Urine Toxicology Screen in Multiple Sleep Latency Test: The Correlation of Positive Tetrahydrocannabinol, Drug Negative Patients, and Narcolepsy

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Objective: Drugs can influence results of multiple sleep latency tests (MSLT). We sought to identify the effect of marijuana on MSLT results in pediatric patients evaluated for excessive daytime sleepiness (EDS).

Methods: This is a retrospective study of urine drug screens performed the morning before MSLT in 383 patients < 21 years old referred for EDS. MSLT results were divided into those with (1) (–) urine drug screens, (2) urine drug screens (+) for tetrahydrocannabinol (THC) alone or THC plus other drugs, and (3) urine drug screens (+) for drugs other than THC. Groups were compared with Fisher exact tests or one-way ANOVA.

Results: 38 (10%) urine drug tests were (+): 14 for THC and 24 for other drugs. Forty-three percent of patients with drug screen (+) for THC had MSLT findings consistent with narcolepsy, 0% consistent with idiopathic hypersomnia, 29% other, and 29% normal. This was statistically different from those with (–) screens (24% narcolepsy, 20% idiopathic

hypersomnia, 6% other, 50% normal), and those (+) for drugs other than THC (17% narcolepsy, 33% idiopathic hypersomnia, 4% other, 46% normal ($p = 0.01$)). Six percent (6/93) of patients with MSLT findings consistent with narcolepsy were drug screen (+) for THC; 71% of patients with drug screen (+) for THC had multiple sleep onset REM periods (SOREMS). There were no (+) urine drug screens in patients < 13 years old.

Conclusion: Many pediatric patients with (+) urine drug screens for THC met MSLT criteria for narcolepsy or had multiple SOREMS. Drug screening is important in interpreting MSLT findings for children ≥ 13 years.

Keywords: multiple sleep latency test, tetrahydrocannabinol, marijuana, narcolepsy, pediatrics

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Excessive daytime sleepiness (EDS) is a frequent clinical complaint in children and adolescents seen in sleep medicine clinics. The differential diagnosis of EDS is broad and includes both narcolepsy and idiopathic hypersomnia. Diagnosis of narcolepsy and idiopathic hypersomnia is made by a clinical history followed by a standardized multiple sleep latency test (MSLT) consisting of 4–5 daytime nap opportunities conducted under a standardized protocol in which mean sleep onset latency (MSL) is calculated and the number of sleep onset rapid eye movement (REM) periods are tabulated.¹ Interpretation of the MSLT findings, however, can be complicated by several factors, including prior sleep deprivation, coexisting sleep disorders such as obstructive sleep apnea, prescription medications, and illicit drugs. Because of the frequency of illicit drug use, the American Academy of Sleep Medicine (AASM) standard of practice for performing an MSLT states that obtaining a morning urine drug screen “may be indicated” in patients undergoing MSLT “to make sure that sleepiness on the MSLT is not pharmacologically induced.”²

This study was undertaken related to our clinical experience with pediatric patients who were referred for evaluation

BRIEF SUMMARY

Current Knowledge/Study Rationale: We hypothesized that symptoms consistent with narcolepsy including excessive daytime sleepiness, cataplexy, sleep paralysis or hypnagogic/hypnopompic hallucinations might be reported by some pediatric patients who use marijuana. We also hypothesized that THC use/withdrawal might be associated with a decreased mean sleep onset latency and an increased number of sleep onset REM periods on multiple sleep latency testing (MSLT) consistent with narcolepsy.

Study Impact: Ten percent of all pediatric patients ≥ 13 years who presented with excessive daytime sleepiness without cataplexy and also had a multiple sleep latency test consistent with narcolepsy were found to have a urine drug screen (+) for THC. Drug screening is important in interpreting MSLT findings for children ≥ 13 years.

of EDS or were referred for management after a diagnosis of narcolepsy was made elsewhere without urine drug screening. Our hypothesis was that tetrahydrocannabinol (THC) use can cause symptoms like EDS and may also cause false (+) MSLT consistent with narcolepsy. We also hypothesized that symptoms of narcolepsy, including EDS, cataplexy, sleep paralysis, or hypnagogic/hypnopompic hallucinations might be found in

some pediatric patients who use marijuana, and that there may be corresponding MSLT abnormalities related to THC use.

