PHILIPS
RESPIRONICS

Actigraphy

Motion Biosensors

Anxiety

Actigraphy in Anxiety Disorders

Anxiety disorders are one of the most common mental health concerns in the United States, affecting over 40 million adults[1]. Examples of anxiety disorders include generalized anxiety disorder (GAD), obsessive compulsive disorder, post-traumatic stress disorder (PTSD), panic disorder, and phobias. Additionally, 7% of children aged 3-17 experience issues with anxiety each year, with most people developing symptoms before age 21.

Anxiety disorders are highly comorbid with sleep disorders[2,3]. In fact, for disorders such as GAD, the core diagnostic criteria includes presence of sleep disturbance[4]. Many patients complain about their sleep by reporting difficulties in initiating and maintaining it. For example, the sleep architecture in GAD typically shows longer sleep onset latency and decreased sleep time by polysomnography (PSG)[4]. Moreover, studies also show that sleep disturbances[5], an evening chronotype,[6] and reduced physical activity are common in patients with anxiety[7,8]. Finally, there are variations in objective and subjective sleep measures in the different sub-types of anxiety disorders. For example, PSG studies have shown that in comparison to normal subjects, the sleep of patients with panic disorder is characterized by longer sleep latency, increased time awake, and reduced sleep efficiency. Sleep architecture is normal and there are no significant changes in REM sleep measures. A dysregulation of the REM sleep control system has been reported for patients with PTSD. Finally, no significant differences were found in any sleep parameters between social phobia patients and controls[9].

The presence of anxiety associated with sleep disturbances is also prevalent in children and adolescents[10]. Literature on objective sleep quality in anxious children are mixed. Some objective observations were indicative of sleep problems in this population[11-13], while others failed to distinguish sleep quality in anxious youth relative to normal controls or depressed children[14-16].

Difrancesco et al.[17], conducted a study using actigraphy and self-reported questionnaires in individuals (n=359) with existing depressive and/or anxiety disorders and found that these subjects had reduced physical activity and more circadian rhythm disturbances than controls. However, self-reported but not objective sleep measures differed between people with current depression/anxiety and those without. These individuals with depression/anxiety reported variable sleep duration and insomnia. In addition, the investigators reported that people with greater severity of depressive/anxiety symptoms and more psychiatric comorbidity exhibited lower physical activity and more circadian rhythm disturbances. Over a 2-week period, actigraphy monitoring provided valid, objective differences in sleep, circadian rhythm and physical activity measures between diagnostic groups that were not seen with self-reported questionnaires.

Actigraphy monitoring provides an easy, continuous, and noninvasive approach to capture objective information regarding both nighttime sleep, activity, and circadian rhythms in the patient's natural environment. Combining this assessment with subjective self-reported assessments can provide very useful information in various anxiety disorders with/without co-morbid conditions[18]. Further research with this approach is needed to a) understand whether objective estimates correlate with clinical characteristics, b) understand the sleep variations within anxiety sub-types, c) understand the reciprocal relationship between anxiety and sleep quality, and d) establish whether actigraphy could possibly play a role in monitoring treatment response to such interventions.

Recommended actigraphy endpoints

Circadian rhythm endpoints:
- Time of exposure to white, red, green, and blue light
- Standard deviation of mean
- Maximal exposure to light type

Activity endpoints:
- Mean activity during active and rest periods
- Standard deviation of mean
- Peak daily activity
- Signal characteristics: skewness, Shannon's entropy, and kurtosis

Sleep endpoints:
- Total sleep time (hours/night)
- Sleep onset latency (minutes)
- Wake after sleep onset (minutes)
- Sleep efficiency (%)
- Average wake bout duration (minutes)
- Mean nighttime activity (counts/ minute)

Once accelerometry data are collected, it can be re-analyzed easily and quickly as new algorithms are developed and published.

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