

490- EEG analysis during sleep onset in autism spectrum disorder

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(OBJECTIVES)

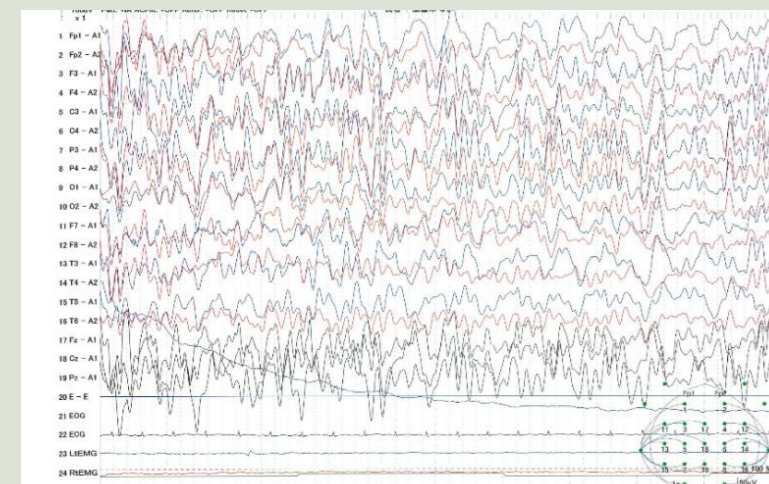
The sleep EEG of children with autistic spectrum disorder (ASD) was analysed and compared with the sleep EEG of typically developing (TD) children to investigate findings specific to children with ASD. Through this research, understanding of the pathology of ASD may be advanced, leading to prevention of the disease, improvement of the pathology and development of new treatments.

(Subjects)

Potential subject patients were selected from among those attending or admitted to the neurodevelopmental outpatient clinic at the hospital, based on diagnostic criteria.

(Methods)

Matlab was used for analysis, with the pwelch function for intensity analysis and the mscohere function for coherence analysis. The intensity and coherence of the various EEG components were calculated as averages over the frequency band range. Correlations between the intensity or coherence of the various EEG components and PARS scores for children with ASD were assessed by calculating Pearson's correlation coefficient and regression analysis.



3-year-old girl ASD (sleep disturbance, easy agitation, delayed language development) No epilepsy

	Fp1		Fp2	
F7	F3	Fz	F4	F8
T3	C3	Cz	C4	T4
T5	P3	Pz	P4	T6
	O1		O2	

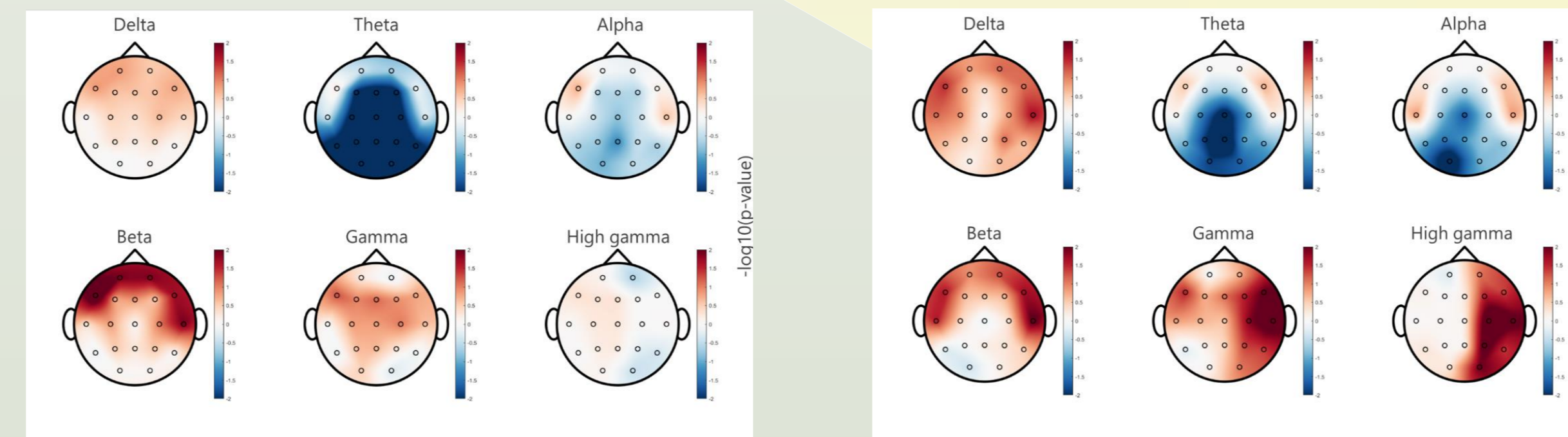
Electrode Maps

(Results)

