Associations of pineal volume, chronotype and symptom severity in adults with attention deficit hyperactivity disorder and healthy controls

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Abstract

The pineal gland, as part of the human epithalamus, is the main production site of peripheral melatonin, which promotes the modulation of sleep patterns, circadian rhythms and circadian preferences (morningness vs. eveningness). The present study analyses the pineal gland volume (PGV) and its association with circadian preferences and symptom severity in adult ADHD patients compared to healthy controls. PGV was determined manually using high-resolution 3 T MRI (T1-magnetization prepared rapid gradient echo) in medication free adult ADHD patients (N=74) compared to healthy controls (N=86). Moreover, the Morningness–Eveningness Questionnaire (MEQ), the ADHD Diagnostic Checklist and the Wender–Utah Rating Scale were conducted. PGV differed between both groups (patients: 59.9±33.8 mm3; healthy controls: 71.4±27.2 mm3, P=0.04). In ADHD patients, more eveningness types were revealed (patients: 29%; healthy controls: 17%; P=0.05) and sum scores of the MEQ were lower (patients: 45.8±11.5; healthy controls 67.2±10.1; P<0.001). Multiple regression analyses indicated a positive correlation of PGV and MEQ scores in ADHD (β=0.856, P=0.003) but not in healthy controls (β=0.054, P=0.688). Patients’ MEQ scores (β=−0.473, P=0.003) were negatively correlated to ADHD symptoms. The present results suggest a linkage between the PGV and circadian preference in adults with ADHD and an association of the circadian preference to symptom severity. This may facilitate the development of new chronobiological treatment approaches for the add-on treatment in ADHD.