

## **TOURETTE SYNDROME and CO-MORBIDITIES**

The exact pathophysiology in Tourette Syndrome (TS) remains unclear, but is thought to relate, in part, to dysfunction in the cortico-striato-thalamo-cortical circuit (Kumar et al., 2016). In addition to this, co-morbidities (CM) represent a multi-faceted interplay between emotions and motion within TS. Cravedi et al. (2017), in their comprehensive review of the neurodevelopmental CM literature, reported that CMs in TS are the rule, rather than the exception.

CMs include Obsessive Compulsive Disorder (OCD), Attention Deficit Hyperactivity Disorder (ADHD), depression and anxiety, sleep disorders, rage attacks, migraines, trichotillomania (hair pulling), excoriation (skin picking), rage attacks, and learning disabilities (Malek & Golinska, 2020). TS is not generally associated with intellectual disabilities. This list is by no means exhaustive.

In TS patients behavioural CMs often compromise well-being, more so than tic severity (Cavanna, 2018). CM disorders also appear to affect self-esteem, more so than tics (Weingarden, et al., 2018). Interestingly, a national population-based study in Taiwan reported that there was a lower risk of psychiatric CM in a tic medication therapy group. Compared to other medication, tic medication therapy had the benefit of decreasing psychiatric CM (Chen, et al., 2020). Overall, converging evidence suggests OCD and ADHD to be the most frequent CMs.

### **Obsessive Compulsive Disorder (OCD)**

OCD is defined by the presence of obsessions (intrusive thoughts) and compulsions (repetitive behaviours) leading to adaptive malfunctioning and emotional maladjustment. Within TS patients there is a greater rate of symmetric obsession, obsessional counting, and “just right”

perceptions (Kumar, et al., 2016). Some research suggests that phenomenological similarities exist between tics and OCD symptoms (Bhikram, et al., 2020). OCD is evident in up to 80% of TS patients and symptoms can arise anytime in the course of TS. Females are more likely to have CM OCD, than males (Hirschtritt, et al., 2015). One study has suggested an association between prenatal smoking and an increased risk of TS with a CM condition of OCD (Browne, et al., 2016).

### **Attention Deficit Hyperactivity Disorder (ADHD)**

ADHD is a complex neurobiological disorder characterised by symptoms of inattention and hyperactivity/impulsivity. Psychiatric symptoms in TS patients include a lack of concentration and restlessness. ADHD normally occurs in adolescence and is present in 60% to 80% of TS patients. Males are more likely than females to have CM ADHD (Hirschtritt, et al., 2015). Although deficits in inhibitory control are inherent components of TS, these are exacerbated when ADHD is concomitant with TS (Morand-Beaulieu, et al., 2017). Although not ADHD, rage attacks, evidenced by behavioural outbursts and anger issues, are evident in 25% to 75% of TS patients (Kumar, et al., 2016).

### **Depression and Anxiety**

TS patients are at higher risk of developing depression than the general population (Malek & Golinska, 2020). Affective psychiatric symptoms include mood swings and feeling isolated. Anxiety symptoms include generalized anxiety and panic feelings in public. Depression and anxiety are present in up to 75% of TS patients (Kumar, et al., 2016). Depression may also be a side effect of pharmacotherapy, primarily neuroleptics used to reduce tics. TS patients with depression report a lower quality of life, with the stigmatisation and exclusionary nature of TS impacting self-esteem. Low self-esteem may also contribute to depression as a result of social

isolation, rejection by peers, or being a victim of violence. Migraines appear in 25% of TS patients compared to 10% to 13% of the general population. A deficit in serotonin metabolism has been suggested as contributing to migraines (Kumar, et al., 2016).

### **Sleep Disorders**

Sleep disorders are present in 12% to 62% of TS patients, with children and adolescents suffering from more sleep disorders and sleep disturbances than their age matched peers (Kumar, et al., 2016). There are two primary sleep disorders CM with TS being insomnia and para insomnia. When TS patients are sleep deprived this can exacerbate tics. When sleep disorders are present in TS and ADHD, the sleep difficulties are primarily related to the ADHD. Oksenberg (2020) suggests that given the prevalence of sleep disorders, that such problems may be regarded as a common CM of TS.

### **Hair Pulling Disorder (Trichotillomania) and Skin Picking Disorder (Excoriation)**

Both hair pulling disorder and skin picking disorder share a genetic susceptibility and underlying pathophysiology with TS and OCD. Being female presents a major risk factor. One study of 811 TS patients reported that hair pulling disorder and skin picking disorder both increased tic severity, and co-occurred with OCD in TS patients (Greenberg, et al., 2018).

### **Learning Disorders**

Large studies have evidenced that 23% of TS patients have associated learning disorders, with smaller studies reporting a higher prevalence at 50% (Kumar, et al., 2016). Math's and spelling disorders are the most frequent and are normally present at the time of TS diagnosis.

It is clear that a thorough understanding of TS and any underlying CM are important in order to meet the needs of TS patients, formulate accurate diagnosis, and implement effective interventions that will improve TS patient's lives.

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