We reviewed all MSLT records performed in our pediatric sleep center over a 10-year period from 2004–2013 to determine how many MSLTs performed in pediatric patients were associated with a (+) illicit urine drug screen that may have complicated the interpretation of a sleep diagnosis. Although there is substantial literature on MSLT testing, there is relatively little reported on the effects of illicit drugs complicating interpretation of clinical MSLT findings. To our knowledge, there are no previous reports of the prevalence of (+) urine drug screens in pediatric patients undergoing MSLT.

METHODS

Study Design and Patients

This is a retrospective study of urine drug screens performed with MSLTs in 383 patients < 21 years of age at Nationwide Children's Hospital in Columbus, Ohio, from 2004 through 2013. We excluded MSLTs from all patients ≥ 21 years of age or any patient who had < 360 min of total sleep time on overnight polysomnography (PSG) prior to MSLT. All pediatric patients were evaluated for EDS on referral from community or medical school physicians to an academic pediatric sleep medicine clinic staffed by board certified pediatric sleep specialists. Sleep diaries were routinely obtained, and a PSG was performed on every patient the evening before MSLT testing to assess nighttime sleep quality and quantity, as well as detect any comorbid sleep conditions that may cause EDS. At least 6 h of sleep was achieved in patients, as recommended by AASM practice parameters.¹ Urine samples were collected for toxicology screening the morning following a polysomnogram before the MSLT was started. It is the protocol of Nationwide Children's Hospital's sleep lab for all patients < 21 years old to be accompanied by a parent or guardian for overnight PSG and MSLT. Quantitative urine levels of drugs were determined by immunoassay from 2004 to 2010 on the Abbott AxSYM, and on the Vitros 5.1 analyzer after 2010. Positive thresholds for these 2 platforms were the same: amphetamines/methamphetamines > 1000 ng/mL, barbiturates > 200 ng/mL, benzodiazepines > 200 ng/mL, cocaine metabolites > 300 ng/mL, opiates > 300 ng/mL, and cannabinoids > 50 ng/mL. These thresholds are consistent with Substance Abuse and Mental Health Service (SAMHSA) guidelines.⁴ Specific gravities of urine were determined and acceptable only if between 1.010 and 1.030, and with a pH ranging 4–8 to avoid questions of tampering.

All sleep study reports were reviewed, and pertinent data were extracted and tabulated by a research associate with accuracy confirmed by authors. The numbers of patient samples testing (+) for illicit drugs were tabulated and results of their MSLT were analyzed. For this study, an MSLT with a mean sleep onset latency < 8 min and ≥ 2 sleep onset REM periods (SOREMs) was considered consistent with a diagnosis of narcolepsy.¹ An MSLT with an MSL < 8 min and < 2 SOREMs was considered consistent with the diagnosis of idiopathic hypersomnia. An MSLT with a mean sleep onset latency > 8 min but more than one SOREM was considered as "other" for this study. All other MSLT results were considered to be normal.

The study was approved by the Institutional Review Board of Nationwide Children's Hospital.

Outcomes and Data Analysis

Based on the urine drug screen results, patients and their MSLTs were divided into 3 groups: (1) those (–) for all tested drugs, (2) those (+) for THC alone or THC plus other drugs, and (3) those (+) for drugs other than THC. Comparisons among the 3 groups were made for gender, age, ethnicity, body mass index (BMI), MSLT (normal/abnormal), sleep diagnosis, and total sleep time (TST) using Fisher exact tests or one-way analysis of variance (ANOVA) with Bonferroni tests for multiple comparisons. All data are presented as mean ± standard deviation (range) for continuous variables and frequency (percent of non-missing data) for categorical variables.

We also reviewed the original documentation to check for other features to support the diagnosis of narcolepsy in all MSLT findings consistent with narcolepsy. We specifically looked for the symptoms of cataplexy, sleep paralysis, and hypnagogic or hypnopompic hallucinations in the original medical histories to support the clinical diagnosis of narcolepsy in each of the 3 patient groups with MSLT consistent with the diagnosis of narcolepsy. All statistical testing and analyses were performed using SAS 9.3 (Cary, NC). Significance was determined at $p < 0.05$.

RESULTS

Patient Demographics

Of 383 patients, 221 (58%) were male; 259 of 288 (79%) with data for race self-identified as white and 69 (21%) non-white, which includes blacks, Hispanics, and Asians. This fairly represents the region's population strata. There were no statistically significant differences between the groups for race or BMI, but males were more often drug test (+) than females (Tables 1 and 2).

