



University
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Most restless sleepers do not
have restless legs syndrome

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Land Acknowledgement



- ▶ The University of Manitoba campuses are located on original lands of Anishinaabeg, Cree, Oji-Cree, Dakota and Dene peoples, and on the homeland of the Métis Nation. We respect the Treaties that were made on these territories, we acknowledge the harms and mistakes of the past, and we dedicate ourselves to move forward in partnership with Indigenous communities in a spirit of reconciliation and collaboration.

Disclosure

▶ None

Objectives

- ▶ Review pediatric restless legs syndrome
- ▶ Discuss the concept of restless sleep syndrome
- ▶ Review the differential diagnoses of restless sleep
- ▶ Recognize diagnostic criteria for restless sleep syndrome
- ▶ Discuss the treatment of restless sleep syndrome

Restless Legs Syndrome

- ▶ RLS is a sensory-motor disorder referring to an urge to move the legs caused by unpleasant sensations, paresthesias, or dysesthesias.
 - A. Symptoms must
 - ▶ Begin or worsen during resting or inactivity periods, such as sitting or lying down.
 - ▶ Be partially relieved by active movements as long as the activity continues.
 - ▶ Occur predominantly at night or in the evening, rather than all day long.
 - B. May not exclusively be accounted for by another medical or behavioral disorder.
 - C. Cause distress, functional impairment, and sleep disturbance.

Pediatric RLS

- ▶ Prevalence: 2-4%
- ▶ Highly familial (twin & sibling studies)
- ▶ Supportive diagnostic finding
 - ▶ PSG: PLM > 5/hour

RLS & PLM

- ▶ Periodic Limb Movement
 - ▶ Highly stereotyped limb movements:
 - ▶ 0.5-10 seconds long
 - ▶ $>8\mu\text{V}$ above resting EMG
 - ▶ In a sequence of 4 or more movements
 - ▶ Separated by an interval of >5 seconds and < 90 seconds
- ▶ PLMs are common in patients with RLS
- ▶ But they are not specific for diagnosis in RLS

What kids say

- ▶ The urge to move in children may be accompanied by sensations that are difficult to describe, particularly for young children.
- ▶ Uncomfortable, often painful feelings, frequently expanding to all 4 limbs, may be referred to as feeling “uncomfortable,” “restless,” “funny,” or needing “to kick.”
- ▶ Can try asking a child to draw his symptoms
- ▶ Symptoms may start earlier during the day in children and adolescents because of the long hours of motor inactivity at school
- ▶ Caveat: parents love a “treatable” diagnosis so they sometimes teach their kids to regurgitate the symptoms.

Best RLS question

- ▶ When you try to relax in the evening or sleep at night, do you ever have unpleasant, restless feelings in your legs that can be relieved by walking or movement?
 - ▶ Positive predictive value: 86.9%
 - ▶ Negative predictive value: 100%

RLS co-morbidity



- ▶ Anxiety: 11.5%
- ▶ Depression: 29%
- ▶ ADHD: 25%

Pathophysiology?

- ▶ Iron deficiency–metabolic theory
- ▶ Brain-iron deficiency, due to impaired iron transport across the blood-brain barrier, primarily affects the substantia nigra and, to a lesser extent, the caudate, putamen, and thalamus, with the activation of the hypoxic pathway.
- ▶ This increases dopaminergic activity with subsequent post-synaptic downregulation.
- ▶ It also increases glutamate and reduces adenosine, resulting in hyperarousal and sleep fragmentation unresponsive to dopaminergic treatment
- ▶ The circadian turnover of dopamine and iron metabolism also explains the circadian night distribution of symptoms and induces overcompensation via an adaptive post-synaptic mechanism.

RLS Treatment

- ▶ Iron supplementation
 - ▶ Target: Ferritin > 50 (sometimes >75)
- ▶ Dopamine agonists
- ▶ Gabapentin, clonazepam, clonidine (off-label)



Okay, my kid doesn't
have RLS

BUT WHAT AM I SUPPOSED TO DO, THEY'RE STILL
RESTLESS IN SLEEP

Sleep Apnea

- ▶ OSA: 24.7%-81% of children were restless in sleep
- ▶ CSA: 50% restless sleep
- ▶ Sleeping in high altitude: 46.8% restless sleep
- ▶ Snoring: 34.1—70% restless sleep

Tonsillectomy

- ▶ Patients with sleep-disordered breathing who are going to have tonsillectomy
 - ▶ 37.7-91% have restless sleep
- ▶ Post-op
 - ▶ Up to 56% have restless sleep
 - ▶ Correlated with subjective pain intensity

