## **Review Article**

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# Assessment, types, and etiologies of vision loss in primary care settings

Ahmed Thabit Al Nahdi<sup>1\*</sup>, Abdulaziz Ahmad Alobaid<sup>2</sup>, Abdullah Khalid Alajmi<sup>2</sup>, Abdullah Saleh Al Majed<sup>3</sup>, Ali Abdulhaq Alkhars<sup>3</sup>, Manal Amer Alsayyar<sup>4</sup>, Husain Amer Althani<sup>3</sup>, Abdulaziz Jamal Almansour<sup>2</sup>, Khaled Ali Alsaadi<sup>2</sup>, Norah Abdullah Aljaloud<sup>5</sup>, Saga Khaled Alwabel<sup>5</sup>

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## \*Correspondence:

Dr. Ahmed Thabit Al Nahdi,

E-mail: noora rahimuddinn@hotmail.com

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### **ABSTRACT**

Studies indicate the vital roles that family physicians play in the diagnosis and assessment of vision loss in the primary care settings. In ddition, family physicians give proper advice to patients and refer them to other departments for adequate screening and management of any associated comorbidities. In this literature review, we have discussed the types, etiologies, and assessment of each cause of vision loss in primary care settings. The most commonly reported etiologies include age-related macular degeneration (AMD), diabetic retinopathy, glaucomas, cataracts, and errors of refraction. The main types of vision loss usually include peripheral vision loss, central vision loss, blurred or patchy vision, and vision loss that is usually associated with a physical disability or an acquired brain injury. Providing adequate management and routine screening for the patients that are affected by the aforementioned etiologies can significantly enhance their outcomes and reduce the risk of vision loss. Providing educational campaigns about the importance of treatment compliance and routine screening should also be conducted to increase awareness and enhance the outcomes in the primary care settings.

Keywords: Vision loss, Etiology, Type, Management, AMDs, Cataract, Glaucoma

#### **INTRODUCTION**

Estimates show that vision loss is common morbidity, especially among the elderly population.<sup>1</sup> It should be noted that the statistics regarding vision loss are continuously updated as a result of the different socioeconomic variabilities that significantly impact the progression of the disease. For instance, it has been reported that the prevalence of vision loss increases with age, and estimates from the United States show that 37 million individuals are above 50 years of age, and more than 25% of this population are even above 70 years old.<sup>2</sup> Many causes have been proposed for vision loss,

including cataracts, diabetes-related eye complications, glaucomas, and age-related macular degenerations.<sup>3</sup> Providing adequate management and interventions to these patients might enhance the outcomes and reduce the rates of vision loss among them.

Evidence indicates the vital roles that family physicians play in the diagnosis and assessment of vision loss in the primary care settings, in addition to giving proper advice to patients and referring them to other departments for adequate screening and management of any associated comorbidities. A recent meta-analysis demonstrated that updates and advances in eye care services within the

<sup>&</sup>lt;sup>1</sup>Department of Ophthalmology, East Jeddah Hospital, Jeddah, Saudi Arabia

<sup>&</sup>lt;sup>2</sup>Department of Ophthalmology, Al-Bahar Ophthalmology Center, Al-Sabah, Kuwait

<sup>&</sup>lt;sup>3</sup>College of Medicine, King Faisal University, Al Hofuf, Saudi Arabia

<sup>&</sup>lt;sup>4</sup>Department of Emergency Medicine, Dammam Medical Complex, Dammam, Saudi Arabia

<sup>&</sup>lt;sup>5</sup>Unaizah College of Medicine and Medical Sciences, Qassim University, Qassim, Saudi Arabia

latest years significantly contributed to the flattening of the prevalence curve of vision loss.<sup>3</sup> In this literature review, we aim to discuss the types, etiologies, and assessment of each cause of vision loss in primary care settings.

#### **METHODS**

This literature review is based on an extensive literature search in Medline, Cochrane, and EMBASE databases which was performed on 26<sup>th</sup> August 2021 using the medical subject headings (MeSH) or a combination of all possible related terms. This was followed by the manual search for papers in Google Scholar while the reference lists of the initially included papers. Papers discussing causes of vision loss in primary care settings were screened for relevant information, with no limitation placed on date, language, age of participants, or publication type.

