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Prevalence of retinal complications related to myopia

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SOMMAIRE

ABREVIATIONS

AMD: age macular degeneration

CRA: chorioretinal atrophy

D: diopters

DALYs: disability-adjusted life years

LC: lacker cracks

mCNV: Myopic choroidal neovascularization

RE: refractive error

SD-OCT: Spectral Domain Optical Coherence Tomography

VA: visual acuity

Prevalence of retinal complications related to myopia.

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ABSTRACT

Objective: Refractive errors (RE), particularly myopia, are the first cause of visual impairment worldwide. High myopia is a frequent cause of sight-threatening chorioretinal complications. This study aimed to evaluate the prevalence of retinal complications in patients suffering from myopia.

Methods: This cross-sectional study was carried out in French eye clinics mainly dedicated to refractive errors. Data collection included age, gender, refractive subjective errors on both eyes and any relevant ocular history related to retinal complications of myopia documented with fundus examination, SD-OCT or fluorescein angiography. Myopia was defined as mild (-0.5 to -3D), moderate (-3 to -6 D), high (-6 to -10D) and very high (less than -10D). Macular complications related to myopia included staphyloma, lacker cracks (LC), myopic choroidal neovascularization (mCNV), chorioretinal atrophy (CRA) and retinoschisis.

Results: medical data files from 198 641 myopic individuals (55.8% of women) with a mean age of 34 years (SD: 15 years) were analyzed. Prevalence of mild, moderate, high and very high myopia was respectively 65.95%, 26.14%, 6.72% and 1.19%. Prevalences of retinal complications in the high and very high myopia groups were respectively: for staphyloma 2.01% [1.78 - 2.27%] and 7.65% [6.61 - 8.80%]; for LC 0.07% [0.03 - 0.13%] and 0.51% [0.26 - 0.88%]; for mCNV 0.07% (0.03 - 0.13%) and 0.42% (0.20 - 0.78%) in the high and very high myopia groups; for retinoschisis 0.03% [0.01 - 0.08%] and 0.30% [0.12 - 0.61%]; for macular CRA 0.39% [0.29 - 0.51] and 3.42% [2.73 - 4.24]. After adjustment on myopia and age, the risk for CRA was higher among women: OR=1.33; 95% CI [1.01 – 1.75]. Prevalence of blindness or visual impairment was observed in 29.95% [28.10 – 31.85%] of very high myopic patients. At 60 years old or over, the frequencies of blindness or visual impairment were respectively of 27.19% [24.35 – 30.19%] and 56.74% [51.10 – 62.25%] in the high and very high myopia groups.

Conclusions: This multicentric study provides new insights in terms of prevalence of retinal complications related to myopia. This is to our knowledge, one of the largest European ophthalmological series of individuals dedicated to prevalences of retinal complications of myopia.

INTRODUCTION

In 2000, according to definitions of myopia and high myopia by refractive error of -0.50 and -5 diopters (D) or less respectively, myopia and high myopia affected 1,406 billion people (22.9%) and 163 million people (2.7%) in the world. In the same study, projections estimated that the prevalence of myopia and high myopia will affect nearly 4.7 billion people and 1 billion people, respectively, by 2050 [1]. The incidence increase does affect more importantly the young urban Asian populations than the other populations, but these latter are also concerned by the myopia epidemy. Indeed, between 1999 and 2004 the prevalence of myopia (defined by a refractive error ≤ -1D) in the United States among individuals aged 20 years or older rose from 20.5% to 36.2% [2]. From six studies providing refractive data on 29 281 individuals aged 40 years or older living in the US, Western Europe and Australia, the Eye Diseases Prevalence Research Group reported estimated prevalences of myopia of 25.4%, 26.6% and 16.4% respectively [3].

In parallel, the prevalence of high myopia, usually defined with a cutoff of -5 or -6 diopters, has increased, with prevalences being almost of 20% in some young Asian populations [4 5 6].

Myopic maculopathy is a major cause of visual impairment worldwide. This spectrum of macular disorders usually associated to high and pathologic myopia frequently affects individuals at working age. In the Taizhou Eye Study conducted in China, myopic macular degeneration is the second cause of visual impairment in adults aged 45-59 years after cataract [7]. In Japan, myopic maculopathy is also a major cause of blindness and visual impairment after 40 years [8]. In USA, Western Europe and Australia, macular degeneration, including age-related macular degeneration (AMD) and myopic macular degeneration, have become one of the most important cause of blindness [9].

