Clinical Profile of Children and Adolescents Newly Diagnosed With Tourette Syndrome: Observational Cohort Study of a Large Electronic Health Records Database

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BACKGROUND

- In populations with Tourette syndrome (TS), psychiatric comorbidities are prevalent (eg, anxiety disorders, attention-deficit/hyperactivity disorder [ADHD], and obsessive-compulsive disorder [OCD])[1-3]
- It is estimated that more than half of patients with TS will have ≥1 comorbid psychiatric disorder during their lifetime,[3] but studies on the real-world clinical profile of children and adolescents at the time of TS diagnosis are limited

OBJECTIVE

- Describe the demographics and clinical characteristics of children and adolescents newly diagnosed with TS using a large US electronic medical records database

METHODS

- Data were analyzed retrospectively using an electronic health records database (TriNetX Dataworks-USA Network) that contains information for >119 million individuals
- Analysis included children and adolescents (aged 6-17 years) newly diagnosed with TS, identified through the following sequential steps:
  - Health care encounter with International Classification of Diseases (ICD), 9th Revision, Clinical Modification diagnosis code 307.23 or ICD, 10th Revision, Clinical Modification code F952
  - No previous encounters with diagnosis code for TS within 18-month period prior to index date (ie, newly diagnosed)
- ≥1 provider encounter with any diagnosis code during the baseline period (18 months prior to index [TS diagnosis] date) and during an 18-month post-index period, thereby selecting for patients with multiple encounters in the medical system

REFERENCES:
1. Berzosa-Gonzalez I, Martinez-Horta S, Pérez-Pérez J, Kulisevsky J, Pagonabarraga J. *Brain Sci*. 2024;14(12):1231. **2.** Pringsheim T, Okun MS, Müller-Vahl K, et al. *Neurology*. 2019;92(19):896-906. **3.** Hirschtritt ME, Lee PC, Pauls DL, et al. *JAMA Psychiatry*. 2015;72(4):325-333. **4.** Cravedi E, Deniau E, Giannitelli M, et al. *Child Adolesc Psychiatry Ment Health*. 2017;11:59.

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RESULTS

- 12,015 children and adolescents with newly diagnosed TS met selection criteria and were included in the analysis (**Table**)
  - The majority of the 12,015 patients were male (71.5%), white (75.1%), and non-Hispanic/Latino (81.0%)
  - Of 6392 patients with BMI data, 32.7% were considered overweight or obese

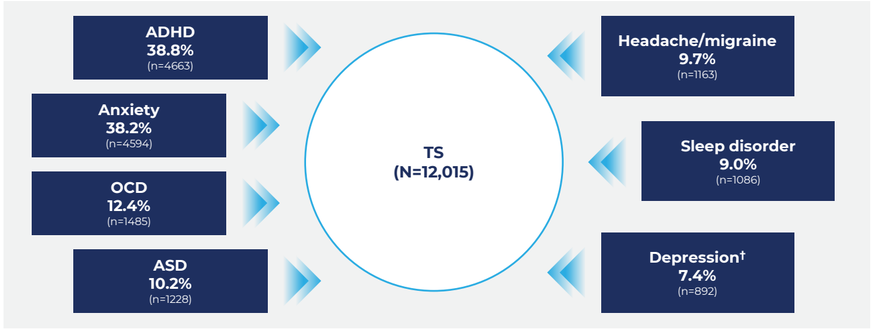
Table. Demographic and Baseline Characteristics in Children and Adolescents Newly Diagnosed With TS

Characteristics	Population (N=12,015)
Age, mean (SD), y	11 (3)
Age group, n (%) 6-11 y 12-17 y	 6267 (52.2) 5748 (47.8)
Sex, n (%)* Male Female	 8594 (71.5) 3420 (28.5)
Race, n (%)* White Black Asian Other†	 9026 (75.1) 814 (6.8) 234 (1.9) 63 (0.5)
Ethnicity, n (%)* Not Hispanic or Latino Hispanic or Latino	 9730 (81.0) 1082 (9.0)
BMI category, n (%)*‡ Underweight Normal weight Overweight Obesity	n=6392 319 (5.0) 3980 (62.3) 932 (14.6) 1161 (18.2)
Metabolic syndrome, n (%)§ None Mild Moderate	 10,335 (86.0) 1565 (13.0) 115 (1.0)

*Missing data: sex (n=1), race (n=1878), ethnicity (n=1203), and BMI category (n=5623). †American Indian, Alaska Native, and Native Hawaiian or other Pacific Islander. ‡Definitions: underweight (BMI z-score <-1.6); normal weight (BMI z-score -1.6 to <1.0); overweight (BMI z-score 1.0 to <1.6), and obese (BMI z-score ≥1.6). §Metabolic syndrome conditions defined as: abdominal obesity (ie, any BMI result indicating obesity), hypertension, any triglyceride result(s) ≥100 mg/dL, any HDL-C result(s) ≤50 mg/dL, and prediabetes, diabetes, or any fasting glucose result(s) ≥110 mg/dL. Mild defined as 1 to 2 metabolic syndrome conditions; moderate defined as 3 to 5 metabolic syndrome conditions.
BMI = body mass index; HDL-C = high-density lipoprotein-cholesterol; TS = Tourette syndrome.

