

Progression of Myopia in Different Ethnic Groups in Malaysia

P T Yeow, PhD

*Department of Optometry, Faculty of Allied Health Sciences,
Universiti Kebangsaan Malaysia, Jalan Raja Muda Abdul Aziz, 50300 Kuala Lumpur.*

Summary

A cross-sectional study on a normal clinical myopic population reveals that there is a difference in the pattern of myopic progression between Malays and Chinese in Malaysia. It shows that while myopia in Malays stays relatively constant throughout 10 to 50 years of age, myopia in Chinese progresses rapidly from 10 to 20 years of age, after which it starts to show hyperopic shift, reaching a level of myopia similar to that of Malays at around 35 years of age. In view of the above finding it is postulated that the difference in myopia between the two races may be due to excessive accommodation in Chinese, causing a temporary increase in crystalline lens power and hence an increase in myopia.

Because the magnitude of myopia for both races for 10 ± 1 years age group is relatively high, i.e. about -2.00 D, it is postulated that myopia in these ethnic groups may start much earlier than 10 years of age.

Key Words: Myopia, Progression, Accommodation

Introduction

It has been reported that there is a high incidence of myopia among Malay school children and the incidence increases with age, that is 4.3 per cent at 7-8 years and 25.6 per cent at 15-16 years¹. However there is still no information on the pattern of progression of myopia in the Malaysian population. It would be interesting to see how the myopia progresses and when it would stop or even reverse to hyperopia. While this information is best obtained by longitudinal studies, it would be very time consuming and costly. On the other hand, cross-sectional studies, though not as powerful as longitudinal studies, can serve as a useful indicator. Thus the aim of this study is to see, cross sectionally how myopia progresses in ethnic Malays and ethnic Chinese in Malaysia.

Materials and Methods

The refraction results of 648 myopic subjects, consisting of equal number of Malays and Chinese were randomly extracted from the records of the Universiti Kebangsaan Malaysia Optometric Clinic in Kuala Lumpur on the basis of gender and age groups. The age groups range from 10 ± 1 years to 50 ± 1 years. Ocular refraction was noted at each interval of five years. Thus there were nine age groups for each race, each consisting of 36 male and 36 female subjects. The records of the Indian patients and other age groups were not studied because the number was too small.

Subjects with anisometropia and astigmatism greater than 2.00 D were excluded from the study. Myopia is defined as having an equivalent sphere of equal or greater than -0.25 D. All the refractive results were recorded in terms of equivalent sphere (i.e. sphere power + 1/2 astigmatism).

Results

Figure 1 shows the mean myopia of Malays and Chinese on the basis of age groups. Figure 1 reveals that there is a difference in the pattern of myopic progression between Malays and Chinese. Myopia in Chinese progresses rapidly from about -2.00 D at age 10 ± 1 years to about -4.00 D at age 20 ± 1 years, after which it starts to show hyperopic shift. Myopia in Malays on the other hand stays relatively constant at about -2.50 D throughout all ages.

Figure 2 shows the mean myopia of Malay males and females on the basis of age groups. There is no significant difference in the trend of myopic progression between the two sexes in the Malay population.

Figure 3 shows the mean myopia of Chinese males and females on the basis of age groups. Figure 3 reveals that although both have the same trend of myopic progression, the females tend to show consistently higher myopia than the males.

Discussion

It is obvious from the results that there is a difference in the pattern of myopic progression between Malays and Chinese. Chinese show rapid myopic progression between age 10 to 20 years while Malays do not. After that the Chinese start to show hyperopic shift, reaching a level of myopia similar to that of the Malays at around 35 years of age.

Unfortunately it cannot be concluded from this study what causes the difference between the two races in Malaysia. However, the fact that the progression of myopia of Chinese subjects shows hyperopic shift after around 20 years of age and reaching a myopic level similar to its original level of about -2.00 D at around 50 years of age suggests that part of the myopia in Chinese in