#### **DISCUSSION**

#### **Types**

Based on evidence from the current studies in the literature, the types of vision loss might include peripheral vision loss, central vision loss, blurred or patchy vision, and vision loss that is usually associated with a physical disability or an acquired brain injury.<sup>4</sup> Other types of vision loss might also include decreased ability to see colors, decreased contract sensitivity, interference from glare, inability to adjust to the different levels of light, and total vision loss. Central vision loss can be observed as the inability of the affected eye to focus on the details, and suffering from central blurred spots within the field of vision of the affected patient. Besides, the blurred spots might then develop into blank or dark spots as the disease progresses without proper treatment or interventions. In another context, it has been demonstrated that peripheral vision loss can significantly impact the affected patient's mobility and quality of life. Tunnel vision is the main characteristic of peripheral vision loss as patients usually experience clearer sight in the central field than the peripheral one. Sensitivity to glare, loss of night vision, reduced adaptation to the frequent changing of light might also be characteristically associated with patients suffering from peripheral vision loss. In cases of blurred vision, patients do not have characteristic sight-related manifestations as peripheral and central vision might be affected. Cataracts and diabetic retinopathy are the most common causes of this type of vision loss. On the other hand, vision loss that is associated with a physical disability is attributable to damage or injury to the occipital lobe, an area of the brain that is responsible for the interpretation of visual information. Stroke and physical trauma are the probable causes for these events, and affected patients usually suffer from associated peripheral vision loss, double vision, involuntary eye movements, problems with fixation and focusing, and visual neglect.5-7

#### Etiologies and assessment

In this section, we will discuss the different most common causes of vision loss and the different recommended approaches to assess each cause based on the evidence from the relevant studies. Many causes have been identified, including AMD, diabetic retinopathy, glaucomas, and cataracts. In general, the American academy of ophthalmology recommends that adults that are ≥65 years old should be routinely examined by comprehensive eye tests based on expert opinions to intervene against the development of any potential diseases that might impair vision and cause vision impairment or loss.<sup>8</sup> Some of the recommended tests include visual field testing, visual acuity test, tonometry, and pharmacological induction of pupillary dilatation.9 On the other hand, and based on the U.S. preventive services task force (USPSTF), no apparent guidelines for the effectiveness and validation of the routine screening of the eye tests that should be performed to adequately intervene against the development of eye diseases in old patients because no conclusive evidence was reported in the literature. 10 Accordingly, in the present section, we will focus on the etiologies of vision loss and how to intervene against their development to preserve vision and intervene against any potential visual impairment. One of the main causes that have been frequently reported in the literature is glaucoma, which can significantly induce damage to the optic nerve via a group of heterogeneous disorders that can consequently cause loss of the visual field and lead to a permanent loss of vision. Primary angle-closure glaucoma and primary open-angle glaucoma are the most commonly reported forms of glaucoma. Elevated intraocular pressure (ocular hypertension) is the main characteristic that is usually observed in patients with glaucoma, however, it was also reported that some patients might suffer from the damaged optic nerve with no observed ocular hypertension.<sup>11</sup> Accordingly, the diagnosis of glaucoma should be done by measuring the intraocular pressure, in addition to evaluating the visual field, and with adequate assessment of the optic disc to measure the severity of damage of the optic nerve. 11,12 Based on the guidelines of the USPSTF, no clear evidence in the literature supports the routine screening for primary open-angle glaucoma. However, it has been demonstrated that some populations (including Hispanics, blacks, and individuals with a family history of glaucoma) might be at increased risk of developing the disease, and therefore, routine assessment of the visual fields of these patients can be beneficial in such cases and might be associated with enhanced outcomes.<sup>12</sup> In patients with increased risk or confirmed glaucoma, previous diagnosis of studies demonstrated that some medications can be used to lower the intraocular pressure and enhance the prognosis. 1,13,14 However, it has been estimated that compliance with these medications is a major hold-back, with an estimated rate of less than 50% of treatment compliance per year. 15 Enhancing patient education, planning for more simple treatment regimens, educating about the proper use of medications, and providing support to patients might enhance the compliance rates. <sup>16</sup> Recently, surgery has been approved as an alternative approach to manage these patients, and the reported outcomes indicate the validity and efficacy of this approach. <sup>17</sup> However, further investigations are still needed.

