The impact of visual environment on the evolution of myopia

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Abstract. Our study represents the impact of the visual environment on the evolution of myopia. We established a statistical study of different types of myopia in Morocco. We classed with degrees of myopia. The long-term work of near vision increases a vision-postural stress leads to an increase in accommodative visual stress and convergence, and the correction with traditional lenses leads to hyperopic defocusing peripheral, which stimulates the elongation of the optical axis [1, 4]. We found that the number of myopia is changing during the four years of study and that the correction by traditional lenses does not allow us to slow down the evolution of myopia., this type of management and the visual environment leads us to an increase in the degrees and number of myopia during the four years. The increase in the power of myopia can lead to a pathological state that is preoccupant. We find that the visual environment has an impact on the increase of different types of myopia, especially average myopia in young people. So we have to try new alternatives for myopia compensation as special lenses for myopia braking and orthokeratology lens contact as well as behavioral and environmental measures to decrease visuals.

Keywords—Concave lens, Digital technology, Diopter, Environment, high myopia, low myopia, medium myopia, concave lens.

1. Introduction

Myopia is the most common visual refractive error in the world, in the absence of correction, it is recognized as a major cause of visual impairment. It has become a worldwide epidemic by 2050, 50°/°of the world [27], the population will be myopic [6, 11, 16]. The prevalence of myopia and high myopia (≤-6D) is increasing excessively worldwide [12]Myopia prevalence rates are higher in Asian cities like Hong Kong, Singapore, Asia, and Taiwan [13]This prevalence is linked to urbanization, lifestyle changes, and higher rates of literacy and education. Increased myopia can cause pathologies like retinal detachment, cataract glaucoma, staphyloma myopic, macular degeneration [10, 21, 26], and myopic choroidal neovascularization (CNV) and it is one of the causes of blindness in many Countries [10, 20, 21]. However, what is worrying is that young people are on the front lines. In just two generations, the rate of young myopic patients has doubled in some countries. [1, 6, 8] Early onset of myopia increases loss of Productivity and independence resulting in the degradation of the quality of life. [12]It is a major public and economic health burden worldwide. [20-21]According to several teams of researchers and Optometry professionals in Europe, the United States, and Asia, the parameters potentially involved in this Planetary epidemic concern [20-21] are genetics[3] and environmental factors such as generalization and lengthening of Schooling and sedentary lifestyle, which seem to be the root of the problem. Added to that is the correction of Ametropia by spherical concave glasses [12] which only

corrects the central myopia Defocusing leaving behind the peripheral hyperopic defocusing. As a consequence, the elongation of the Ocular axis remains stimulated. [1,4,8,12,23] There are several alternative compensation studies., pharmaceutical atropine,[7-22], optics the lens of frames, contact lens orthokeratology, flexible multifocal[2,5,9,18,19,22,24,25].Behavioral given the increased prevalence of myopia worldwide, and the growing number of myopia. Patients that we receive daily in practice in our Moroccan optical. We conducted a prospective statistical study of different types of Myopia in Morocco taking as a sample the population of a coastal city, Casablanca, whose population is young (65°/°) and active (49°/°).

2 . Method

We collected the data in the optical in Casablanca after the execution of the prescriptions of the patients who carried out objective refraction with their agreement. We randomly screened fifty (50) patients each year during a period from 2017 to 2020, the age group was from 16 and 45 years old. Aspherical equivalent (ES) =sphere+½ cylinder, Diopter (D).Low myopia represents individuals who have (ES) of (−0.50 to −3) D. Myopic averages represent individuals who have (ES) from (−3 to −6) D. High myopia represents individuals who have an (ES) (≤−6).

3. Results

3.1. Resultat 1

This table represents the number of patients collected over the four years and their classification into myopic and not myopic patients.

Table 1. Prevalence of myopia and non-myopia

Number of patients/the year	**2017**	**2018**	**2019**	**2020**
Number of no myopic	22	22	20	16
Number of myopics	28	28	30	34

3.2. Resultat 2

This table shows the classification of the number of patients with different types of myopia for four years.

Table 2. Prevalence of different myopia between the years 2017 and 2020

Number of patients/the year	**2017**	**2018**	**2019**	**2020**
Number of low myopics	6	6	8	10
Number of medium myopics	16	16	16	17
Number of high myopia	7	6	6	7

4. Discussion

According to Table1, the prevalence rate of myopia is progressively increasing during the four successive years compared to other ametropias.According to Table 2 we notice that the prevalence of medium myopia is very high compared to low myopia and high myopia during the four successive years. The impact of the visual environment on the evolution of myopia, or nearsightedness, has been a topic of research and discussion in recent years. Myopia is a refractive error that causes distant objects to appear blurry while near objects remain clear. The prevalence of myopia has been increasing worldwide, particularly in urban areas and among younger populations. While genetics play a role in the development of myopia, environmental factors, including visual stimuli, have also been identified as significant contributors. It's important to note that while these factors have been associated with myopia, the exact mechanisms and causal relationships are still under investigation. Additionally, individual susceptibility and genetic factors also play a role in the development and progression of myopia.

To address the impact of the visual environment on myopia, it is recommended to practice good visual hygiene. This includes taking regular breaks during near work, maintaining proper posture and ergonomics while using digital devices, ensuring adequate lighting conditions, and encouraging outdoor activities and exposure to natural daylight. Regular eye examinations are also important for early detection and management of myopia.

5 . conclusion

During four years of study, we carried out a quantitative statistical study at the level of Morocco. We found that the prevalence rate of myopia is higher than any other ametropia, noting that the most dominant type was medium myopia. The prevalence rate increased excessively in 2019-2020. During this period, capitalized Government imposed a full lockdown as the most effective strategy to combat the spread of COVID-19. Subsequently, work and studies were carried out remotely. As a result, the time devoted to outdoor activities and Exposure to daylight was very restricted as opposed to increased exposure to artificial lighting. And as the Casablanca region is an economic hub in its own right, a significant increase in myopia cases has been noted. To limit their impact, we need to encourage patients

to spend more free time outdoors and to use their digital devices rationally, especially children and teenagers. As for professionals, we encourage the use of the latest optical innovations, both for glasses and lenses, such as MiSight, advanced orthokeratology, multifocal contact lenses, and bifocals lenses, which have proven to give acceptable results in correcting optical refractive errors.

6. References

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