Facing to a pandemic level of myopia, it is very likely that visual impairment related to myopic maculopathy will increase, with subsequent consequences, apart from socioeconomic cost, on quality of life and working efficiency [10]. Furthermore, the burden of myopic maculopathy in terms of disability-adjusted life-years (DALYs) is probably much higher than AMD, the first cause of visual impairment in developed countries, due to the age at occurrence of macular complications in high myopia, because lacquer cracks or myopic choroidal neovascularization frequently occur around

fifty years of age [11] [12], chorioretinal atrophy being usually the last stage of the myopic maculopathy.

If many studies have focused on prevalence of myopia itself and its consequence in terms of functional impact, the prevalence of retinal complications of myopia and their functional consequences remain largely unknown.

In this context, we aimed to describe the prevalence of macular complications related to myopia and their visual impact in a large group of European individuals through a cross-sectional study.

METHODS

Study design

This cross-sectional study was carried out in French eye clinics mainly dedicated to refractive errors.

Data collection

Data collection included age, gender, subjective refractive error, visual acuity, any relevant medical history such as laser refractive surgery, cataract surgery and any macular complications related to myopia on both eyes. The best corrected visual acuity was assessed on a Monoyer chart and determined after objective auto-refractometry followed by subjective refinement. All individuals underwent an ophthalmic examination, including non cycloplegic autorefraction on both eyes in adults (tono-refractometer, Nidek®) and a cycloplegic autorefraction with cyclopentolate for children, a slit lamp examination and a fundus examination.

Refractive and examination data

Severity of myopia was classified as mild myopia (-0.5 to -2.75 D), moderate myopia (-3 to -5.75 D), high myopia (-6 to -9.75 D) and very high myopia (less than -10 D).

Retinal complications related to myopia included staphyloma, lacquer cracks, past or active myopic choroidal neovascularization, retinal hemorrhage, chorioretinal atrophy and retinoschisis. These lesions were assessed by fundus examination, SD-OCT and or fluorescein angiography if judged necessary by the ophthalmologist.

Exclusion criteria included any missing data related to subjective refractive error, age, gender, and any history of refractive or cataract surgery.

Visual impairment was defined as a best-corrected visual acuity of less than 0.3 to 0.05 or greater. Blindness was defined as a best-corrected visual acuity less than 0.05, according to the World Health Organization criteria [13].

Data collection was declared to the CNIL IRB/Ethics Committee which ruled that approval was not required for this study and that the described research adhered to the tenets of the Declaration of Helsinki.

Data annotation

The original dataset contained the records of 602,103 myopic and non-myopic patients. In the initial database, information pertaining to complications and exclusion criteria was part of unstructured text fields. Patient annotation for a given complication was carried-out through a three-step text-mining process:

- Extraction of relevant terms from all text fields
- Selection of records based on these terms (47,438 records)
- Manual review and annotation of the selected records

Statistical analysis

A pathology was assigned to a *patient* as opposed to an *eye, i.e.* regardless whether it was mentioned about the right or left eye, it was considered present. Visual acuity was treated similarly: a patient was given a visual acuity status ("no visual impairment", "visual impairment" or "blindness") based on the worst eye. On the other hand, refractive errors (REs) were assigned to each eye. Only left eyes were considered in the analysis, making the common assumption that both eyes are highly correlated. Note that since cylinder measurements were not available, refractive errors were quantified by the sphere instead of the more common spherical equivalent.

Prevalence of visual impairment and blindness, and prevalences of complications were computed with respect to myopia severity, age, and gender, and reported with exact Clopper-Pearson binomial 95% confidence intervals (CI). Univariate and multivariate odds ratio (OR) for myopia severity were computed from logistic regression coefficients with corresponding Wald 95% CI. All analyses were performed with the SAS software.

RESULTS

Demographic, refractive and functional data

Data from 198 641 myopic outpatients (mean age 34 ± 15 years) were included into the analysis. The distribution of severity of myopia in this population was: mild 65.95%, moderate 26.14%, high 6.72%, and very high 1.19%. Demographic and refractive data are presented in Table 1.