- The most common comorbid psychiatric disorders were ADHD (38.8%), anxiety (38.2%), OCD (12.4%), and autism spectrum disorder (10.2%; **Figure 1**)

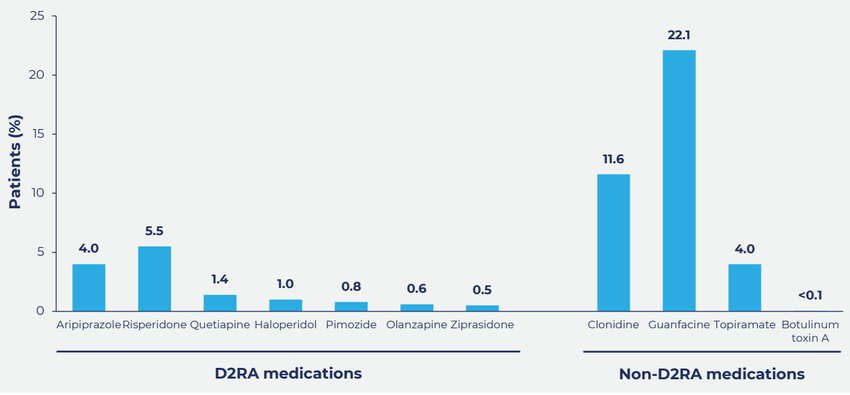
Figure 1. Most Common* Comorbid Psychiatric/Neurologic Conditions in Children and Adolescents Newly Diagnosed With TS



*≥9.0% of patients. †Included mood disorders.
ADHD = attention-deficit/hyperactivity disorder; ASD = autism spectrum disorder; OCD = obsessive-compulsive disorder; TS = Tourette syndrome.

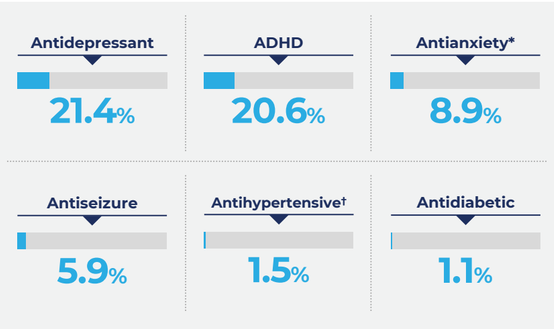
- Common medications for TS and other comorbid conditions identified during the 18-month baseline period were guanfacine (22.1%) and clonidine (11.6%); dopamine D2 receptor antagonist/partial agonist use was infrequent (**Figure 2**)
- Of 6 additional medication classes examined, antidepressant (21.4%) and ADHD (20.6%) medications were most commonly identified during the 18-month baseline period (**Figure 3**)

Figure 2. Baseline Period Medication Records in Children and Adolescents With Newly Diagnosed TS (N=12,015)



D2RA = dopamine D2 receptor antagonist/partial agonist; TS = Tourette syndrome.

Figure 3. Relative Frequencies of Other Medications During 18-Month Baseline Period in Children and Adolescents Newly Diagnosed With TS (N=12,015)



†Benzodiazepines and buspirone. ‡Aldosterone antagonists, alpha-adrenoreceptor angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, antagonists, beta-blockers, calcium channel blockers, diuretics, and methyldopa.
ADHD = attention-deficit/hyperactivity disorder; TS = Tourette syndrome.

DISCUSSION AND CONCLUSIONS

- A substantial percentage of this large cohort of children and adolescents had psychiatric comorbid conditions at the time of TS diagnosis
- The relative frequencies of several comorbid conditions in this population differed from published comorbid lifetime prevalence rates in pediatric TS samples:
  - ADHD and OCD was lower than published lifetime prevalence rates (59.2%-63.9% and 43.1%-57.0%, respectively)[3]
  - Anxiety was slightly higher than published lifetime prevalence rates (25.2%-28.6%)[3]
  - Autism spectrum disorder was comparable (up to 11%)[4]
- Future research is warranted to better understand the:
  - Relationship between TS and these psychiatric comorbid conditions
  - Impact of these psychiatric conditions and other baseline characteristics on safety and efficacy outcomes of TS treatments