



Diabetic Retinopathy Prevalence in High Income and Low Middle-Income Countries

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Diabetes Mellitus (DM) is emerging as a major public health problem globally. DM has been the leading cause of mortality and various morbidities including blindness both in high income and in low and middle-income countries. In recent report of International Diabetes Federation (IDF), 463 million adults aged 20 - 79 years worldwide (9.3% of all adults in this age group) have diabetes in 2019 and this number is projected to be 478 million by 2030 and 700 million by 2045 globally [1]. Almost four fifth (79.4%) of people with diabetes live in low and middle-income countries. The burden of diabetes has overwhelmed many healthcare systems, especially those of low and middle-income countries [1].

Diabetic retinopathy (DR), a micro-angiopathy, is one of the most common complications of diabetes mellitus. DR can cause irreversible blindness on delayed treatment [2]. Globally, DR is the fifth leading cause of blindness and moderate to severe vision loss [3]. DR is the leading causes of visual impairment and blindness especially among the working age group people in developed world. DR blindness has been decreased in high income countries due to raised awareness, timely screening and proper treatment on time. However, there is increasing trend of blindness, and more than 80% of DR related blindness occurs in low and middle-income countries [2]. The increased number of diabetes in low and middle-income countries is due to urbanization, sedentary life style, changing in diets with more refined foods, limited treatment facilities and delayed on treatment. The number of adults with diabetes is expected to increase by 69% in low and middle-income

countries as compared to only 20% in high income countries from 2010 to 2030 [4]. People with diabetes is expected to increase five-fold by 2045 in many South East Asia (SEA) countries [1].

The global prevalence of DR is about 34.6% [5]. Globally, average of one third of the people with diabetes have some form of DR. Among the DR cases, one third have vision-threatening diabetic retinopathy (VTDR) [5]. VTDR comprised cases with DR of having severe non-proliferative diabetic retinopathy (NPDR), very severe NPDR, proliferative diabetic retinopathy (PDR) and diabetic macular oedema (DME) [5]. Timely treatment of VTDR is the only way to avoid from its irreversible blindness. Previous study suggested the prevalence of DR is higher in western high income countries than the low and middle-income Asian countries populations; 29 - 40% in the USA, 27% in Canada, and 30% in the UK and Australia, 15.8% in South Korea, 18% in India, and 23% in China [6]. However, the recent studies and meta-analysis suggested the DR prevalence could be actually higher in Asian countries than the expected. The lower rates could have been due to a lack of awareness, late detection of DR, and poor access to health care [7]. The recent study reported prevalence of any DR varied from 12% to 43%, and STDR varied between 12% to 26% in people with DM in some SEA Countries [8]. The differences is possibly due to variation of risk factors among people with diabetes. DR prevalence ranged from 9% to 23.6% in population based studies of Nepal, a lower middle-income country in SEA region. DR was higher among the studies involving older age groups as compared to those of younger age groups [9-11]. Likewise, DR prevalence was found in the range of 21% to 44.7%

in hospital based studies [12-14]. The higher prevalence of DR in hospital based study is because of the predominant patients with poorly controlled blood sugar and those with eye problems visiting the hospitals for treatment purpose. Even in high income countries, DR prevalence has been found higher in migrant populations and minority ethnic groups. In the UK, South Asians have a significantly higher prevalence of DR than white Europeans (45 vs. 37% of any DR; 16 vs. 12% of VTDR) [15]. In Singapore, Indians were found to have higher prevalence than Malays and Chinese [16]. African Americans and Mexicans are reported to have a higher prevalence of DR as well as VTDR than whites in USA [17]. The variation in DR prevalence was due to higher levels of modifiable risk factors and early onset of diabetes in these minority and ethnic groups.

The three most important risk factors for DR are a longer diabetes duration, hypertension and hyperglycemia besides the other factors like hyperlipidaemia, anaemia, cigarette smoking, nephropathy and pregnancy [5,7,9,16]. Depending on high risk groups, prevalence of DR could varies both in high and low middle-income countries. According to Wisconsin Epidemiological Study, in 20 years duration, almost 99% developed DR in type 1 diabetes and two third had DR in type 2 diabetes mellitus [18,19]. The overall prevalence of DR in developed countries have been found higher as compared to many developing countries [6]. The difference could be related to duration of diabetes and life expectancy. A meta-analysis involving 72 articles from 33 countries from developed and developing countries reported the DR prevalence varied from 10% to 61% in persons with known type 2 diabetes and from 1.5 to 31% in newly diagnosed diabetes [20]. Studies conducted in Nepal reported the DR prevalence among newly diagnosed cases of diabetes higher in hospital based as compared to population based studies (13% in hospital based study versus 7% in population based study) [9,13]. Presence of DR among newly diagnosed people with diabetes is due to delay in diagnosis of diabetes and uncontrolled blood sugar for prolonged period of time. IDF recently reported overall prevalence of any DR in 27% with the lowest prevalence in SEA (12.5%) and highest in Pacific Region (36.2%) among the 5,43,884 diabetic patients screened using fundus photography from 2015 to 2019 [21].

The prevalence of DR in low middle income countries is comparable across the world. The lower prevalence of DR than the high income countries is possibly due to the difference in duration of

diabetes and life expectancy. People with diabetes in high income countries live longer due to availability of health facilities, healthy diets, overall awareness and good control of other systemic risk factors. In the future, studies involving large number of people with diabetes will be useful to assess the DR prevalence, major risk factors both in high income and low middle-income countries to undertake appropriate measures of prevention and treatment to avoid resulting irreversible blindness.

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