	N (%)	Age Mean ± SD	Sphere Mean ± SD	Visual impairment or blindness % [95% CI]
Myopes	198,641 (100.00)	34 ± 15	-2.63 ± 2.21	3.59 [2.51 - 3.67]
Gender				
Females	110,777 (55.77)	34 ± 15	-2.73 ± 2.29	3.44 [3.33 - 3.55]
Males	87,864 (44.23)	35 ± 15	-2.50 ± 2.10	3.78 [3.66 - 3.91]
Myopia class				
Mild myopia	131,001 (65.95)	34 ± 15	-1.41 ± 0.70	2.94 [2.85 - 3.03]
Moderate myopia	51,920 (26.14)	35 ± 14	-4.05 ± 0.82	3.37 [3.22 - 3.53]
High myopia	13,355 (6.72)	36 ± 14	-7.20 ± 1.03	6.20 [5.80 - 6.62]
Very high myopia	2,365 (1.19)	41 ± 15	-13.00 ± 3.31	29.95 [28.10 - 31.85]

Table 1. Age, refraction and functional data according to gender and myopia severity.
Visual impairment or blindness is defined as a best-corrected visual acuity of less than 0.5.

Macular complications

In terms of macular complications, the prevalences of staphyloma, lacker cracks (LC) and myopic choroidal neovascularization (mCNV) were respectively 2.01% [1.78 – 2.27%], 0.07% [0.03 – 0.13%]), and 0.07% [0.03 – 0.13%] in the high myopia group, whereas these frequencies were 7.65% [6.61 – 8.80%]), 0.51% [0.26 – 0.88%] and 0.42% [0.20 – 0.78%]) in the very high myopia group. The prevalence of CRA was of 0.39% [0.29 – 0.51%] and 3.42% [2.73 – 4.24] in the high and very high myopia groups respectively. The prevalence of retinoschisis was of 0.03% [0.01 – 0.08%] and 0.30 % [0.12 – 0.61%] in the high and very high myopia groups respectively. These results are detailed in Table 2.

		Mild myopia (N = 131 001)		Moderate myopia (N = 51 920)		High myopia (N = 13 355)		Very high myopia (N = 2 365)	
Staphyloma	N, % [95% CI]	136	0.10 [0.09 - 0.12]	260	0.50 [0.44 - 0.57]	269	2.01 [1.78 - 2.27]	181	7.65 [6.61 - 8.80]
	OR [95% CI]		Ref		4.94 [4.02 - 6.09]		19.42 [15.78 - 23.90]		63.95 [50.85 - 80.43]
Macular complications	N, % [95% CI]	56	0.04 [0.03 - 0.06]	72	0.14 [0.11 - 0.17]	67	0.50 [0.39 - 0.64]	101	4.27 [3.49 - 5.17]
	OR [95% CI]		Ref		3.43 [2.42 - 4.87]		11.72 [8.20 - 16.75]		74.31 [53.20 - 103.79]
Chorioretinal atrophy	N, % [95% CI]	44	0.03 [0.02 - 0.05]	57	0.11 [0.08 - 0.14]	52	0.39 [0.29 - 0.51]	81	3.42 [2.73 - 4.24]
	OR [95% CI]		Ref		3.48 [2.35 - 5.17]		11.66 [7.78 - 17.46]		74.08 [50.94 - 107.75]
Lacquer cracks	N, % [95% CI]	3	0.00 [0.00 - 0.01]	4	0.01 [0.00 - 0.02]	9	0.07 [0.03 - 0.13]	12	0.51 [0.26 - 0.88]
	OR [95% CI]		Ref		3.52 [0.79 - 15.76]		29.09 [7.86 - 107.64]		158.45 [44.39 - 565.51]
Myopic choroidal neovascularization	N, % [95% CI]	5	0.00 [0.00 - 0.01]	6	0.01 [0.00 - 0.03]	9	0.07 [0.03 - 0.13]	10	0.42 [0.20 - 0.78]
	OR [95% CI]		Ref		3.14 [0.96 - 10.32]		17.00 [5.68 - 50.90]		70.60 [23.98 - 207.85]
Retinoschisis	N, % [95% CI]	7	0.01 [0.00 - 0.01]	9	0.02 [0.01 - 0.03]	4	0.03 [0.01 - 0.08]	7	0.30 [0.12 - 0.61]
	OR [95% CI]		Ref		3.29 [1.22 - 8.84]		5.37 [1.57 - 18.35]		40.56 [14.07 - 116.90]

Table 2. Prevalence of staphyloma and macular complications, and odds ratios, with respect to myopia severity.
Myopia severity is defined as mild: -0.5 to -3 diopters (D); moderate: -3 to -6 D; high: -6 to -10 D; and very high: less than -10 D. Odds-ratios (adjusted for age and gender) of moderate, high and very high myopia for the occurrence of complications were computed with logistic regression and use mild myopia as reference.

