

Myopia

I Dewa Bagus Ketut Widya Pramana

Faculty of Medicine, University of Mataram, Indonesia

gustutpramana@gmail.com

Article Information

Accepted : 15 November 2021

Submitted : 08 December 2021

Online Publish : 20 December 2021

Abstract

Refractive disorder is the most common cause of visual impairment in the world, and one of them is myopia. Myopia is a condition of the eye failing to focus light from an object causes it to focus in front of the retina. The elongation of the axis of the eyeball and the high refractive power of the cornea and lens might be the cause of myopia. Myopic patients often complain of blurred vision when looking at a far objects. There are several risk factors of myopia, including genetics, gender, age and environment. This article is literature review. The purpose of this paper is to provide an overview related to refractive disorders, especially myopia. The management of myopia patients can be divided into 2, including optical therapy and pharmacological therapy. Optical therapy includes the smallest negative spherical glasses that provide maximum visual acuity, contact lenses, and orthokeratology. Management of myopic patients aims to reduce progression and complications by providing optical therapy in the form of spherical glasses, contact lenses, and orthokeratology

Keywords : Refractive Disorder; Visual Impairment; Myopia;

Introduction

Visual impairment is one of the global health issues that had an impact on personal, economic, and social life (Alswailmi 2018). Visual impairment is a condition of a person experiences a decrease in visual function (Lee and Mesfin 2017). The incidence of visual impairment in the world is around 2.2 billion, which often occur at the age above 50 years, but also can affect people of all ages (WHO.2021). The most common causes of visual impairment in the world are uncorrected refractive disorders (48.9%), cataracts (25.8%), and Age-Related Macular Degeneration (AMD) (4.1%) (Kemenkes, 2018).

Refractive disorder is the failure of the eye to focus the light from an object to the retinal plane (Gomez-Salazar et al. 2017). Myopia is the most common refractive disorder in the world (Cooper and Tkatchenko 2018). Myopia or nearsightedness is a condition of the eye failing to focus the light on an object causing the light to be focused directly in front of the retina (Flitcroft et al. 2019). Myopic patients mostly complain about blurred vision when looking at distant objects (Carr and Stell 2017). The impacts of myopia include: effect of the ability to learn, quality of life, personal life, economic, psychological, and can cause blindness (Congdon, Burnett, and Frick 2019); (Cooper and Tkatchenko 2018). The purpose of this paper is to provide an overview related to refractive disorders, especially myopia.

Method

This article is literature review, A literature review discusses and analyses published information in a particular subject area. Sometimes the information covers a certain time period

Result and Discussion

Definition

Myopia is a refractive disorder characterized by the failure of the eye to focus the light on an object causing it to be focused right in front of the retina. The value of spherical refraction in myopic patients in – 0,50 diopters (Flitcroft et al. 2019).

Epidemiology

Myopia is the most common refractive disorder in the world (Cooper and Tkatchenko 2018). The estimated incidence of myopia in the world will increase from 2000 to 2050. The incidence of myopia in 2000 was 22% and in 2050 increased by 52% (Holden et al. 2016). The countries with the highest incidence of myopia are in East Asia, namely China, Japan, Korea, and Singapore. Meanwhile, the lowest incidence of myopia is in Australia, Europe, North America, and South America (Organization 2015). The incidence of myopia in Indonesia, especially North Sulawesi was around 26.1% with the prevalence of myopia being more dominant in women, namely 613 people, and men, namely 320 people (Kalangi et al. 2016).

Risk Factor

1. Genetic

Family history plays an important role in the development of myopia. Several studies have revealed that children with parental history of myopia than those without myopic parents increase the risk of myopia. Children with no history of myopic parents increased the risk by 7.6%, history of one myopic parent increased the risk by 14.9%, and the history of both parents have myopically increased the risk of myopia by 43.6% (Li and Zhang 2017).

2. Gender

Several studies show the incidence of myopia is higher in women due to men's daily activities related to higher outdoor activities (titi Lestari et al. 2020). Outdoor activity increases the intensity of light that enters the eye, causing it to reduce the accommodation power and dopamine release by the retina, which is reducing eye elongation and the risk of myopia (Rose et al. 2008)

3. Age

The incidence of myopia generally occurs in children and young adults due to an increase of lens refractive index to the high accommodation power in children and young adults (titi Lestari et al. 2020)

4. Environment

The habit of close-range activities, like staying in front of a computer or laptop or other electronic devices can increase the risk of myopia. This induced disturbance of the eye accommodation, causing the eye muscles too tired quickly, a decrease in visual acuity, so when viewing at a distant object it will be blurry (Czepita, Czepita, and Lubi ski 2017; titi Lestari et al. 2020). Other environmental factors that can cause myopia include lack of outdoor activity, lack of physical activity, diet, low level of education, and living in urban areas (Mrugacz and Witkowska n.d.). People with high outdoor activities can reduce the incidence of myopia by 2%, depending on their time spent outdoors (Recko and Stahl 2015).

