Original Research

Spectacles need and ownership among multiethnic students in rural China

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ABSTRACT

Objectives: The aim of this study is to describe the prevalence and associated factors of spectacles need and ownership among multiethnic school students in rural China.

Study design: School-based cross-sectional study.

Methods: This school-based eye study was conducted in Yunnan province located in Southwestern China. Questionnaires were filled out by children with the help of their parents concerning demographic characteristics, spectacles usage, and myopia-related lifestyle exposures. Spectacles need was defined as participants who had an uncorrected visual acuity (VA) of less than 6/12 but could be corrected to more than 6/12 in the better-seeing eye, with myopia of less than −0.5 diopters (D), hyperopia of more than +2.0 D, or astigmatism of more than 0.75 D in both eyes. Definition of spectacles ownership was based on spectacles wearing at school on the examination day.

Results: Among the 7681 students aged 5–16 years participating in this study, 7166 (93.3% of the study participants) successfully completed VA tests and questionnaires. The rate of spectacles need among children with an uncorrected VA of 6/12 or worse in either eye was 68.3% (623/912). Among the students who needed spectacles, only 18.9% owned them. Multivariate analyses revealed that spectacles ownership was significantly associated with increasing age (odds ratio [OR]: 1.30; 95% confidence interval [CI]: 1.08–1.55), more time on reading and writing (OR = 1.66; 95% CI: 1.15–2.40), having myopic friend(s) (OR: 1.90; 95% CI: 1.01–3.56), self-awareness of myopia (OR: 6.67; 95% CI: 2.48–17.92), and poorer uncorrected VA (OR: 4.57; 95% CI: 2.78–7.52).

Conclusions: We observed a lower rate of spectacles ownership among rural children compared with those of similar ages in urban China. These findings may have important public health implications for China and other countries regarding vision-related health resources allocation.

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Introduction

Visual impairment is a global public health concern among both adults and children, especially in rural areas, posing heavy economic burden on individuals, communities, and countries. Uncorrected or undercorrected refractive error is a major cause of visual impairment among Asian and non-Asian children and can be easily corrected with a pair of spectacles the majority of the time. The impact of uncorrected refractive error is profound, and the unmet need for refractive correction is widespread. Considering that wearing spectacles provides a cost-effective intervention for refractive errors, it is essential to determine the prevalence and predictors for spectacles ownership among different populations. China is the world’s most populous country and may have the greatest burden of uncorrected refractive error. Recently, a survey including 4409 children aged 10–12 years indicated that the prevalence of spectacles need is around 80% in urban cities located in the eastern part of China. Among those needing spectacles, only 35% had owned them. According to the latest Chinese national census data, rural populations account for more than 80% of the Chinese national population. Therefore, understanding the rates for spectacles ownership in the rural areas of China is of utmost importance from a public health perspective.

Another important issue which has not been fully addressed is whether disparities in spectacles need and ownership exist between the major and minor ethnic groups in China. China is a country with a multiethnic population including Han Chinese and another 55 ethnic minorities. Han Chinese is the major ethnic group which accounts for nearly 90% of the national population. Considering that Chinese ethnic minorities usually reside in rural communities and have only limited access to health care services, it is important for health policy makers to plan affirmative action programs related to vision health. This information would also be important for other countries where the key objective for public health reform is to readdress the health inequities between the major and minor ethnic groups.

In this study, we described the prevalence and associated factors of spectacles need and ownership among multiethnic school students in rural communities in a less-developed area located in Southwestern China.

Methods

Participants

This school-based eye study was conducted in 2014 aiming at estimating the prevalence and associated factors of common vision disorders among multiethnic school students in Mangshi, which is located in the southwestern part of China. In brief, a total of 8225 primary and secondary school students aged 5–16 years from 55 schools in Mangshi were enumerated, 7681 (response rate: 93.4%) of whom were examined, including 3897 (50.7%) boys and 3784 (49.3%) girls. The study cohort was composed of a multiethnic population including Han students (1870, 24.3%) and ethnic minorities such as Yi (4101, 53.4%), Bai (813, 10.6%), Dai students (237, 3.1%) and students of other ethnicities (660, 8.6%). In this analysis, 7166 (93.3% of the study participants) children with completed clinical examination and questionnaire data were included.

Ethical approval was granted by the Institutional Review Board of Kunming Medical University. We carried out the study according to the tenets of the Declaration of Helsinki involving human participants. Additionally, we obtained written informed consents from at least one parent or legal guardian of each participant.

Instruments and procedure

Detailed ocular examinations of the eyelid, globe, pupillary reflex, lens, and retinal fundus were carried out by trained study ophthalmologists and optometrists in schools. Visual acuity (VA) test was performed separately on each eye with the right eye being tested first. A reduced LogMAR E-chart (Precision Vision, Villa Park, IL) was employed to measure VA in a well-lit area (>500 lux) and was carried out at a distance of 4 m. If the students failed to identify any letters on the chart at 4 m, the subject was advanced to 1 m and the measurement which divided by four was recorded. For cycloplegic refraction, we administered one drop of cyclopentolate (1%) to each student twice with 5 min apart. We evaluated cycloplegia and pupil dilation after 15 min. If the pupil size was more than 6 mm or if the pupil was not reactive, autorefraction with closed field (RM-8000; Topcon Corp., Tokyo, Japan) was performed. Otherwise, a third drop was applied.

Questionnaires

Information regarding demographic characteristics, spectacles wear, self-awareness of myopia, myopia-related lifestyle exposures including near-work and outdoor activities, details of ophthalmic histories, family income, parental histories of myopia, and parental education level was collected using a predesigned questionnaire. Children filled out the questionnaire with the help of their parent(s) at home 2 days before the ophthalmic examinations. Information on parental myopia, parental education, and questions beyond the understanding of young children were reported by parents. Children brought the questionnaire to school after finishing it, and our study assistants checked the questionnaires item by item to strengthen the quality of data. Awareness of myopia and myopic friend(s) were collected by asking ‘Are you myopic?’ and ‘Are any of your friends myopic?’ For the assessment of socio-economic status, children were asked about the family’s ownership of 16 items such as car, washing machine, air conditioner, computer, and so on. As reported by Rural Household Survey Yearbook, family socio-economic status was estimated by adding the value of 16 items and dividing the sum into three family wealth tertiles.

Definitions of spectacles need and ownership

Spectacles need was defined as the percentage of students who presented with uncorrected VA of 6/12 or worse and could improve with correction to at least 6/12 or better in the better-seeing eye, together with the presence of myopia of...
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