A significant increase in the prevalence of macular complications in relation with the severity of myopia was observed. Taking mild myopia as the reference group, univariate ORs for lacquer cracks were 29.45 [7.97 – 108.78] and 222.69 [62.80 – 789.65] in the high myopia and very high myopia groups. Similarly, the ORs for myopic choroidal neovascularization were respectively 17.67 [5.92 – 52.73] and 111.25 [38.00 – 325.73]. Considering chorioretinal atrophy, the risk was associated to an odds ratio of 11.63 [7.78 – 17.39]) and 105.55 [72.95 – 152.72] in the high myopia and very high myopia groups respectively. After adjustment on age and gender, multivariate logistic regression analysis showed that the risk of lacquer cracks was associated to ORs of 29.09 [7.86 – 107.64] and 158.45 [44.39 – 565.51] in the high myopia and very high myopia groups respectively. Similarly, the ORs for myopic choroidal neovascularization were of 17.00 [5.68 – 50.87] and 70.60 [23.98 – 207.85] in the high myopia and very high myopia groups respectively. Considering chorioretinal atrophy, the risk was associated to an odds ratio of 11.66 [7.78 – 17.46] and 74.08 [50.94 – 107.75] in the high myopia and very high myopia groups. These results are detailed in Table 2.

Functional impact

Visual impairment and blindness were observed respectively in 2.24 % [2.17 – 2.31%] and 1.35% [1.30 – 1.40%] of the myopic population. In the high myopia group, frequencies of visual impairment and blindness were respectively 4.53% [4.18 – 4.89%], and 1.67% [1.46 – 1.91%], whereas these frequencies were 23.82% [22.11 – 25.59%], and 6.14% [5.20 – 7.18%]) in the very high myopia group.

Subgroup analyses of visual impairment and blindness were also performed by defining three subgroups categorized by the 0-29 years, 30-59 years and 60 years old or more groups. In the age group 30-59 years, the prevalences of blindness or visual impairment were respectively 5.66 % [5.12 – 6.23%] and 28.65 % [26.25 – 31.14%] in the high and very high myopia groups. In the age group 60 years old or more, the prevalences of blindness or visual impairment were respectively 27.19% [24.35 – 30.19%] and 56.74 % [51.10 – 62.25%]. These results are detailed in Figure 1.

