Simulated Hyperopic Anisometropia and Academic-related Performance in Children

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INTRODUCTION AND AIMS

• 80% of the sensory input for learning is believed to be visual, therefore visual anomalies may negatively impact on children's academic performance¹
• Anisometropia is an important visual problem in children, affecting up to 11% of the population²³
  • The impact of low levels of uncorrected anisometropia on measures of academic-related performance has not been investigated
  • Some studies have reported that hyperopic anisometropia is associated with impaired reading skills in children, but the strength of evidence from these studies is weakened by confounding factors (differences in IQ levels, presence of amblyopia²³)
• The aim of this study was to investigate the impact of 0.75 D of simulated hyperopic anisometropia on children's ability to perform a range of academic-related tasks, particularly following sustained near work. The possible impact of ocular dominance on the reduction of performance was also investigated

METHODS

Participants:
• 16 visually normal children from Years 5-7
• Mean age 11.1±0.8 years (10 males, 6 females)
• English as first language
• Three standardised academic-related measures were assessed 4 times (on 2 separate visits) for a combination of different visual and near work conditions during binocular viewing
• Half of the participants had the simulated hyperopic defocus before the dominant eye and the other half before the non-dominant eye
• The order of visual conditions and outcome measures was randomised

RESULTS: READING PERFORMANCE

• Assessed using the Neale Analysis of Reading Ability examination
  • Reading rate (words per minute)
  • Reading accuracy (number of correct words)
  • Reading comprehension (number of correct questions)
• There was a significant main effect of both hyperopic anisometropia simulation and sustained near work on all measures (p<0.001) with a significant interaction between visual condition and near work (p<0.05)
• There was no significant impact of ocular dominance (p>0.05)
• The largest decrease was observed in the reading comprehension measure (11%) compared to rate (4%) and accuracy (4%) with simulated hyperopic anisometropia and following sustained near work

RESULTS: VIP PERFORMANCE

• Assessed using the Coding and Symbol Search subs tests of the Wechsler Intelligence Scale for Children
  • The number of correct responses on the Coding and Symbol Search subs tests within 120 seconds was recorded
  • Coding and Symbol Search subs test scores were significantly reduced by both simulated hyperopic anisometropia and 20 minutes near work (p<0.001), with a significant interaction between visual condition and near work (p<0.05)
• There was no significant impact of ocular dominance (p>0.05)
• A mean reduction of 8% and 12% in performance was found in each of the subs tests respectively with simulated anisometropia following prolonged near work
• This suggests that anisometropia simulation and sustained near work may affect children's ability to accurately extract and interpret visually presented information

REFERENCES

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