

To cite this article: Asst. Prof Dr. Wasfi Dhahir Abid Ali, Ph. D in Physiology (2024). NEUROPHYSIOLOGY OF SLEEP PARALYSIS, International Journal of Education and Social Science Research (IJESSR) 7 (1): 57-60 Article No. 889, Sub Id 1384

NEUROPHYSIOLOGY OF SLEEP PARALYSIS

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DOI: <https://doi.org/10.37500/IJESSR.2024.7106>

ABSTRACT

During sleep paralysis you may feel: awake but cannot move, speak or open your eyes, like someone is in your room, like something is pushing you down, frightened these feelings can last up to several minutes. Sleep paralysis happens when you cannot move your muscles as you are waking up or falling asleep. This is because you are in sleep mode but your brain is active. It's not clear why sleep paralysis can happen but it has been linked with: insomnia. disrupted sleeping patterns – for example, because of shift work or jet lag, narcolepsy – a long-term condition that causes a person to suddenly fall asleep, post-traumatic stress disorder (PTSD), generalized anxiety disorder, panic disorder and a family history of sleep paralysis

KEYWORDS: Neurophysiology, sleep, paralysis

DEFINITIONS AND PREVALENCE

Idiopathic SP (SP not associated with narcolepsy, and without known cause) is a benign and transient parasomnia [1]. occurring during transitions between wake and sleep: at sleep onset or upon awakening. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) classifies isolated SP accompanied by fearful mentation as an instance of a nightmare disorder. Prevalence estimates of SP range widely, and may depend on geographic and cultural factors. A systematic review of SP prevalence has revealed that studies report SP lifetime prevalence from as low as 1.5% to possibly 100% in the general population [2]. The developmental trajectory of SP is traditionally associated with an onset during adolescence, which may indicate a process associated with sleep architecture maturation [3]. However, in one study of older adults, a bimodal onset pattern was reported, with a second pattern of onset of SP episodes after the age of 60 years old [4]. suggesting a possibility that SP may have a variety of onset conditions.

Little is known about the epidemiology of SP, but growing evidence points to a combination of genetic and experiential factors. The only study to date to examine genetic factors associated with SP has reported moderate heritability and that this effect was associated with factors known to contribute to disrupted sleep cycles [5].

The most dramatic quality of SP is its sensory content, characterized by vivid, intrusive audio-visual and somatosensory imagery. The experience of SP can be extremely realistic, have a quasi-perceptual and wake-like quality, and may be accompanied by tactile and kinesthetic sensations. Reflective thought processes, self-awareness and metacognitive abilities seem to be relatively preserved during SP experiences, and people who have had multiple SP experiences may develop a “feel” for recognizing SP imagery. Found that while game addiction leads to negative academic performance, moderate engagement in gaming can lead to improved performance in an academic setting. This is of great significance to adolescents, as using effective social interactions is essential for behavioral, emotional adaption and successful functioning. Children and adolescent socialization ability improve their communication skills and makes them more receptive to social influence, and grow better with good communication skills [11].

EPIDEMIOLOGY

While there is no established direct causation between a risk factor and sleep paralysis from studies, research has found multiple factors to have some degree of association with this illness. These include anxiety disorders, poor sleep quality, consumption of alcohol, exposure to traumatic events, and a family history of sleep paralysis. A familial association has been established in multiple studies, a fact that hints towards the genetic predisposition of this condition.

NEUROPHYSIOLOGY

Sleep paralysis is currently understood as a state dissociation or a state overlap between REM sleep and wakefulness [6]. During SP one can open her eyes, look around the room, become aware of her environment and simultaneously experience REM sleep-related paralysis (muscle atonia) as well as intense and realistic imagery¹ of all sensory modalities - a nightmare spilling into the real world. Normally, during REM (rapid eye movement) sleep, skeletal muscle atonia blocks most motor output, effectively preventing the sleeper from acting out her dreams [7]. SP can also occur in the context of narcolepsy [2], but the majority of those who experience SP report it in its isolated form (often referred to as Isolated Sleep Paralysis), without known medical or neurological association.

In current medical and neuroscientific literature, SP is discussed in terms of its presentation and negative factors: SP-associated mentation is generally seen as a non-desirable effect of REM sleep intrusion into waking.

FELT PRESENCE

Felt presence experiences are often interpreted within the cultural framework available to the experiencer ,but some basic characteristics seem to be common across cultures and ages[8]: 1) felt presence often manifests from ambiguous stimuli: it is often described as “shadowy”, and its physical characteristics are often unclear; 2) the experiencer may report a distinct sensation of being watched, and that the presence has some intentions towards the dreamer; these range from some vague interest to full-blown assault; 3) felt presence is usually accompanied by intense emotions (often fear when the

presence is interpreted as threatening), sometimes to the point of a distinct feeling of dread, imminent death, or being in the presence of evil. Positive emotions, however, are also possible, especially when the experience is understood as visitations by deceased relatives or visions of the divine.

Most (if not all) SP episodes are defined by an altered experience of the body. These include simple experience of muscle paralysis; sensations associated with supernatural assault, including touch, pressure on the chest, or even choking; feelings of unusual vibrations or falling into a vortex; and out-of-body experiences, including flying, falling, or moving around one's house. One of the most salient features of SP is the REM sleep-related muscle atonia. The inability to move is a striking and unusual experience for most individuals, and the mismatch between sensing the body and the loss of voluntary control over the body's movements may contribute to a range of somatosensory experiences.

Although most accounts of and research on SP experience have centered on paralysis accompanied by terrifying mentation and by felt presence, not all SP experiences are characterized by imagery and many are simply experiences of transient body paralysis during the transition between sleep and wakefulness, without any other accompanying mental activity [9].

Treatment and management

To help prevent sleep paralysis. Sleep hygiene refers to a person's daily habits and routines that influence sleep quality. For example [10] (Jalal ,2016).

- Going to bed and waking up in the morning.
- The bedroom should have a comfortable mattress and pillow. with limited intrusion from light or noise.
- avoid watching TV in the bedroom
- Less consumption of caffeine and alcohol, especially in the evening.
- As possible avoid use of electronic devices, including cell phones, for at least a half-hour before bed.

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