Pathogenesis

The light refraction in the eye is determined by the visual medium consisting of the cornea, eye fluid, lens, glass body, and eyeball length. The lens, the curvature of the cornea, and the length of the eyeball play an important role in the balance of light refraction. In myopic patients, there is an altered biometric visual media. There is an increase in refractive power of the cornea and lens, elongated length of eyeball, choroid, and sclera are thinner than in normal eyes, causing entered light through the visual medium will be focused in front of the retina. (Chakraborty et al. 2020) (Ilyas and Yulianti. 2017).

Clinical Manifestations

Signs and symptoms of a person experiencing myopia include blurred vision when objects are far away so that they often narrow their eyes, often see objects at close range, impaired concentration, and headaches (Michelle 2019).

Treatment

The management of myopia patients can be divided into 2, including optical therapy and pharmacological therapy. Optical therapy includes the smallest negative spherical glasses that provide maximum visual acuity, contact lenses, and orthokeratology. (Cooper and Tkatchenko 2018) (Ilyas and Yulianti. 2018) (Recko and Stahl 2015). Pharmacological therapy in the form of atropine and pirenzepine is a selective antimuscarinic drug that can reduce the progression of myopia (Recko and Stahl 2015).

Conclusion

Myopia is an eye refractive disorder characterized by the failure of the eye to focus light on an object causing it to be focused in front of the retina. This abnormality can be caused by the elongation of the axis of the eyeball and the high refractive power of the cornea and lens. Risk factors of myopia include genetics, age, gender, and environment such as close-range activities, for example, staying in front of computers, laptops, gadgets, or other electronic devices, lack of outdoor activities, diet, high level of education, and living in an urban area. Management of myopic patients aims to reduce progression and complications by providing optical therapy in the form of spherical glasses, contact lenses, and orthokeratology.

REFERENCES

- Alswailmi, Farhan Khashim. 2018. "Global Prevalence and Causes of Visual Impairment with Special Reference to the General Population of Saudi Arabia." *Pakistan journal of medical sciences* 34(3): 751.
- Carr, Brittany J, and William K Stell. 2017. "The Science behind Myopia." *Webvision: The Organization of the Retina and Visual System [Internet]*.
- Congdon, Nathan, Anthea Burnett, and Kevin Frick. 2019. "The Impact of Uncorrected Myopia on Individuals and Society." *Community eye health* 32(105): 7.
- Cooper, Jeffrey, and Andrei V Tkatchenko. 2018. "A Review of Current Concepts of the Etiology and Treatment of Myopia." *Eye & contact lens* 44(4): 231.
- Czepita, Maciej, Damian Czepita, and Wojciech Lubi ski. 2017. "The Influence of Environmental Factors on the Prevalence of Myopia in Poland." *Journal of ophthalmology* 2017.
- Flitcroft, Daniel Ian et al. 2019. "IMI-Defining and Classifying Myopia: A Proposed Set of Standards for Clinical and Epidemiologic Studies." *Investigative ophthalmology & visual science* 60(3): M20–30.
- Gomez-Salazar, Francisco et al. 2017. "Refractive Errors among Children, Adolescents and Adults Attending Eye Clinics in Mexico." *International journal of ophthalmology* 10(5): 796.
- Holden, Brien A et al. 2016. "Global Prevalence of Myopia and High Myopia and Temporal Trends from 2000 through 2050." *Ophthalmology* 123(5): 1036–42.
- Lee, So Yeon, and Fassil B Mesfin. 2017. Blindness.StatPearls[Internet]. Access from: <https://www.ncbi.nlm.nih.gov/books/NBK448182/>
- Li, Jiali, and Qingjiong Zhang. 2017. "Insight into the Molecular Genetics of Myopia." *Molecular vision* 23: 1048.
- Michelle, L. 2019. "How to Detect Myopia in the Eye Clinic." *Eye Health* 32(105): 201915.
- Mrugacz, Malgorzata, and Katarzyna J Witkowska. "Myopia: Risk Factors, Disease

Mechanisms, Diagnostic Modalities, and Therapeutic Options.”

Organization, World Health. 2015. “The Impact of Myopia and High Myopia.” In *Report of the Joint World Health Organization-Brien Holden Vision Institute Global Scientific Meeting on Myopia, University of New South Wales, Sydney, Australia, ,* 16–18.

Recko, Matthew, and Erin Durrie Stahl. 2015. “Childhood Myopia: Epidemiology, Risk Factors, and Prevention.” *Missouri medicine* 112(2): 116.

Rose, Kathryn A et al. 2008. “Myopia, Lifestyle, and Schooling in Students of Chinese Ethnicity in Singapore and Sydney.” *Archives of ophthalmology* 126(4): 527–30.

titi Lestari, Titi, Anggunan Anggunan, Tusy Triwahyuni, and Rachmat Syuhada. 2020. “Studi Faktor Risiko Kelainan Miopia Di Rumah Sakit Pertamina Bintang Amin.” *Jurnal Ilmiah Kesehatan Sandi Husada* 9(1): 305–12.

Copyright holder:

I Dewa Bagus Ketut Widya Pramana (2021)

First publication right:

KESANS : International Journal Health and Science