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SOMNAMBULISM: CLINICAL ASPECTS AND PATHOPHYSIOLOGICAL HYPOTHESES


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# TABLE OF CONTENTS

**Introduction**

1. Epidemiology

2. Common Misconceptions

3. Clinical Management

4. Theoretical Frameworks

5. Future research

**Conclusion**
INTRODUCTION

Clinical Characteristics

Sleepwalking is "A serie of complex behaviors that are usually initiated during arousals from slow-wave sleep and culminate in walking around with an altered state of consciousness and impaired judgments."

- From mundane to more sophisticated behaviors
- Episodes last from few seconds to more than 30 minutes
- Misperceptions, unresponsiveness to external stimuli, mental confusion, perceived threat and variable retrograde amnesia
INTRODUCTION

Diagnostic Criteria

- The American Academy of Sleep Medecine in the second International Classification of Sleep Disorders

Panel: Somnambulism diagnostic criteria of the American Academy of Sleep Medicine—second International Classification of Sleep Disorders

A. Ambulation occurs during sleep
B. Persistence of sleep, a changed state of consciousness, or impaired judgment during ambulation shown by at least one of the following:
   - Difficulty in arousal of the person
   - Mental confusion when awakened from an episode
   - Amnesia (complete or partial) for the episode
   - Routine behaviours that occur at inappropriate times
   - Inappropriate or nonsensical behaviours
   - Dangerous or potentially dangerous behaviours
C. The disturbance is not better explained by another sleep, medical, neurological, or mental disorder; drug use; or substance use disorder

- The American Psychiatric Association in the Diagnostic and Statistical Manual of Mental Disorders

Sleepwalking Disorder

A. Repeated episodes of rising from bed during sleep and walking about, usually occurring during the first third of the major sleep episode.
B. While sleepwalking, the person has a blank, staring face, is relatively unresponsive to the efforts of others to communicate with him or her, and can be awakened only with great difficulty.
C. On awakening (either from the sleepwalking episode or the next morning), the person has amnesia for the episode.
D. Within several minutes after awakening from the sleepwalking episode, there is no impairment in mental activity or behavior (although there may initially be a short period of confusion or disorientation).
E. The sleepwalking causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
F. The disturbance is not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition.
Clinical Aspects

- Pathophysiology poorly understood
- Subjective diagnosis
- Various consequences between children and adults
- Sleep-related injuries (Schenck and al., 1989)
  - One of the leading causes
  - More prevalent than generally recognised
  - Legal cases of sleep-related violence is rising
  - Leads sleepwalkers to consult a medical specialist
  - Examples: driving motor vehicles, suspected suicide, homicide or attempt...
INTRODUCTION

Role within Sleep

- **NREM**: First third of the night
  - N1: Sleep Onset
  - N2: Light Sleep
  - N3: Slow-wave Sleep

- **REM**: Last third of the night

- NREM sleep and REM sleep alternate in cycles of 90 minutes
- Somnambulism: In N3 and N2
- Somnambulism as a disorder of arousals called parasomnia
1. EPIDEMIOLOGY

Tinuper and al., (2007)
- Toddlers (2.5 – 5 years): 3-5%
- Children (7-10 years): 11-13%
- Adults: 2-4%

More common in childhood
Decreases during adolescence
Persists for 25% of the cases
Can also arise de novo in adults

*Figure 3: Prevalence of somnambulism in children aged 2.5-12 years in a prospective cohort of 1400 children*
Comorbidities

- Anxiety or Mood Disorders reported by 25% of sleepwalkers
- Anxiety or Stress increase the occurrence of episodes
- In early childhood: Associated with Separation Anxiety
- In adulthood: Not associated with Psychiatric or Personality Disorders

Run in the family

- At least one member is affected in 80% of sleepwalkers
- Prevalence higher in children whose parents have a history of somnambulism
- First degree relatives have a 10-fold increased likelihood of somnambulism
2. COMMON MISCONCEPTIONS

Somnambulism is characterised by episodic amnesia

Prime importance of validity and reliability of the diagnostic criteria

- Low interobserver reliability: Disagreement on the "Amnesia" criterion
- Patients recall specific elements: Sleep mentation, specific behaviors, perceptual elements of the environment, emotions...

