

Daytime Somnolence by Pupillometry in Developmental Disorders

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We have previously shown that in a heterogeneous group of children and adolescents with developmental disorders including attention and/or reading, pupillary instability is commonly observed as measured by pupillometry similar to that observed in adult narcolepsy and sleep deprivation (1,2). This study is an attempt to replicate the prior investigation using a population with only attention and/or reading disorder of narrower age range and more consistent data regarding personal and family sleep history.

Fifty children (41M/9F) between 10 and 15 years of age (Mn 12, SD 1.84) met DSM-III-R diagnosis of attention deficit hyperactivity disorder (ADHD) and/or developmental disorder of reading (RD). The evaluation included at least Weschsler Intelligence Scale for Children revised, Gray Oral Reading Test, Conners Rating Scales, Achenbach Child Behavior Checklist, standardized family, prenatal, perinatal, developmental and academic history, early childhood and current sleep history as well as family history of sleep disorder, EEG, Three Letter Cancellation Task (LCT), Rey Auditory Verbal Learning Test (AVLT), Rey-Osterreith Complex Figure, Color Span Test and quantitative neurologic examination including laterality quotient and Tanner sexual development as well as standardized serologic studies. All subjects underwent quantitative measurement of pupil size and stability utilizing pupillometry (monocular pupillometer manufactured by Micromeritics, Farmington, Connecticut). Subjects were initially drug free. The study included three minutes of dark adaptation and a 10-minute recording performed between noon and 4:00 p.m. Thirty-two subjects qualified as ADHD only, 15 as ADHD and RD, with 3 RD only. Moderate or severe pupillary instability was observed in 13 ADHD (41%), 7 ADHD and RD (47%) and one of the three RD only (33%). A total of 42% of the subjects demonstrated moderate or severe pupillary instability assessed semiquantitatively.

Test doses of methylphenidate (Ritalin) within one hour often produced pupillary stability, and when simultaneous enhanced cognitive performance was noted, a favorable drug response was recorded. If improved performance was not observed, responses were contrasted with those achieved with d-amphetamine (Dexedrine) and/or pemoline (Cylert). These data suggest that daytime somnolence in the absence of current nighttime history of sleep disturbance is common in children with developmental disorders of attention. A history of sleep disturbance in relatives was uncommon. An early childhood history of anomalous sleep behavior was not rare. When combined with cognitive measures, pupillometry offers a more precise means of determining effective medication dosage. Polysomnography, multiple sleep latency studies and HLA typing are in progress. Developmental disorders of vigilance may include a component of nonalertness (3), the mechanism of which remains obscure.

References

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