The age of patients ranged from 5 to 20 years, with an overall mean of 13.3 ± 3.5 years. Patients with (+) urine drug screens for THC ranged from 13–20 years, and were significantly older than those (+) for drugs other than THC and pediatric patients with (–) screens ($p < 0.01$; Table 1). Of 144 children aged 5–12 years, none had urine drug screens (+) for THC.

Urine Drug Screens

As illustrated in Figure 1, 345 (90%) patients tested drug (–). Thirty-eight patients (10%) were drug test (+): 24 (6%) were (+) for drugs other than THC, and 14 (4%) were (+) for THC. For the 24 patients (+) for drugs other than THC, 16 were (+) for amphetamine/methamphetamine alone, 3 for amphetamine/methamphetamine plus benzodiazepine (1 of the 3 was also (+) for barbiturates), 4 for benzodiazepine alone, and 1 for metoprolol. Of the 14 patients testing (+) for THC, 12 were (+) for THC alone and 2 were (+) for THC plus amphetamine/methamphetamine.

None of the patients refused urine drug testing which was always performed on the morning of the MSLT. All urine specimens were successfully collected by sleep technologists in the sleep lab and met specific gravity and pH criteria.

Table 1—Characteristics of pediatric patients undergoing MSLT.

	Patients with (–) Drug Screens	Patients (+) for Drugs Other than THC	Patients (+) for THC Alone or THC Plus Other Drugs	p value
Male gender	(N = 345)	(N = 24)	(N = 14)	
N (%)	192 (56)	17 (71)	12 (86)	0.03 ^a
Race/ethnicity	(N = 294)	(N = 22)	(N = 12)	
White, N (%)	231 (79)	18 (82)	10 (83)	
Black/other, N (%)	63 (21)	4 (18)	2 (17)	1.00
Age, years	(N = 345)	(N = 24)	(N = 14)	
Mean ± SD	13.2 ± 3.5	12.3 ± 3.8	16.8 ± 1.7	
Range	5–2	7–18	13–20	< 0.01 ^{b,c,d}
BMI, kg/m ²	(N = 324)	(N = 22)	(N = 14)	
Mean ± SD	25.4 ± 7.7	25.5 ± 9.4	27.3 ± 9.2	
Range	13–60	15–46	19–50	0.70

^a Significant difference at $p < 0.05$ using Fisher exact test. ^b Significant difference between means ($p < 0.05$) of patients with drug screens (+) urine for THC versus patients with (–) urine drug screens. ^c Significant difference between means ($p < 0.05$) of patients with drug screen versus patients (+) urine for drugs other than THC. ^d After correcting for multiple comparisons (Bonferroni test), a significant difference between means at $p < 0.05$ was observed between patients with drug screens (+) for THC versus patient (+) urine drug screens for other drugs, and patients with drug screen (+) for THC versus patients with (–) urine drug screens.

Table 2—Characteristics of pediatric patients undergoing MSLT, ages 13–20.

	Patients with (–) Drug Screens	Patients (+) for Drugs Other than THC	Patients (+) for THC Alone or THC Plus Other Drugs	p value
Male gender	(N = 210)	(N = 15)	(N = 14)	
N (%)	102 (49)	13 (87)	12 (86)	< 0.01 ^a
Race/ethnicity	(N = 176)	(N = 13)	(N = 12)	
White, N (%)	148 (84)	10 (77)	10 (83)	
Black/other, N (%)	28 (16)	3 (23)	2 (17)	0.75
Age, years	(N = 210)	(N = 15)	(N = 14)	
Mean ± SD	15.6 ± 1.8	14.9 ± 1.7	16.8 ± 1.7	
Range	13–20	13–18	13–20	0.02 ^{b,c,d}
BMI, kg/m ²	(N = 197)	(N = 14)	(N = 14)	
Mean ± SD	27.8 ± 7.7	29.7 ± 8.8	27.3 ± 9.2	
Range	16–60	20–46	19–50	0.66

^a Significant difference at $p < 0.05$ using Fisher exact test. ^b Significant difference between means ($p < 0.05$) of patients with drug screens (+) urine for THC versus patients with (–) urine drug screens. ^c Significant difference between means ($p < 0.05$) of patients with drug screen versus patients (+) urine for drugs other than THC. ^d After correcting for multiple comparisons (Bonferroni test), a significant difference between means at $p < 0.05$ was observed between patients with drug screens (+) for THC versus patient (+) urine drug screens for other drugs, and patients with drug screen (+) for THC versus patients with (–) urine drug screens.