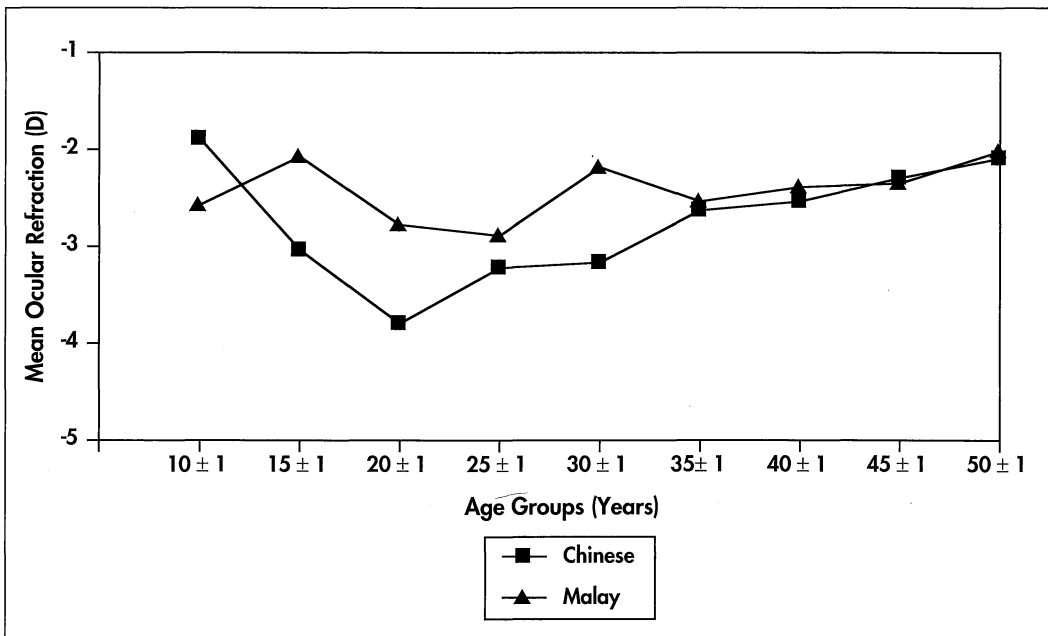


Fig. 1: Progression of Myopia (Chinese & Malay)

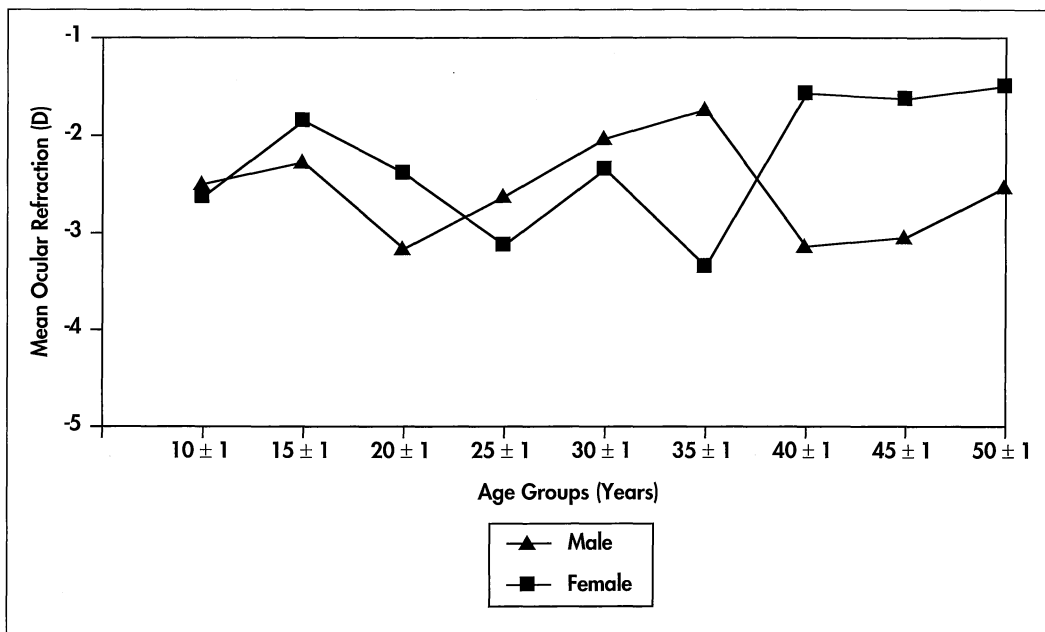


Fig. 2: Progression of Myopia (Malay)