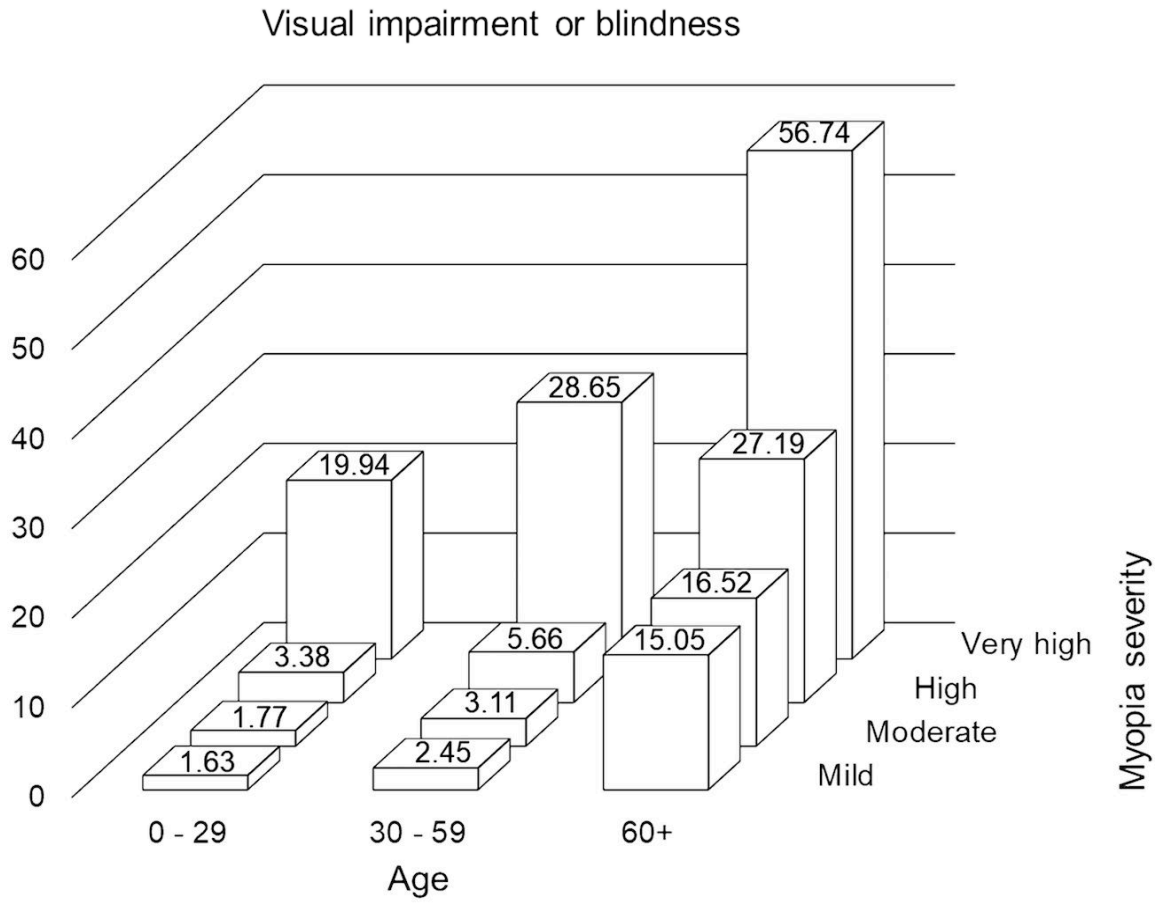

Figure 1. Relative prevalence (%) of visual impairment or blindness.
Visual impairment is defined as a best-corrected visual acuity less than 0.5.
Myopia severity is defined as mild: -0.5 to -3 diopter (D); moderate: -3 to -6 D; high: -6 to -10 D; very high: less than -10 D.

DISCUSSION

The main characteristic of the present study is to investigate the macular complications of myopia and their consecutive visual impairments in a large group of individuals. In this group of individuals with a mean age of 34 years, visual impairment and blindness were observed in 6.20 % [5.80 – 6.62] and 29.95 % [28.10 – 31.85] of high and very high myopic patients (table 1). These results obtained in a rather young group of European patients obviously raised the concern of visual impact of myopia in older population and in population with a higher incidence of high myopia. This concern is presently confirmed by the fact that of all persons with high myopia and very high myopia, respectively 27.19% [24.35 – 30.19%] and 56.74 % [51.10 – 62.25%] developed visual impairment or blindness by age 60 years.

Literature data

These results are corroborated by Tideman et al. In this cross-sectional study based on 15,693 Europeans from population-based data from the Rotterdam Study I to III, the Erasmus Rucphen Family Study and from case-control data from the Myopia Study, all from the Netherlands, the cumulative risk of visual impairment by age 75 years was 20.0% for −6 to greater than −10 D, 19.9% for −10 to greater than −15 D, and 80.3% for −15 D or less [14].

In a Scandinavian study including 10,135 participants randomly selected by the Copenhagen central population registry from a prospective cardiovascular population-based study, myopia related retinal disorders accounted for 7% of the causes of visual impairment and for 14% of causes of blindness in the total study population. However, between 20 and 64 years of age, myopia related retinal disorders accounted for 26% of the causes of visual impairment and for 14% of causes of blindness [15].

Anteriorly, the Rotterdam study showed that myopic degeneration was a major cause of visual impairment in subjects younger than 75 years [16].

In a Chinese population-based cohort study including 10,234 participants aged 45 years or more, the first cause of total bilateral and monocular visual impairment among the adults 45 to 59 years of age was myopic macular degeneration in 59.6% and 27.2% respectively [7]. In other studies on Chinese population, the Beijing Eye Study and the Shihpai Taiwan Eye Study, myopic macular degeneration accounted for 32.7% of low vision and for 12.5% of visual impairment respectively [17] [18].