MSLT Results

Figure 2 illustrates percentages of patients from the 3 groups meeting MSLT diagnostic criteria for narcolepsy or idiopathic hypersomnia. Based on these criteria, 43% (6/14) of patients with urine drug screens (+) for THC had MSLT findings consistent with narcolepsy, 0% with idiopathic hypersomnia, 28.5% (4/14) other, and 28.5% (4/14) had normal MSLT. This was significantly different from patients with (–) screens (24% MSLT finding consistent with narcolepsy, 20% idiopathic hypersomnia, 6% other, 50% normal), and those (+) for drugs other than THC (17% MSLT finding consistent with narcolepsy, 33% idiopathic hypersomnia, 46% normal, 4% other; $p = 0.01$). For paired comparisons between groups, overall differences were observed between patients with urine drug screens (+) for THC and patients with (–) urine drug screens ($p < 0.05$) and patients with urine samples (+) for drugs other than THC ($p < 0.05$). There were no differences observed between patients with (–)

urine drug screens and patients with urine drug screens (+) for drugs other than THC. Overall, 93/383 (24%) of MSLTs met the criteria for narcolepsy. In 6 of these 93 (6%) MSLTs, the patient's urine drug screens were (+) for THC. Total sleep time (TST) on the overnight PSG ranged from 360–596 minutes, with a mean of 445 ± 43 minutes. While there was no difference in TST on PSG or mean sleep onset latencies on MSLT among the 3 groups, the THC (+) group did have more SOREMs than the other 2 groups ($p = 0.04$; **Table 3**).

Interestingly, 71% of MSLTs associated with urine drug screens (+) for THC had ≥ 2 SOREMs (**Figure 3**). Of the 93 MSLTs with findings consistent with narcolepsy, 16 patients (17%) had reported the symptom of cataplexy. All patients reporting the symptom of cataplexy were urine drug screen (–) for THC. This did not reach statistical significance compared to the urine drug screen (–) group ($p = 0.19$). The prevalence of cataplexy was 16/83 (19%) in pediatric patients with MSLT

findings consistent with narcolepsy that were urine drug screen (–). Some patients with urine drug screen (+) for THC plus other drugs and MSLT findings consistent with narcolepsy had symptoms of either sleep paralysis or hypnagogic or hypnopompic hallucinations. Each symptom was found in about 20% to 33% of the drug (+) and drug (–) pediatric patients with MSLT findings consistent with narcolepsy. There was not a statistically difference for either sleep paralysis ($p = 0.84$) or hypnagogic or hypnopompic hallucinations ($p = 0.84$).

Figure 1—Results of urine drug screening in 383 pediatric patients undergoing MSLT.

Our data also show that the group associated with the highest prevalence of (+) urine drug screens and with MSLT findings consistent with narcolepsy occurred in males ≥ 13 years old presenting with EDS without cataplexy (13%). Overall, 10% of all pediatric patients ≥ 13 years old who presented with EDS without cataplexy and a MSLT consistent with narcolepsy had a urine drug screen (+) for THC. Considering our results showed that our population of patients who were urine drug screen (+) for THC were significantly older than the urine drug screen (–) population (16.8 years vs. 13.2 years, $p < 0.01$), a separate analysis of patients ages ≥ 13 years was completed to look for differences among the results of MSLT testing (two-sample T-test). Overall, this subpopulation was demographically similar—patients who were urine drug screen (+) for THC were largely male and ≥ 16 years old (**Table 2**). Results of this subanalysis (**Table 4**) showed the same trends as the overall analysis reported above (**Table 3**). First, there was no difference in mean sleep latency among groups ($p = 0.60$). The difference in SOREMs had the same trend but was no longer statistically different ($p = 0.06$). We suspect the significant reduction in sample size for this subanalysis ($N = 239$) may have contributed to this result.

DISCUSSION

Pediatric patients with urine drug screens (+) for THC often had either MSLT findings consistent with the diagnosis of narcolepsy (43%) or had two or more SOREMs on MSLT (72%). No child under 13 years old was urine drug test (+) for THC. We found that pediatric patients with (+) urine drug screens for THC and an MSLT consistent with narcolepsy did not have symptoms of cataplexy, but presented with findings consistent with narcolepsy without cataplexy. If our results are

Figure 2—Diagnosis of sleep disorders in pediatric patients grouped by urine drug screening results.

Table 3—PSG and MSLT values of pediatric patients undergoing MSLT.