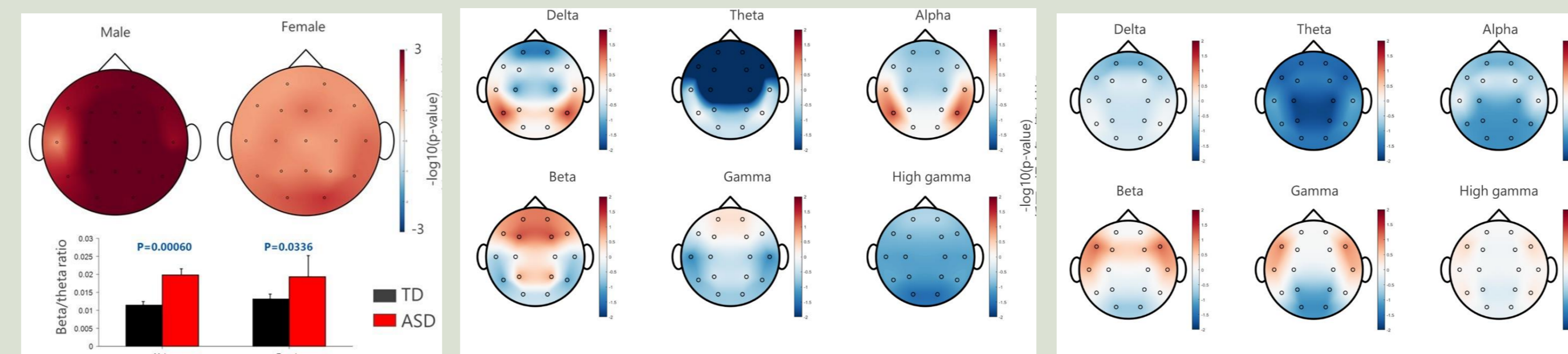
The subjects were 19/9 ASD children (boys/girls) (median age 5.3/5.1) and 16/17 volunteer TD children (boys/girls) (median age 6.2/6.9); when comparing all-electrode mean power between TD and ASD children, a significant decrease in power in the θ band was observed in ASD boys and a significant increase in ASD children of both sexes when examining the beta/theta ratio.

	Male	Female
TD	16 cases(6.19+/-0.62y)	17 cases(6.92+/-0.52y)
ASD	19 cases(5.29+/-0.41y)	9 cases(5.11+/-0.81y)
T-test	P=0.22	P=0.06

The subjects were 19/9 ASD children (boys/girls) (median age 5.3/5.1) and 16/17 volunteer typical developmental children (boys/girls) (median age 6.2/6.9); when comparing all-electrode mean power between TD and ASD children, a significant decrease in power in the θ band was observed in ASD boys ($p=0.0041$) and a significant increase in ASD children of both sexes ($p=0.0006/0.0336$) when examining the β/θ ratio. For the mean coherence of the paired electrode pairs on the left and right sides of the brain, a significant decrease in coherence in the θ band was found in ASD children of both sexes ($p=0.0014/0.0066$).



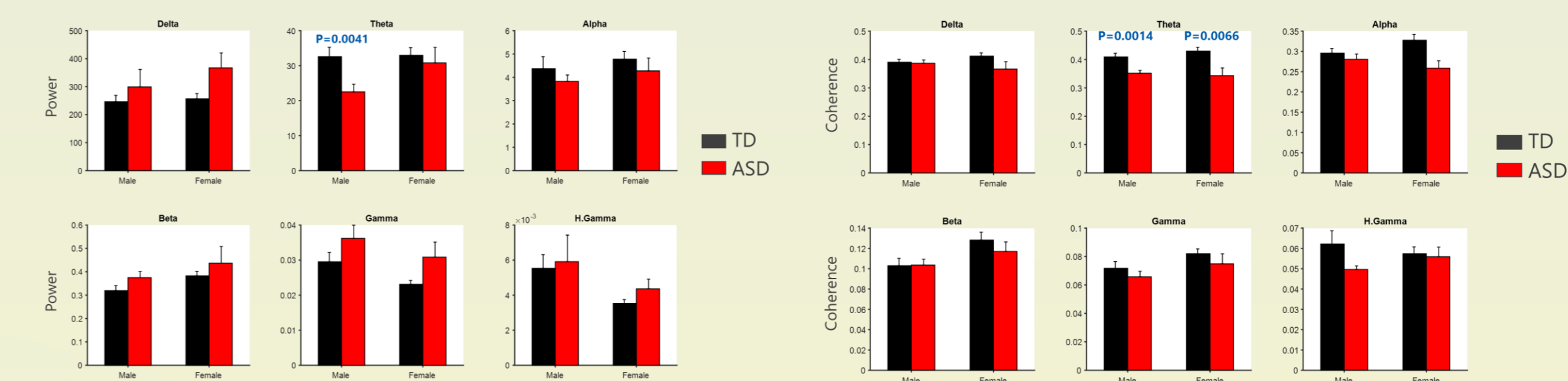
The present finding of reduced coherence in the θ band during slow wave sleep is consistent with previous reports of reduced coherence in the left-right paired EEG in children with ASD during rest-wake. Decreased θ -power and decreased coherence in the θ -band in the EEG during sleep may be useful as a tool for auxiliary diagnosis in children with ASD.



β/θ ratio (ANCOVA p-value, covariate: age)

Coherence of left-right electrode pairs in boys (ANCOVA p-value, covariate: age)

Coherence of left-right electrode pairs in girls (ANCOVA p-value, covariate: age)



All-electrode mean power (ANCOVA, covariate: age)

Mean coherence of all electrode pairs (ANCOVA, covariate: age)

The subjects were 19/9 ASD children (boys/girls) (median age 5.3/5.1) and 16/17 volunteer TD children (boys/girls) (median age 6.2/6.9); when comparing all-electrode mean power between TD and ASD children, a significant decrease in power in the theta band was observed in ASD boys and a significant increase in ASD children of both sexes when examining the beta/theta ratio.

(Conclusin)

The present finding of reduced coherence in the θ band during slow wave sleep is consistent with previous reports of reduced coherence in the left-right paired EEG in children with ASD during rest-wake. Decreased θ -power and decreased coherence in the θ -band in the EEG during sleep may be useful as a tool for auxiliary diagnosis in children with ASD.

Ethical considerations: National Institute of Neurology and Psychiatry Research Approval number A2020-104

Conflict of interest disclosures: none

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