Another etiology that might cause visual loss is cataracts, which can be easily detected using a handheld ophthalmoscope. The physicians can observe the red reflex as being extinct, dull, or shady in these patients. However, it should be noted that many cases with cataracts do not require treatment because no visual impairment is usually associated. On the other hand, glare sensitivity, impaired vision, or reduced ability to see clearly at night are indicative to be assessed by an ophthalmologist to draw the appropriate management plan. In such cases, it has been demonstrated that surgical approaches are the only valid in these situations to obtain favorable outcomes. 18 Reports from the United States indicate that the standardized surgical modality for these patients has been phacoemulsification with replacement of the intraocular lens. It should be noted that a previous meta-analysis indicated that no improvement in the outcomes was noticed if a routine examination was conducted before the surgery, based on the analysis of findings from 3 randomized controlled trials. 19,20 Accordingly, the American Academy Ophthalmologists has recommended that medical testing should not be routinely conducted amind surgical approaches.<sup>21</sup> Studies have also evaluated the costefficacy of immediate sequential cataract surgeries versus delayed ones. An estimate from a previous investigation shows that if immediate sequential cataract surgeries were conducted across the United States rather than the delayed ones, \$522 million per year would be saved. 22,23 Progressive cataract development has been reported to be associated with smoking and ultraviolet rays exposure.<sup>24</sup>-<sup>26</sup> Besides, it has been reported that smoking is also a risk factor for the development and progression of AMD.<sup>24-26</sup> Accordingly, it is recommended to avoid these elements to achieve better outcomes.

Diabetes mellitus (DM)-related eye changes are also potential causes that might induce vision loss (Figure 1). Therefore, patients with DM should be routinely monitored and examined by an ophthalmologist to achieve favorable outcomes.<sup>27</sup> On the other hand, it has been demonstrated that such examinations can be dispensed with in cases with older adults with DM with no apparent eye diseases or associated chronic morbidities. To reduce the risk of developing diabetic retinopathy, the results of many previous randomized controlled trials have demonstrated that glycemic control has been associated with significantly favorable outcomes.<sup>28-31</sup> However, it was also reported that it is not clear about the effects of these favorable effects on older patients because, in these patients, tight glycemic control might induce hypoglycemia and increase the risk of mortality.<sup>32,33</sup> Accordingly, a target range of hemoglobin

A1C of 8.5% has been recommended for older patients, based on the consensus guidelines from the American Diabetes Association.<sup>28</sup> In the same context, previous clinical trials have also demonstrated the efficacy of fenofibrate on slowing the progression of diabetic retinopathy and decreasing the time to performing the first laser treatment, irrespective of the effects of these treatment modalities on lipid profiles.34,35 Using panretinal photocoagulation has been also previously validated to reduce the process of neovascularization and reduce the risk of proliferation of diabetic retinopathy.<sup>36</sup> previous review also demonstrated that the administration of vascular endothelial growth factor inhibitors can be useful in some cases. 37,38 However, the evidence is still poor and further investigations are still needed. The management of diabetic macular edema is also important because it may cause a rapid deterioration in vision. In this context, the Food and Drug Administration has approved ranibizumab and aflibercept in 2015. Besides, it was also reported that the latter drug can be used in more advanced cases with macular edema.<sup>39,40</sup> Intravitreal administration of corticosteroids was also reported for treating macular edema. However, it has been linked with an increased risk of intraocular pressure elevation.41

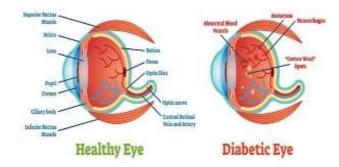


Figure 1: The differences between a healthy eye and a diabetic one.

Furthermore, AMD was also reported as an important factor that can cause vision loss. It has been demonstrated that worsening or novel abnormalities that might develop in patients with AMD are indicative of routine examination by an ophthalmologist to intervene against the development of any potential complications, including vision loss. Many treatment modalities have been proposed to enhance the outcomes that might be associated with AMDs. Vitamin supplementations and vascular endothelial growth factor inhibitors are the main treatment modalities that were previously validated with enhanced outcomes and favorable safety profiles for patients with AMDs. Evidence regarding these modalities is obtained from previous randomized controlled trials, which indicates the strong efficacy that these modalities pose in the management of AMD and intervening against vision loss. 42-47 Finally, errors of refraction were also reported as common causes of vision loss in primary care settings. The meta-analysis showed that errors of refraction and cataracts were the most commonly reported

etiologies for moderate and severe visual impairment.<sup>3</sup> Therefore, providing optimal management and routine examination for these patients can significantly intervene against any visual impairment.

#### **CONCLUSION**

The most commonly reported etiologies include AMD, diabetic retinopathy, glaucomas, cataracts, and errors of refraction. The main types of vision loss usually include peripheral vision loss, central vision loss, blurred or patchy vision, and vision loss that is usually associated with a physical disability or an acquired brain injury. Providing adequate management and routine screening for the patients that are affected by the aforementioned etiologies can significantly enhance their outcomes and reduce the risk of vision loss. Providing educational campaigns about the importance of treatment compliance and routine screening should also be conducted to increase awareness and enhance the outcomes in the primary care settings.

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