	Patients with (–) Drug Screens	Patients (+) for Drugs Other than THC	Patients (+) for THC Alone or THC Plus Other Drugs	p value
Mean total sleep time	(N = 345)	(N = 24)	(N = 14)	
Mean ± SD	445 ± 42.8	452 ± 54.2	438 ± 26.5	0.15
Mean sleep latency on MSLT				
Mean ± SD	9.8 ± 5.4	9.9 ± 5.5	9.7 ± 4.8	0.99
Range	1.4–20	1–20	1.6–16	
SOREMS				
Mean ± SD	1.1 ± 1.4	1.0 ± 1.4	2.0 ± 1.2	0.03 ^{a,b,c}
Range	0–5	0–4	0–4	

^a Significant difference between means ($p < 0.05$) of patients with drug screens (+) urine for THC versus patients with (–) urine drug screens. ^b Significant difference between means ($p < 0.05$) of patients with drug screen versus patients (+) urine for drugs other than THC. ^c After correcting for multiple comparisons (Bonferroni test), a significant difference between means at $p < 0.05$ was observed between patients with drug screens (+) for THC versus patient (+) urine drug screens for other drugs, and patients with drug screen (+) for THC versus patients with (–) urine drug screens.

Table 4—Results of paired T-test for PSG and MSLT values of pediatric patients, ages 13–20 years undergoing MSLT.

	Patients with (–) Drug Screens	Patients (+) for THC Alone or THC Plus Other Drugs	p value
Mean total sleep time	(N = 210)	(N = 14)	
Mean ± SD	440 ± 39	438 ± 26.5	0.84
Mean sleep latency on MSLT			
Mean ± SD	9.0 ± 5.1	9.7 ± 4.8	0.60
Range	1–20	1.6–16	
SOREMS			
Mean ± SD	1.2 ± 1.4	2.0 ± 1.2	0.06 ^a
Range	0–5	0–4	

^a Although a statistically significant difference was not observed between patients with drug screens (+) urine for THC versus patients with (–) urine drug screens ($p = 0.06$), this result shows a strong trend towards significance.

generalizable, narcolepsy with cataplexy should not present a diagnostic challenge.

On the other hand, challenges can be encountered trying to diagnose pediatric narcolepsy without cataplexy. HLA DQB1*0602 allele testing and neuroimaging are both nonspecific tests. There is currently no commercially available test to measure cerebrospinal fluid hypocretin levels. Our experience has been that caution must be used in interpreting clinical histories, PSG, and MSLT results in pediatric patients, since many factors can confound diagnosis.

There is limited useful information on the effects of marijuana on sleep in adults.^{2,3} Smoked marijuana and oral THC facilitates falling asleep.^{2,3} Acute use of THC reportedly leads to reduced sleep onset latency, increased slow wave sleep, alpha activity (intrusions), reduced eye movement density in REM sleep, and REM suppression. Chronic marijuana use may lead to long-term suppression of slow wave sleep. Abrupt withdrawal of marijuana can result in strange dreams, extremely high density of eye movements, increased REM sleep (REM rebound) with increased REM duration, large sleep spindles, increased sleep onset latency and reduced slow wave sleep. Marijuana abstinence (within 28 days) leads to reduced total sleep time, reduced sleep efficiency, reduced REM sleep duration, increased wake after sleep onset, and may increase periodic leg movements. While the last time of usage was not available in our patients, there was no significant difference in

Figure 3—Number of SOREMS on MSLT in pediatric patients grouped by urine drug screening results.

* Indicates significance at $p < 0.05$.

mean TST on the PSG performed before MSLT between THC (+) and (–) patients in this study (**Table 3**).

Marijuana use is very common, with at least 11 million Americans having used marijuana at least once in the past year.⁴ Marijuana use among teens is also common, with one study reporting that nearly 50% of 12th graders have tried marijuana and 6% use marijuana daily.⁵ A small retrospective report of 41 subjects evaluated in a pediatric sleep clinic in Belgium for sleep problems found that 9.8% of all patients had (+) urine drug screens for cannabis.⁶ Interestingly, this study found that three of 10 (30%) of adolescents evaluated for chronic fatigue or hypersomnia had (+) urine drug screens for cannabis. Based on their findings, these authors recommended routine urine screening for cannabis in teenagers seen for sleep problems and certainly in the evaluation of unexplained fatigue or hypersomnia.

