Diagnosing Narcolepsy in the Active Duty Military Population

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INTRODUCTION

- Narcolepsy type I (NT1) and type II (NT2) are central hypersomnias characterized by excessive daytime sleepiness (EDS), the irrepressible urge to sleep, and nighttime interruptions of sleep.
- NT1 and NT2 are exceedingly rare disorders with an prevalence of 0.01 to 0.05% worldwide. Diagnosis requires a sleep onset latency (SOL) of less than 8 minutes and two or more sleep onset rapid eye movement periods (SOREMPs) on a multiple sleep latency test (MSLT). One SOREMP from preceding polysomnography (PSG) can be counted.
- There are multiple disorders that can cause false positive results on MSLT including insufficient sleep, obstructive sleep apnea (OSA), and circadian rhythm disorders.
- Active duty military personnel have a high prevalence of sleep disorders.
- The purpose of this study was to compare the diagnostic rate of narcolepsy between initial evaluation and repeat testing in one military sleep disorders center.

METHODS

- All participants underwent 14 days of actigraphy to assess for insufficient sleep or the presence of a circadian rhythm disorder.
- Level I in-laboratory PSG was performed to assess for other etiologies for the patient's EDS.
  - For this study, OSA = AHI > 5 events/hour.
  - Medications that might affect test results were stopped 14 days prior to the PSG to include stimulants, SSRIs/SNRIs, and/or sodium oxybate.
- MSLT: five nap opportunities were given at two hour intervals starting two hours after awakening from the nocturnal PSG. Naps were terminated after 20 minutes if no sleep occurred. If sleep occurred during a nap opportunity, the session was continued for 15 minutes.

Table 1. Original Polysomnography and MSLT Data

Patient	AHI (events/hr)	SOL (min:sec)	SOREMPs (#)
1	1.9	N/A	N/A
2	N/A	01:18	4
3	0.4	05:06	4
4	0.4	N/A	N/A
5	0.5	02:37	2
6	1.0	06:24	4
7	1.3	02:04	2
8	0.1	07:00	2
9	1.1	N/A	N/A
10	0.3	02:54	2
11	N/A	03:00	2
12	3.0	04:36	3
13	0.4	02:18	3
14	0	06:00	2
15	N/A	03:03	3
16	0.8	03:36	2
17	1.7	06:18	2
18	N/A	02:00	2
19	4.1	00:22	2
20	1.5	02:24	3
21	0	06:30	2
22	0.8	01:24	4
23	1:1	03:00	2

Table results presented as time (min:sec) or number. N/A indicates that results were unavailable. AHI = apnea-hypopnea index; MSLT = multiple sleep latency test; SOL = sleep onset latency; SOREMP = sleep onset rapid eye movement period.

Table 2. Baseline Demographics and Polysomnography Results (N=23)

Age	35.0 ± 11.3 years
Male, no.	14 (60.7%)
Female, no.	9 (39.1%)
BMI	27.7 ± 3.2 kg/m²
History of cataplexy, no.	4 (17.4%)
Mood disorder, no.	6 (26.1%)
Sodium oxybate prescription, no.	6 (26.1%)
Stimulant prescription, no.	18 (78.3%)
SSRI/SNRI prescription, no.	3 (13.0%)
Sleep onset latency	22 ± 26.0 min
Wake after sleep onset	39 ± 16.8 min
Arousal index	17 ±7.17 events/hr
Total sleep time	405 ± 50.7 min
Sleep efficiency	87 ± 7%
REM latency	123 ± 80.3 min
Stage N1	7.3 ± 4.5%
Stage N2	54.8 ± 6.5%
Stage N3	18.4 ± 5.8%
Stage R (REM)	19.5 ± 6.4%
AHI	5.0 ± 3.9 events/hr
REM AHI	10.6 ± 10.1 events/hr
Supine AHI	10.6 ± 11.2 events/hr
Left lateral AHI	3.3 ± 3.9 events/hr
Right lateral AHI	2.2 ± 2.5 events/hr
SpO2 nadir	90.3 ± 3.0%

Results presented as mean ± SD or number (%). AHI = apnea-hypopnea index; BMI = body mass index; REM = rapid eye movement; SpO2 = oxygen saturation; SNRI = serotonin-norepinephrine reuptake inhibitor; SSRI = selective serotonin reuptake inhibitor.

Table 3. Multiple Sleep Latency Test Results and Final Diagnosis

Patient	Mean Sleep Onset Latency (min:sec)	Number of SOREMPs (#)	Final Diagnosis(es)
1	N/A	N/A	DSWPD
2	N/A	N/A	Mild OSA (supine predominant*: AHI: 6.8, supine AHI: 31.1); insufficient sleep syndrome**
3	7:18	0	Insufficient sleep syndrome
4	N/A	N/A	Mild OSA (supine predominant: AHI: 10.7, supine AHI: 31.3); insufficient sleep syndrome
5	N/A	N/A	Mild OSA (supine predominant: AHI: 13.2, supine AHI: 16.8); insufficient sleep syndrome
6	9:39	3	Narcolepsy without cataplexy
7	N/A	N/A	Insufficient sleep syndrome
8	12:21	0	Negative workup***
9	N/A	N/A	Inadequate sleep hygiene****
10	N/A	N/A	Insufficient sleep syndrome
11	N/A	N/A	Mild OSA (supine predominant: AHI: 6.3, supine AHI: 30.2); inadequate sleep hygiene
12	N/A	N/A	Mild OSA (AHI: 12.4); inadequate sleep hygiene
13	6:51	1	Narcolepsy without cataplexy
14	7:10	0	Idiopathic hypersomnia
15	15:39	0	Negative workup
16	N/A	N/A	Insufficient sleep syndrome
17	10:11	0	Negative work up
18	N/A	N/A	Mild OSA (AHI: 9.7); insufficient sleep syndrome
19	5:46	0	Inadequate sleep hygiene
20	3:03	0	Mild OSA (AHI: 7)
21	11:16	0	Insufficient sleep syndrome
22	7:19	0	Mild OSA (AHI: 7.6); insufficient sleep syndrome
23	1:25	0	Mild OSA (AHI: 7.5)
Mean:	8:10 (± 03:56)		

N/A indicates test was not performed. AHI = apnea-hypopnea index; DSWPD = delayed sleep-wake phase disorder OSA = obstructive sleep apnea; SOREMP = sleep onset rapid eye movement period.

*AHI > 5 events/hour with supine AHI at least twice lateral AHI.

**Average of less than 7 hours per night on actigraphy.

***Normal work-up without objective criteria for a sleep disorder diagnosis.

****Per clinician interpretation of actigraphy; characterized by significant variability in bedtime and wake times.

DISCUSSION

- Previous studies have revealed:
  - Low reproducibility of narcolepsy on repeat testing.
  - High prevalence of sleep disorders that may mimic narcolepsy.
- Our study demonstrated that 91% of patients had a change in diagnosis to a condition other than narcolepsy.
- The most common disorders diagnosed were insufficient sleep syndrome (43%), OSA (39%), and circadian rhythm disorders (21%).
- Actigraphy is currently recommended but not required in the diagnosis of narcolepsy.
  - Actigraphy can help identify other sleep disorders such as insufficient sleep or circadian rhythm disorders.
- Decreased REM percentage due to the first night effect and the presence of supine predominate OSA may have contributed to the initial negative PSG.

CONCLUSION

- Narcolepsy is a rare condition with a significant impact on quality of life and occupational function.
- There are multiple sleep disorders that can influence testing and ultimately diagnosis.
- Diligent exclusion of these confounding disorders is necessary prior to diagnosing a patient with narcolepsy.

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