In adult: Complete amnesia of the event is not a standard
In children: Complete amnesia explained by the nature of behaviors
2. COMMON MISCONCEPTIONS

Somnambulism has no daytime consequences

Impairment of daytime functioning: Not a part of the clinical portrayal

Study of Montplaisir and al., (2011)
- Daytime somnolence (even after episode-free nights)
- Lower mean sleep onset latencies
- Mean sleep onset latency of 8 mn: Threshold for pathological somnolence

Excessive daytime somnolence: Important characteristic
Somnambulism not limited to patient's sleep
2. COMMON MISCONCEPTIONS

Somnambulism is an automatic behavior arising in the absence of dreamlike mental activity

Dreamlike mentations: REM and NREM sleep
Complex mental contents: Implicated in behaviors during episodes

Oudiette and al., (2009)
- Sleep mentation: Part of the main experience of somnambulism
- Sleep mentation: Modulate motor behavior during episodes
- Mentation reported: Congruent with nocturnal behaviors

Sleepwalkers's eyes opened during episodes
REM and NREM dreaming: Virtual environment
3. CLINICAL MANAGEMENT

Factors that might precipitate somnambulism in predisposed individuals

- Factors that increase pressure for deep sleep:
  Examples: Fever, lack of sleep
  → Getting enough sleep, avoid irregular sleep schedules and sleep deprivation

- Factors that increase arousal during sleep
  Examples: Sleep apnoea, stress
  → Ensure that breathing problems and movement disorders are treated

- Factors that induce confusional states
  Examples: Psychiatric disorders, psychotropics
  → Might lead to sleepwalk through modulation of states of sleep and alertness
3. CLINICAL MANAGEMENT

Traitement available

- Hypnosis: Effective in both children and adults
- Scheduled awakenings: Preferred treatment for children
- Drugs (Benzodiazepines): When behaviors extremely disruptive

Always: Instructions about regular sleep routine, good sleeping habits, avoidance of sleep deprivation, stress management, safe sleep environment
4. THEORITICAL FRAMEWORKS

A disorder of slow-wave sleep

Gaudreau and al., (2000)
- Intrinsic abnormalities in slow-wave sleep
  - Absence of NREM sleep continuity: Spontaneous awakenings
  - Disturbances in sleep intensity: Overall decrease in slow-wave activity
  - Disturbance in consolidation of slow-wave sleep

- Atypical responses to sleep deprivation
  - No rebound of slow-wave sleep neither consolidated NREM sleep
    (Physiological need for sleep to restore the body’s equilibrium)
  - More somnambulistic events
  - Complexifies the somnambulistic events
4. THEORITICAL FRAMEWORKS

A disorder of arousal

Broughton (1968)

- Sleepwalkers: Caught between NREM sleep and full EEG arousal
  → Neither fully awake: Absence of conscious, awareness or insight
  → Nor fully asleep: Capacity to interact with others

- Arousals from slow-wave sleep: Induce episodes in predisposed individuals

- Arousals by sleep deprivation & auditory stimulation during slow-wave sleep
  Induce somnambulistic episodes in all sleepwalker

Sleepwalkers have abnormal arousal reactions
4. THEORITICAL FRAMEWORKS

Phenotypical expression of simultaneous states of Sleep & Wakefulness

Originally: Human sleep as a global process occurring uniformly
Nowadays: Sleep might be controlled by local events

De Gennaro and al., (2001)
- Sleep depth does not occur simultaneously throughout the brain
- EEG patterns related to sleep and wakefulness can coexist simultaneously

Local Sleep: Sleep and wakefulness are not mutually exclusive
→ Simultaneous activation of localised cortical and subcortical networks

Might result from an imbalance between the 2 behavioral states
→ An interplay between states of wakefulness, REM and NREM sleep
5. FUTURE RESEARCH

- PET neuroimaging: Detect subtle changes in cerebral blood flow and metabolism throughout the human sleep-wake cycle during NREM sleep
  → Only few studies have been done in sleep disordered patients

- General daytime functioning: Record the nature and extent of impairments
  Changes in limbic structures
  → Might be associated with disturbances in emotional regulation

- Molecular studies to identify genes that predispose to somnambulism
  → Some have been done but not replicated
CONCLUSION

- Clarification of the key relations between waking & sleep-related processes
  
  Comprehensive view: Simultaneous states of sleep and wakefulness
  
  A comprehensive understanding: Hard to grasp

- Misconceptions, difficulties in assessment & definition
  
  Crucial accurate diagnosis (Especially in medicolegal sleep-related violence)

- Well-designed clinical trials for the treatment: Non-existent
  
  Greater efforts needed to establish treatment
REFERENCES


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THANK YOU FOR YOUR ATTENTION!

DO YOU HAVE ANY QUESTIONS?