The relation between degree of myopia and risk of developing macular complications (such as myopic CNV) remains unknown, although the risk is clearly demonstrated. There may be a relationship with increased risks of pathology with each unit increase in spherical equivalent in diopters and/or unit increase in axial length in millimeters and a threshold beyond witch the risks of pathology increase exponentially after a certain level of refractive error [19].

Myopia and visual impairment

The global visual impairment due to myopia obviously combines both refractive error itself and disabilities due to ocular complications which mainly include cataract, glaucoma, macular complications and retinal detachment. It is likely that the burden of refractive error itself does represent the main part of DALYs related to myopia in countries with low socio-economic level, whereas complications of myopia are likely to represent the main part of DALYs in developed countries where the access to optical corrections by lenses, glasses or by refractive surgery is widely available by the populations. However, in a systematic review based on surveillance of the prevalence and causes of vision impairment in high-income countries and Central/Eastern Europe, the uncorrected refractive error was the leading cause of moderate and severe vision impairment defined by visual acuity in the better eye of worse than 6/18 to 3/60 inclusive, contributing to almost half of the vision impairment burden [20].

Limitations

We do acknowledge some weakness in this study. On the one hand, the representativeness of our myopic population to the general population could be a little overrated given that the patients easily consult for a loss of visual acuity by lack of optical correction compared to the population of hyperopic ones for example. On the other hand, our population aged 50 years or more is likely to be similar to the general population in this age range because this latter usually requires optical correction due to presbyopia.

The exclusion of patients with history of cataract and refractive surgery was the consequence of usually unknown initial refractive status of patients who underwent cataract surgery or retinal surgery. In addition, the exclusion of these patients may have minored the frequencies of vision impairment because the size of this subgroup (n=1 934) excluded from the analyses does only represent 0.96% of the myopic sample.

Furthermore, the cross-sectional design of this study provided much information on the visual function and retinal complications at a given time, but the temporal sequence of the macular complications cannot be apprehended by this approach. In the same way, myopic eyes with visual impairment are frequently prone to have several macular complications, so that it might have been difficult to incriminate which one of the complications was the most important contributing factor to the visual impairment. For this reason, we did not attempt to correlate the macular complications to the visual function.

The choice of a classification of myopia according to the degree of refractive error can also be challenged. Several studies have shown pathological signs in eyes with mild to moderate myopia[21 17 22]. In other terms, macular complications of myopia are frequently observed even below -6 D [23].

Myopia and strategies to face it

Myopia has been defined as one of the five immediate priorities for the 'Vision 2020' initiative by the World Health Organization because it is an important cause of vision impairment in populations throughout the world [24]. In this context, two complementary approaches are needed to face this socio-medical problem. It is of crucial importance to investigate more precisely the impact of every potential complications of myopia on visual acuity on targeted populations. The present study focused on the macular complications of myopia and not on other ocular complications related to high myopia, as cataract, optic neuropathy and retinal detachment, which are also frequently associated to myopic maculopathy itself. The analyses of the specific data related to retinal detachment and glaucoma are ongoing.

Secondly, facing to the global increase of myopia and in high myopia, there is a need to develop nationwide preventive strategies. Some Asian countries facing to the highest myopia incidence are developing such strategies, based on environmental, pharmacologic and optical approaches to target the two pathways for myopia control : slowing the onset of myopia and reducing or preventing progression [25].

It has been demonstrated that longer outdoor time can be benefit on myopia onset but not on myopia progression [26 27].

Comparison of studies aiming to evaluate the impact of near work activities on myopia is a challenge since near work activities is defined differently across studies (such as

studying, reading, computer use or watching TV) and because studies reported outcomes regarding progression of myopia very differently. Some studies do conclude that near work activities is a risk factor whereas other do not [28] [29] [30] [31].

In a systematic review and meta-analysis, the association between near work activities and myopia indicated a 2% increased odds of myopia per additional diopter-hour of time spent on near work per week [32].

Children treated by atropine 0.01% have lower myopia progression with minimal myopic rebound after atropine is stopped and negligible effects on accommodation, pupil size and on near visual acuity [33] [34] [35]. Its mechanism of action remains to be specified.

