lamoureux EL, Lavanya R, Wu R, Ikram MK, Wang JJ, Mitchell P, Cheung N, Aung T, Saw SM, Wong TY. Prevalence and risk factors of diabetic retinopathy in migrant Indians in an urbanized society in Asia: the Singapore Indian eye study. Ophthalmology. 2012; 119: 2119-2124. doi: 10.1016/j. ophtha.2012.04.027.

15. Al Ghamdi AH, Rabiu M, Hajar S, Yorston D, Kuper H, Pollock S. Rapid assessment of avoidable blindness and diabetic retinopathy in Taif, Saudi Arabia. Br J Ophthalmol. 2012; 96: 1168-1172. doi: 10.1136/bjophthalmol-2012-301874.

16. Dehghan MH, Katibeh M, Ahmadieh H, Nourinia R, Yasemi M. Prevalence and risk factors for diabetic retinopathy in the 40 to 80 year-old population in Yazd, Iran: the Yazd eye study. J Diabetes. 2015; 7: 159-141. doi: 10.1111/1753-0407.12205.

17. Thapa R, Joshi DM, Rizyal A, Maharan J, Joshi RD. Prevalence, risk factors and awareness of diabetic retinopathy among admitted diabetic patients at a tertiary level hospital in Kathmandu. Nepal J Ophthalmol. 2014; 6: 24-30.

18. Kahloun R, Jelliti B, Zaouali S, Attia S, Ben Yahia S, Resnikoff S, Khairallah M. Prevalence and causes of visual impairment in diabetic patients in Tunisia, North Africa. Eye. 2014; 28: 986-991. doi: 10.1038/eye.2014.131.

19. Mathenge W, Bastawros A, Peto T, Leung J, Yorston D, Foster A, Kuper H. Prevalence and correlates of diabetic retinopathy in a population-based survey of older people in Nakuru, Kenya. Ophthamlic Epidemiol. 2014; 21: 169-177. doi: 10.3109/09286586.2014.905982.

20. Shareg W, Ilako DR, Kimani K, Gelaw Y. Prevalence of diabetic retinopathy in Jimma University Hospital, Southwest Ethiopia. Ethiop Med J. 2013; 51: 105-113.

21. Wong TY, Cheung N, Tay WT, Wang JJ, Aung T, Saw SM, Lim SC, Tai ES, Mitchell P. Prevalence and risk factors for diabetic retinopathy: the Singapore Malay eye study. Ophthalmol. 2008; 115: 1869-1875. doi: 10.1016/j.ophtha.2008.05.014.

22. Al-Rubeaan K, Abu El-Asrar AM, Youssf AM, Subhani SN, Ahmad NA, Al-Sharqawi AH, Alquwaieh A, Aloaibi MS, Al-Ghamdi A, Ibrahim HM. Diabetic retinopathy and its risk factors in a society with a type 2 diabetes epidemic: a Saudi National Diabetes Registry-based study. Acta Ophthalmol. 2015; 93: e140–e147. doi: 10.1111/aos.12532.

23. Pugliese G, Solini A, Zoppi G, Fondelli C, Zerbini G, Vedovato M, Cavalot F, Lamacchia O, Buzzetti R, Morano S, Nicolucci A, Penno G, Renal Insufficiency and Cardiovascular Events (RIACE) Study Group. High prevalence of advanced retinopathy in patients with type 2 diabetes from the renal insufficiency and cardiovascular events (RIACE) Italian multicenter study. Diabetes Res Clin Pract. 2012; 98: 329-337. doi: 10.1016/j.diabres.2012.09.006.

24. Dutra Medeiros M, Mesquita E, Papaolul AL, Genro V, Raposo JF. First diabetic retinopathy prevalence study in Portugal: RETINODIAB study-evaluation of the screening programme for Lisbon and Tagus Valley region. Br J Ophthalmol. 2015; 99: 1528-1533. doi: 10.1136/bjophthalmol-2015-306727.

25. Nathoo N, MG, Rudnisky CJ, Tennant MT. The prevalence of diabetic retinopathy as identified by teleophthalmology in rural Alberta. Can J Ophthalmol. 2010; 45: 28-32. doi: 10.3129/109-220.

26. Esteves JF, Kramer CK, Azevedo MJ, Stolz AP, Roggia MF, Laranjeira A, Miozzo SA, Rosa C, Lambert JH, Pecis M, Rodrigues TC, Canani LH. Prevalence of diabetic retinopathy in patients with type 1 diabetes mellitus. Rev Assoc Med Bras. 2009; 55: 268-273. doi: 10.1590/S0104-42302009000300007.

27. Villena JE, Yoshiyama CA, Sanchez JE, Hilario NL, Merin LM. Prevalence of diabetic retinopathy in Peruvian patients with type 2 diabetes: results of a hospital-based retinal tele screening program. Rev Panam Salud Publica. 2011; 30: 408-414.

28. Thomas RL, Distiller L, Luzio SD, Cheddury SR, Melville VJ, Kramer B, Owens DR. Ethnic differences in the prevalence of diabetic retinopathy in persons with diabetes when first presenting at a diabetes clinic in South Africa. Diabetes
29. Kaidonis G, Mills RA, Landers J, Lake SR, Burdon KP, Craig JE. Review of the prevalence of diabetic retinopathy in indigenous Australians. Clin Exp Ophthalmol. 2014; 42: 875-882. doi: 10.1111/ceo.12338.
30. Klein RJ, Klein BE, Moss SE, Linton KL. The Beaver Dam Eye Study. Retinopathy in adults with newly discovered and previously diagnosed diabetes mellitus. Ophthalmology. 1992 Jan; 99(1): 58-62.
31. Ling R, Ramsewak V, Taylor D, Jacob J. Longitudinal study of a cohort of people with diabetes screened by the Exeter Diabetic Retinopathy Screening Programme. Eye (Lond). 2002 Mar; 16(2): 140-145.
32. Mitchell P1, Smith W, Wang JJ, Attebo K. Prevalence of diabetic retinopathy in an older community. The Blue Mountains Eye Study. Ophthalmology. 1998 Mar; 105(3): 406-411.
33. McKay R1, McCarty CA, Taylor HR. Diabetes in Victoria, Australia: the Visual Impairment Project. Aust N Z J Public Health. 2000 Dec; 24(6): 565-569.
34. Hove MN, Kristensen K, Lauritzen T, Bek T. The prevalence of retinopathy in an unselected population of type 2 diabetes patients from Arhus County, Denmark. Acta Ophthalmol Scand. 2004 Aug; 82(4): 443-448.
35. Giuffrè G1, Lodato G, Dardanoni G. Prevalence and risk factors of diabetic retinopathy in adult and elderly subjects: The Casteldaccia Eye Study. Graefes Arch Clin Exp Ophthalmol. 2004 Jul; 242(7): 535-540.
36. Dunstan DW1, Zimmet PZ, Welborn TA, Cameron AJ, Shaw J, de Courten M, Jolley D, McCarty D. Australian Diabetes, Obesity and Lifestyle Study (AusDiab). The Australian Diabetes, Obesity and Lifestyle Study (AusDiab) - methods and response rates. Diabetes Res Clin Pract. 2002 Aug; 57(2): 119-129.
37. Bertoni AG, Kramer H, Watson K, Post WS. Diabetes and Clinical and Subclinical CVD. Glob Heart. 2016; 11(3): 337-342. doi:10.1016/j.ghheart.2016.07.005
38. Niels vesti nielsen, The prevalence of glaucoma and ocular hypertension in type 1 and 2 diabetes mellitus; Acta Ophthalmologica. 1983; 61(4): 662-672.