



## ORIGINAL ARTICLE

# Prevalence of correctable visual impairment in primary school children in Qassim Province, Saudi Arabia



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### KEYWORDS

Prevalence;  
Visual impairment;  
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### Abstract

**Purpose:** The worldwide prevalence of refractive errors (RE), which is a common cause of treatable visual impairment among children, varies widely. We assessed the prevalence of correctable visual impairment (uncorrected RE) in primary school children in Qassim, Saudi Arabia.

**Methods:** A cross-sectional study was conducted in 21 primary schools. A total of 5176 children (mean age  $9.5 \pm 1.8$  years), 2573 boys (49.7%) and 2603 girls (50.3%), underwent a comprehensive eye examination. The examinations consisted of visual acuity, autorefractometry, cover test, ocular motility, pupillary evaluation, anterior segment examination, cycloplegic auto-refraction and dilated fundus examination with direct ophthalmoscopy. The children were divided into groups based on their age and gender.

**Results:** The overall prevalence of RE in the better eye was 18.6% ( $n = 963$ ), and the prevalence of uncorrected RE 16.3% ( $n = 846$ ), with only 2.3% ( $n = 127$ ) of children wearing spectacles during examination. The prevalence of uncorrected myopia (5.8%) and myopic astigmatism (5.4%) was higher compared to that of hyperopic astigmatism (2.7%), mixed astigmatism (1.7%) and hyperopia (0.7%). The anisometropia prevalence was 3.6%. Risks for astigmatism, myopia and anisometropia were positively associated with age. In addition, myopia and anisometropia risks were also associated with female gender, while risk of astigmatism was correlated with male gender. Few children with vision reducing RE wore spectacles; an additional 16.3% of children could benefit from spectacle prescription.

**Conclusion:** The prevalence of uncorrected RE in children is relatively high and represents an important public health problem in school-aged children in Qassim province. Performance of routine periodical vision screening throughout childhood may reverse this situation.

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**PALABRAS CLAVE**

Prevalencia;  
Disfunción visual;  
Error refractivo;  
Niños;  
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## Prevalencia de deficiencia visual corregible en niños de educación primaria en la provincia de Qassim, Arabia Saudí

**Resumen**

**Objetivo:** La prevalencia mundial de los errores refractivos (ER), que son una causa común de disfunción visual tratable en niños, varía ampliamente. Evaluamos la prevalencia de la deficiencia visual corregible (ER no corregido) en escuelas de primaria de Qassim, Arabia Saudí. **Métodos:** Se realizó un estudio transversal en 21 escuelas primarias. Se sometió a un amplio examen visual a 5.176 niños (edad media  $9,5 \pm 1,8$  años): 2.573 chicos (49,7%) y 2.603 chicas (50,3%). El examen consistió en la evaluación de la agudeza visual, auto-refracción, cover test, motilidad ocular, evaluación pupilar, examen del segmento anterior, auto-refracción ciclopéjica y examen del fondo dilatado con oftalmoscopia directa. Se dividió a los niños en grupos, basándonos en su edad y sexo.

**Resultados:** La prevalencia general de ER en el mejor ojo fue del 18,6% ( $n = 963$ ), y la prevalencia de ER no corregido fue del 16,3% ( $n = 846$ ), de los que únicamente el 2,3% ( $n = 127$ ) de los niños llevaban gafas durante el examen. La prevalencia de la miopía no corregida (5,8%) y astigmatismo miópico (5,4%) fueron superiores en comparación al astigmatismo hipermetrópico (2,7%), astigmatismo mixto (1,7%) e hipermetropía (0,7%). La prevalencia de anisometropía fue del 3,6%. Los riesgos de astigmatismo, miopía y anisometropía presentaban una asociación positiva con la edad. Además, los riesgos de miopía y anisometropía se asociaron también al sexo femenino, mientras que el correspondiente al se asoció al género masculino. Pocos niños con reducción visual por ER no corregido portaban gafas, y un 16,3% adicional de los niños podría beneficiarse de la prescripción de las mismas.

**Conclusión:** La prevalencia de ER no corregido es relativamente elevada en niños de educación primaria, y representa un serio problema de salud pública en los niños en edad escolar de la provincia de Qassim. La realización de revisiones rutinarias y periódicas de la vista en la infancia podría revertir esta situación.

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**Introduction**

According to the World Health Organization (WHO), refractive errors (RE) such as myopia, hypermetropia and astigmatism are the second leading cause of visual impairment (uncorrected RE) among all age, gender and ethnic groups.<sup>1</sup> Such visual impairments originate from RE correctable by refraction ("correctable visual impairment", CVI) or RE associated with ocular or neurological disease and, thus not-correctable by refraction ("non-correctable visual impairment", NCVI).<sup>2</sup> CVI (uncorrected RE) implies that visual impairment is present when there is no or inadequate refractive correction.<sup>2</sup> There would be about 153 million cases of visual impairment globally, with 12.8 million children (5–15 years old) affected by uncorrected RE<sup>1</sup> in both developed and developing countries.<sup>3</sup> Thus uncorrected RE is a significant public health concern.<sup>4,5</sup> Though some children with uncorrected RE are asymptomatic,<sup>6</sup> others occasionally complain of headaches and inability to read the material on the chalkboard, which can have a serious impact on a child's learning ability, academic performance, and personality.<sup>2,7</sup>

The Refractive Error Study in Children (RESC) was conducted in China, Nepal, Chile, India, South Africa and Malaysia, using a population-based method and logMAR protocol to assess children aged 5–15 years. Overall, 56–94% cases of reduced vision were caused by uncorrected RE.<sup>2</sup> The proportion of children whose visual acuity could have been improved with spectacles to 20/32 or better increased

with early detection from as low as 0.9% in South Africa<sup>8</sup> to 9% in China.<sup>9,10</sup>

Though many studies have assessed the RE prevalence among school-aged children worldwide, only few studies have been performed in Saudi Arabia. According to UNESCO (2007), in Saudi Arabia the gross enrollment ratio (GER) for boys in primary school is 99.9% and 96.3% for girls, with a total GER of 98.1%.<sup>11</sup> Qassim Province is the seventh most populated province of Saudi Arabia (population: 1,016,756). This province is served by primary, intermediate and secondary schools. Children enter elementary education at the age of 6 years, and the duration of study is six years. To the best of our knowledge, there is no data available on the prevalence of uncorrected RE in primary school children in Qassim province. Therefore, the present study was aimed at determining the prevalence of uncorrected RE among primary school children in different areas of Qassim province, and at assessing the association between age, gender, and these visual impairments considering that both the earlier and recent reports indicate an association between growth and RE risk.<sup>9,10,12–16</sup>

**Methods****Selection of study population and data collection**

The study population was selected using a random cluster sampling in 112,975 primary school subjects in Qassim

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