Reverse geometry lenses are worn overnight to temporarily flatten the central cornea. The flattening induced by the lens in the center of the cornea is necessarily accompanied by a camber in the corneal periphery leading to a peripheral myopic defocus, which seems to be a signal whose effect is to slow down the growth of the eye. A meta-analysis including 7 studies showed that orthokeratology results in 45% reduction on myopia progression at two years [36]. Although clear vision provided during the day, the indications for this approach must be discussed for each case according to the degree of myopia (rather mild or moderate myopia), risk of discomfort and microbial keratitis.

Other approaches to slow down myopia progression have been evaluated: undercorrection of myopia is not effective but may be potentially harmful [37], rigid gas oxygen-permeable lenses did not slow the myopia progression [38].

Up to now, if many approaches do exist to decrease myopia progression, there is a need to define precisely preventive personalized protocols for each myopic patient.

In summary, it is to our knowledge the widest survey of European prevalence of myopia aiming to investigate macular complications and their visual impact. A significant increase in the prevalence of macular complications in relation with the severity of myopia was observed. The sight-threatening impact of myopia will certainly conduct to future therapeutic personalized protocols stratified by age group and degree of myopia.

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ABSTRACT

Objective: Refractive errors (RE), particularly myopia, are the first cause of visual impairment worldwide. High myopia is a frequent cause of sight-threatening chorioretinal complications. This study aimed to evaluate the prevalence of retinal complications in patients suffering from myopia.

Methods: This cross-sectional study was carried out in French eye clinics mainly dedicated to refractive errors. Data collection included age, gender, refractive subjective errors on both eyes and any relevant ocular history related to retinal complications of myopia documented with fundus examination, SD-OCT or fluorescein angiography. Myopia was defined as mild (-0.5 to -3D), moderate (-3 to -6 D), high (-6 to -10D) and very high (less than -10D). Macular complications related to myopia included staphyloma, lacker cracks (LC), myopic choroidal neovascularization (mCNV), chorioretinal atrophy (CRA) and retinoschisis.

Results: medical data files from 198 641 myopic individuals (55.8% of women) with a mean age of 34 years (SD: 15 years) were analyzed. Prevalence of mild, moderate, high and very high myopia was respectively 65.95%, 26.14%, 6.72% and 1.19%. Prevalences of retinal complications in the high and very high myopia groups were respectively: for staphyloma 2.01% [1.78 - 2.27%] and 7.65% [6.61 - 8.80%]; for LC 0.07% [0.03 - 0.13%] and 0.51% [0.26 - 0.88%]; for mCNV 0.07% (0.03 - 0.13%) and 0.42% (0.20 - 0.78%) in the high and very high myopia groups; for retinoschisis 0.03% [0.01 - 0.08%] and 0.30% [0.12 - 0.61%]; for macular CRA 0.39% [0.29 - 0.51] and 3.42% [2.73 - 4.24]. After adjustment on myopia and age, the risk for CRA was higher among women: OR=1.33; 95% CI [1.01 – 1.75]. Prevalence of blindness or visual impairment was observed in 29.95% [28.10 – 31.85%] of very high myopic patients. At 60 years old or over, the frequencies of blindness or visual impairment were respectively of 27.19% [24.35 – 30.19%] and 56.74% [51.10 – 62.25%] in the high and very high myopia groups.

Conclusions: This multicentric study provides new insights in terms of prevalence of retinal complications related to myopia. This is to our knowledge, one of the largest European ophthalmological series of individuals dedicated to prevalences of retinal complications of myopia.

SERMENT

En présence des Maîtres de cette école, de mes chers condisciples et devant l'effigie d'Hippocrate, je promets et je jure d'être fidèle aux lois de l'honneur et de la probité dans l'exercice de la médecine. Je donnerai mes soins gratuits à l'indigent et n'exigerai jamais un salaire au-dessus de mon travail. Admis dans l'intérieur des maisons mes yeux ne verront pas ce qui s'y passe ; ma langue taira les secrets qui me seront confiés, et mon état ne servira pas à corrompre les mœurs ni à favoriser le crime. Respectueux et reconnaissant envers mes Maîtres, je rendrai à leurs enfants l'instruction que j'ai reçue de leurs pères.

Que les hommes m'accordent leur estime si je suis fidèle à mes promesses ! Que je sois couvert d'opprobre et méprisé de mes confrères si j'y manque !