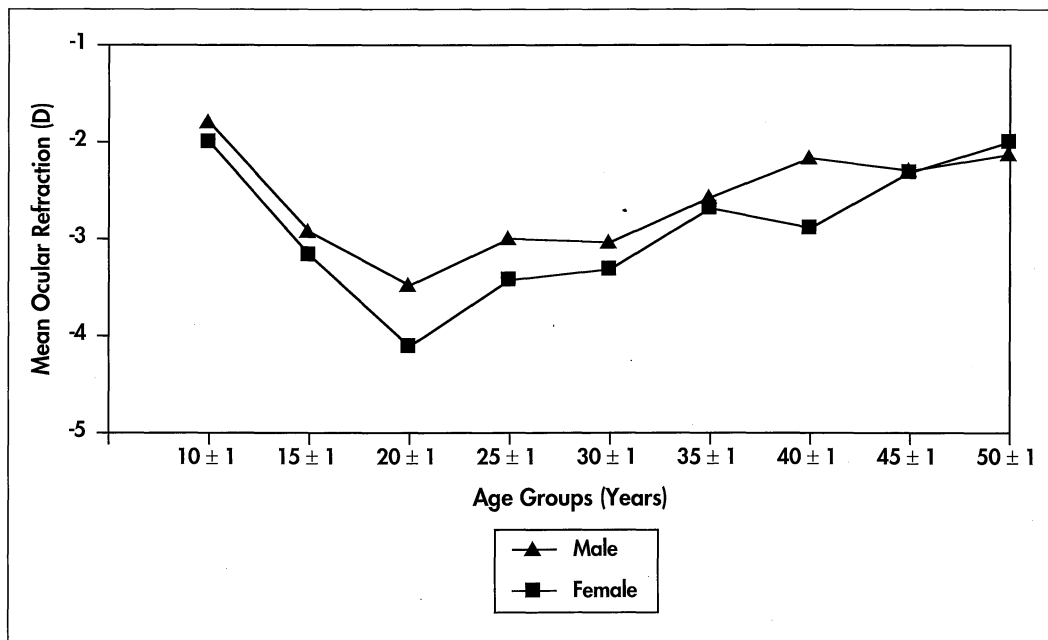


Fig. 3: Progression of Myopia (Chinese)

the earlier stages may be caused by excessive tonus of accommodation. It is possible that this excessive tonus of accommodation causes a temporary increase in lens power thus causing an increase in myopia. This is supported by several studies in Japan which showed that this so called school myopia can be caused by an increase in crystalline lens power. Sato, cited in Curtin²,

PROGRESSION OF MYOPIA IN DIFFERENT ETHNIC GROUPS

performed manifest and later cycloplegic refraction on the same population of school children. He noted a marked shift of the distribution curve towards the hyperopic limb. Otsuka and Kundo^{3,4} also obtained similar results.

The fact that there is no progression of myopia in Malays between 10 to 50 years of age together with the fact that there is no difference in myopia between Chinese and Malays after 35 years of age suggests that the earlier difference between the two races is probably due more to excessive accommodation in Chinese rather than a difference in axial length. This of course would have to be substantiated by a biometric study

If the rapid increase in myopia in Chinese from 10 to 20 years of age is due to excessive accommodation, then it may be reduced by removing factors which can cause excessive accommodation. According to Curtin⁵, factors which can cause excessive accommodation or accommodative spasm are excessive near work, effects of drugs, certain ocular pathologies and psychological factors such as stress. Since this sample consists of only normal myopic subjects, the most likely causes here would either be excessive near work or psychological factors. To separate these two factors, a study on the amount of near work performed or a study on the stress level of school children of the two races will be useful. It is also possible that the two factors interact to produce the effect.

In view of the rapid progression of myopia in Chinese from age 10 to 20 years, further studies would have to be done to determine how myopia actually advances during this period of time. If longitudinal data is difficult to obtain, then a cross-sectional study with yearly interval and a larger number of subjects can be valuable.

In addition, the fact that the mean myopia of Malays and Chinese at around 10 years of age is about 2.50 D and 2.00 D respectively suggests that the onset of myopia is probably much earlier than that. If progression of childhood myopia is linear and has a rate of between 0.25 D/yr and 0.50 D/yr as reported by Gross⁶ in an American population, then a study on the progression of myopia on children starting perhaps at five years of age would be useful.

There appears to be no difference in the progression of myopia between the two sexes of each race. However these results cannot be conclusive because of the small number of subjects in each age group (n=18) when it is subdivided into males and females. Unfortunately at present we still do not have enough data in our clinic for this.

References

1. Garner LF, Chung KM, Grosvenor TP, Mohidin M. Ocular dimension and refractive power in Malay and Malanesian children. *Ophthal Physiol Opt* 1990;10 : 234-8.
2. Curtin BJ. The etiology of myopia. In : Curtin BJ. *The myopias, basic science and clinical management*. Philadelphia: Harper and Row Publishers, 1985 : 61-151.
3. Otsuka J. Research on the aetiology and treatment of myopia. *Acta Soc Ophthalmol Jap* 1967;71 : 7-17.
4. Otsuka J, Kondo M. Nature and cause of school myopia. *Acta Soc Ophthalmol Jap* 1952;56 : 1360-9.
5. Curtin BJ. Pseudomyopia. In: Curtin BJ. *The myopias, basic science and clinical management*. Philadelphia: Harper and Row Publishers 1985 : 455-68.
6. Goss DA. Linearity of refractive change with age in childhood myopia progression. *Am J Optom Physiol Opt* 1987;64 : 755-80.