The finding of narcolepsy without cataplexy in older adolescents could be related to unreported marijuana use, abuse of sedatives, or other illicit drugs. We were interested in evaluating whether any symptom would differentiate the pediatric patients with MSLT findings consistent with narcolepsy and THC (+) urine drug screens from those with MSLT findings consistent with narcolepsy and (–) urine drug screens. Some adolescents in both of the groups reported symptoms of sleep paralysis and hypnagogic hallucinations. This is not surprising since sleep paralysis has been reported in 40% of adults with narcolepsy and also occurs in 6% of normal adults.^{7,8} Hypnagogic or hypnopompic hallucinations occur in about 50% of adults with narcolepsy and in 5% of healthy adults. However, none of the pediatric patients with MSLT findings consistent with narcolepsy in the (+) urine drug screen group reported cataplexy. While this finding did not achieve statistical significance because of the small number of subjects, it highlights one possible clinical feature that might differentiate a pediatric patient unlikely to have a urine drug screen (+) for THC plus other drugs. In adults, cataplexy is reported in up to 90% of patients.^{7,8} In our study, 19% of pediatric patients with MSLT findings consistent with narcolepsy had the symptoms of cataplexy on initial presentation to the sleep clinic. The youngest child undergoing an MSLT was five years old in whom mother reported had cataplexy at nine months.⁹

There are several limitations to this study. First, the period between the last marijuana use by patients before the time of MSLT was unknown. The only information available to us was that some of the patients reported past use of marijuana. The increased SOREMs on MSLT may be a result of REM rebound from an abstinence of marijuana.^{2,3} A second limitation is that a urine drug screen may detect the presence of THC for up to 30 days in chronic heavy users, even after abstinence. In addition, the comorbid use of other substances, such as alcohol, is unknown for these adolescents/young adults, which makes it impossible to infer that abnormal MSLT findings were specifically due to marijuana use. THC use could be a marker for other unmeasured factors such as concomitant alcohol use, which even in pediatric patients may be associated with fragmented sleep and other findings consistent with narcolepsy. A third limitation is that inaccurate and false (+) urine drug tests might occur. The (+) predictive value for a positive urine drug screen for THC is 92% to 100%, but the (+) predictive value

for a positive urine drug screen for amphetamine is only 74% due to cross-reactivity with over-the-counter cold medicines and anorexiant containing pseudoephedrine, ephedrine, and phenylephrine.¹⁰ We did not go to the additional expense of quantitating THC levels in the majority of patients. No pediatric patient refused urine drug testing, which was always performed on the morning of the MSLT. The presence of an adult with each patient no doubt influenced willingness to provide a urine sample for testing since parents had gone to significant time and expense to investigate their child's/teenager's EDS. All specimens collected met specific gravity and pH criteria.

Another weakness of the study is the limited follow-up with sleep physicians of all adolescents with MSLT findings consistent with narcolepsy and urine drug screen (+) for THC plus other drugs. These adolescents were managed by their primary care physicians and frequently enrolled in community drug treatment programs. Most pediatric patients do not have repeat MSLT testing, presumably because symptoms of EDS abated with marijuana abstinence. Anecdotally, one adolescent was found to subsequently have an MSLT consistent with narcolepsy after a subsequent (–) drug screen and was treated. We also recognize, however, that it is possible that some pediatric patients who are narcoleptic may be more likely to self-medicate with marijuana to improve their fragmented nocturnal sleep patterns, as well as other concomitant psychiatric comorbidities, such as anxiety.¹¹ Finally, our sample size was small (N = 383), and we also had typical limitations of a retrospective study, including incomplete/missing data.

CONCLUSION

The diagnosis of narcolepsy, especially without cataplexy, is based on clinical history combined with results of MSLT testing. The problems inherent are highlighted by a recent paper assessing the test-retest variability in MSLT findings and diagnosis in adults with hypersomnia.¹² The authors found a change in diagnostic category between cataplexy, idiopathic hypersomnia, and normal occurring in 53% of adults based on MSLT findings. Because of the recent movement towards decriminalization and legalization of marijuana in the USA, with recreational marijuana laws now approved in two states (Colorado and Washington) and medicinal/decriminalized marijuana laws approved in 20 states,¹³ awareness of the potential effects of marijuana use on MSLT findings seems important to address, with future studies needed.

Our findings highlight and support the importance of obtaining a urine drug screen especially in any pediatric patient ≥ 13 years old with MSLT findings consistent with narcolepsy prior to making this diagnosis. Urine drug screening would also be important in any population studies looking at the prevalence of narcolepsy in adolescents, especially with the recent trend in changing marijuana decriminalization and legalization.

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