

ORIGINAL ARTICLE

Refractive Error in School Children in an Urban and Rural Setting in Cambodia

Zoe Gao^{1,2}, Ngy Meng³, James Muecke^{1,2}, Weng Onn Chan¹, Horm Piseth⁴, Aimee Kong¹, Theresa Jnguyenphamhh¹, Yalda Dehghan¹, Dinesh Selva^{1,2}, Robert Casson^{1,2}, and Kim Ang⁵

¹Sight For All Foundation, South Australian Institute of Ophthalmology, Adelaide, Australia, ²Discipline of Ophthalmology & Visual Sciences, University of Adelaide, Australia, ³Preah Ang Doung National Hospital, Phnom Penh, Cambodia, ⁴The Fred Hollows Foundation, Australia, and ⁵National Paediatric Hospital, Phnom Penh, Cambodia

ABSTRACT

Purpose: To assess the prevalence of refractive error in schoolchildren aged 12–14 years in urban and rural settings in Cambodia's Phnom Penh and Kandal provinces.

Methods: Ten schools from Phnom Penh Province and 26 schools from Kandal Province were randomly selected and surveyed in October 2010. Children were examined by teams of Australian and Cambodian optometrists, ophthalmic nurses and ophthalmologists who performed visual acuity (VA) testing and cycloplegic refraction.

Results: A total of 5527 children were included in the study. The prevalence of uncorrected, presenting and best-corrected VA $\leq 6/12$ in the better eye were 2.48% (95% confidence interval [CI] 2.02–2.83%), 1.90% (95% CI 1.52–2.24%) and 0.36% (95% CI 0.20–0.52%), respectively; 43 children presented with glasses whilst a total of 315 glasses were dispensed. The total prevalence of refractive error was 6.57% (95% CI 5.91–7.22%), but there was a significant difference between urban (13.7%, 95% CI 12.2–15.2%) and rural (2.5%, 95% CI 2.03–3.07%) schools ($P < 0.0001$). Refractive error accounted for 91.2% of visually impaired eyes, cataract for 1.7%, and other causes for 7.1%. Myopia (spherical equivalent ≤ -0.50 diopters [D] in either eye) was associated with increased age, female gender and urban schooling.

Conclusions: The prevalence of refractive error was significantly higher in urban Phnom Penh schools than rural schools in Kandal Province. The prevalence of refractive error, particularly myopia was relatively low compared to previous reports in Asia. The majority of children did not have appropriate correction with spectacles, highlighting the need for more effective screening and optical intervention.

Keywords: Refractive error, Myopia, Children, Urban, Rural

INTRODUCTION

The prevalence of myopia is increasing dramatically in certain Asian regions and has been most well characterized in individuals of Chinese descent.^{1–3} The gene/environment interactions which cause myopia, however, remain unclear. Urban living has emerged as a major environmental factor associated with the development of myopia. This has been demonstrated in surveys from several countries that have compared refractive error between children in urban and rural areas.^{4–7} A tendency for less academically rigorous classes and lower educational pressures in rural areas, leading to reduced near work, possibly explains the lower prevalence of myopia.⁸ However, the data regarding the associations between near work and

outdoor activities and the development of myopia have not always been consistent.^{4,9–14}

Estimates of the prevalence of myopia in different ethnic groups are available from a number of studies. The prevalence in Caucasian populations has been estimated in the United States¹⁵ and Australia.^{16, 17} In the United States, the overall prevalence of myopia in 12- to 17-year-olds has increased from 24.5% in 1971–1972 to 34.8% in 1999–2004.¹⁵ In Australia, it has been reported to be as low as 1.4% in 6-year-olds,¹⁶ increasing to 5.1% in 12-year-olds.¹⁷ In the 12-year-old children of East Asian descent however, the prevalence of myopia was 41.6%.¹⁷

In the Nepalese and Indian population, the prevalence of refractive error is also relatively low. The prevalence of myopia in Nepal was estimated at

Received 25 April 2011; revised 16 August 2011; accepted 16 August 2011

Correspondence: Robert Casson, South Australian Institute of Ophthalmology, Adelaide, SA 5000, Australia. Tel: +61 8 8222 2729. Fax: +61 8 8222 2741. E-mail: robert.casson@adelaide.edu.au