

Early Development Difficulties as Predictors for Tic and Comorbid Severity, an EMTICS Study

Tamar Steinberg*^{1,2}, Dana Feldman-Sadeh*¹, Alan Apter^{1,2}, Yael Bronstein², Adi Moka¹, Miri Carmel^{2,3}, Elena Michaelovsky^{2,3}, Avi Weizman^{2,3}, Andrea Dietrich⁴, Blanca Garcia Delgar⁵, Astrid Morer⁵, Pieter Hoekstra⁴, Noa Benaroya-Milshtein^{1,2} and the EMTICS consortium

¹The Matta and Harry Freund Neuropsychiatric Tourette Clinic, Schneider Children's Medical Center of Israel, Petach Tikva, Israel. ²Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

³Research Unit, Geha Mental Health Center, and Laboratory of Biological Psychiatry, Felsenstein Medical Research Center, Petah Tikva, Israel. ⁴Department of Child and Adolescent Psychiatry, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands ⁵Department of Child and Adolescent Psychiatry and Psychology, Institute of Neurosciences, Hospital Clinic Universitari, Barcelona, Spain

Introduction

Chronic Tic disorders (CTD), including Tourette Syndrome (TS), are neurodevelopmental disorders that appear in childhood and are frequently associated with psychiatric comorbidities. It is clinically known that children with CTD are more often diagnosed with developmental disorders, but the link between developmental delay and the severity of tics and comorbidities later in life has not yet been fully described.

Objectives

The current study aimed to investigate the severity of tics and common comorbidities (obsessive compulsive disorder: OCD; Attention deficit and hyperactivity disorder: ADHD; autistic spectrum disorder: ASD) in the context of delays in the acquisition of common, early childhood, developmental milestones. It was hypothesized that children with CTD will show higher prevalence of developmental delays and that there will be a significant correlation between the severity of developmental delays and the severity of CTD and associated comorbidities.



Methods

The current study is a part of the longitudinal European Multicenter Study of the Etiology of Tic Disorder. Children and adolescents diagnosed with CTD, aged 3-16 years (n=383, M=10.67± 2.69 years) were recruited from sixteen child and adolescent psychiatry or pediatric neurology outpatient clinics throughout Europe and Israel. Participants were asked to complete parent-report questionnaire and to participate in a clinical interview. Measures included: Developmental Milestones Questionnaire; Yale Global Tic Severity Scale (YGTSS); The Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS); Swanson, Nolan, and Pelham, version IV (SNAP-IV) rating scale; The Autism Spectrum Screening Questionnaire (ASSQ); Strengths & Difficulties Questionnaire (SDQ).

Results

Participants were mostly boys (76.8%, n=294) with TS (87.5%, n=335), with moderate severity of tics (n=180, 47%). Additional diagnoses included ADHD and OCD, present in 96 (25.1%) and 116 (30.3%) participants respectively, while 37 participants (9.7%) had both ADHD and OCD. Suspected developmental disorders were prevalent in 20.6% of the participants (n=79). Descriptive statistics of developmental milestones in comparison to known developmental norms are shown in table 1.

Table 1: Descriptive statistics of developmental milestones in comparison to known developmental norms (n=383)

Age (Month) of Acquiring Developmental Milestone	M	SD	Norms of Age (Month) of Acquiring Milestone*	
			50 th percentile	90 th percentile
Motor development				
Sitting	6.84	1.54	8.5	10
Walking	13.01	2.48	12.5	16.5
Language development				
First words	13.28	5.98	11.5	15
Complete a sentence	21.95	7.58	18.5	24
Toilet training				
			Norms of age (month) of acquiring milestone**	
			50 th percentile	75 th percentile
Toilet trained bladder (day)	30.80	13.87	35	39
Toilet trained bladder (night)	37.34	21.70	36	42
Toilet trained bowel (day & night)	31.35	10.73	34.5	39

* Denver II Developmental Screening Test

**Schum et al. (2002)

Most correlations between developmental milestones, tics and comorbidities were found insignificant while the significant ones were weak ($r < .20$; table 2). Delayed motor developmental milestone was correlated with OCD severity, while motor, language and toilet training delays were all positively correlated with severity of ADHD symptoms. Prediction of suspected developmental disorders by developmental milestones was statistically significant ($\chi^2(8) = 28.85$, $p < .001$).

Table 2 Correlation matrix between developmental milestones, tics and comorbid psychopathology (n=383)

	Age of acquiring developmental milestones							
	Sitting	Walking	First words	Complete a sentence	Day bladder control	Night bladder control	Bowel control	
Total Tic Severity (YGTSS)	-.08	.09	.09	.07	.06	-.00	.06	
Tic Impairment (YGTSS)	-.03	.07	-.01	.04	.10	.06	.07	
OCD: Obsessions (CY-BOCS)	.01	.10*	.04	.07	.12*	.02	.11*	
OCD: Compulsions (CY-BOCS)	.02	.14**	.03	.09	.07	.00	.06	
ADHD (SNAP)	.06	.10*	.11*	.11*	.11*	.03	.08	
Total difficulties score (SDQ)	-.01	.13**	.16**	.06	.06	.01	.07	

* $p < .05$, ** $p < .01$

Conclusions

TS as a neurodevelopmental disorder, has always been considered a prototype of developmental psychopathology, still, the link between delay in developmental milestones and CTD remained unclear in past studies as in the current study. While most correlations were found insignificant, OCD and ADHD were significantly and positively correlated with delay in some developmental milestones. Developmental milestones also significantly predicted suspected developmental disorders. Future research is warranted in order to elaborate our knowledge on the neurodevelopmental precedents of TS.

Acknowledgement

The authors are deeply grateful to all children and their parents who willingly participated to make this research possible. This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under Grant agreement no. 278367. We thank all members of the EMTICS collaborative group for their continued commitment to this project and in particular all colleagues at the various study centers who contributed to data collection and/or management for their support.