Other respiratory issues

- ▶ Pneumonia, upper respiratory tract infections with or without otitis media, tonsillitis, hypertrophy of tonsils, and coughing at night
 - ▶ 16.8%-48.5% have restless sleep
- ▶ Poorly controlled asthma: up to 83.5% have restless sleep
- ▶ Exposed to 2nd hand smoke
 - ▶ 23% of teenagers have restless sleep
- ▶ Smokers: 9.8-17.6% of teenagers have restless sleep
- ▶ Acute Otitis Media: 85.2% have restless sleep

Neuro/Psych d/o

- ▶ Children with epilepsy: 64.3% have restless sleep
- ▶ Migraines: 34.04% have restless sleep
- ▶ Psychiatric patients: 31.7% have restless sleep
- ▶ Restless sleep also associated with:
 - ▶ Bipolar mood disturbance
 - ▶ Anxiety-affective disorder
 - ▶ Conduct disorder

Neurodevelopmental d/o



- ▶ Down syndrome: 1/3 to 2/3 have restless sleep
- ▶ ADHD: 50-57% have restless sleep
- ▶ Autism: 40-77% have restless sleep

Other diseases

- ▶ Bruxism: 49.8-77.1% have restless sleep
- ▶ Nocturnal enuresis: 5.7% have restless sleep
- ▶ Sleepwalking: 94.5% have restless sleep
- ▶ Mobile phone-related awakenings: 37.9% have restless sleep

General population

- ▶ 6%-49.6% have restless sleep
- ▶ However, sleep experts feel that there is definitely a subset of restless sleepers without secondary causes that is “pathologic” in children



What does this all mean?

Restless Sleep

- ▶ Maybe some normal children can have restless sleep
- ▶ But specific non-RLS diseases definitely increase risk for secondary restless sleep
- ▶ But experts feel that there are kids who don't have restless legs syndrome, who don't have secondary restless sleep
- ▶ As they probably have primary restless sleep syndrome

Diagnostic algorithm

- ▶ If patient has restless sleep
- ▶ First rule out secondary causes
 - ▶ Sleep-disordered breathing
 - ▶ Respiratory tract disorder, otitis, smoking
 - ▶ Sleep-related movement disorder (incl. RLS)
 - ▶ Neurologic or psychiatric disorder
 - ▶ Neurodevelopmental disorder
 - ▶ Other medical disorder
- ▶ NB: treating these disorders don't necessarily improve the restless sleep but might

Restless Sleep Syndrome

▶ Diagnostic criteria

1. A complaint of “restless sleep” as reported by the patient's parent, caregiver, or bedpartner, or by the patient
2. Restless sleep movements involve large muscle groups of the whole body, all four limbs, arms, legs, or head
3. The movements occur during sleep or when the individual appears to be asleep.
4. Video-polysomnography shows a total movement index (by video analysis) of 5 or more per hour of sleep
5. Restless sleep occurs at least three times per week
6. Restless sleep has been present for at least three months
7. Restless sleep causes clinically significant impairment in behavioral, educational, academic, social, occupational, or other important areas of functioning, as reported by the patient's parent, caregiver, or bedpartner, or by the patient (e.g., daytime sleepiness, irritability, fatigue, mood disturbance, impaired concentration, or impulsivity)
8. The condition is not better explained by another sleep disorder, medical disorder, mental disorder, behavior disorder, environmental factor, (e.g., sleep-disordered breathing, restless legs syndrome, periodic limb movement disorder, sleep-related rhythmic movement disorder, insomnia disorder, atopic dermatitis, seizure disorder, etc.), or the physiological effects of a substance (e.g., caffeine)

RSS Treatment

- ▶ 7.7% of children with restless sleep have primary restless sleep syndrome
 - ▶ Iron supplementation may help
 - ▶ But not everyone benefits
 - ▶ Otherwise, we have no treatment
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- ▶ So mostly the diagnosis was made so that researchers and sleep experts can study the condition better

Conclusion/Take Home

- ▶ Most kids with restless sleep don't have restless legs syndrome
- ▶ Should rule out secondary causes of restless sleep first
- ▶ But treating those causes may or may not improve the restless sleep
- ▶ Not sure how to diagnose primary restless sleep syndrome without video-PSG
- ▶ Can try iron supplementation but if doesn't work...

Reference

- ▶ Silvestri and DelRosso, *Sleep Med Clin*, **16** (2021):305-314
- ▶ LM DelRosso *et al.*, *Sleep Med Rev*, **56** (2021):101406
- ▶ LM DelRosso *et al.*, *Sleep Med*, **75** (2020):335-340

Thanks