Sopite Syndrome: A Revised Definition

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In 1976, Graybiel and Knepton proposed the term "sopite syndrome" to describe a symptom complex centering on drowsiness and lethargy related to motion sickness. However, existing descriptions and definitions of sopite syndrome have limitations in fully conveying the appropriate information to the reader. Our objective is to propose a revised definition providing a more adequate conceptual framework for research. The proposed definition of sopite syndrome addresses the nonspecificity of soporific symptoms, the health state of the individuals, and the existence of a motion stimulus.

Keywords: motion effects, motion sickness, drowsiness.

IT HAS LONG BEEN KNOWN that symptoms like drowsiness, apathy, lassitude, lethargy, and lack of interest in the task or the environment occur in nauseogenic motion conditions (5,12). Research conducted in a slow rotating room (SRR) reported depression and sleepiness (3). Reason and Brand (12) reported an unpublished study by Reason and Graybiel involving a 3-d exposure to angular accelerations where drowsiness was persistent and overwhelming.

Graybiel and Knepton (4) identified and described "sopite syndrome," a symptom-complex centering on drowsiness and lethargy related to motion sickness. Sopite syndrome is a response to motion that includes symptoms such as drowsiness, lethargy, apathy, decreased ability to concentrate, daydreaming, melancholy, yawning, disinterest and disinclination to work, lack of participation in group activities, mood changes, irritability, sleep disturbances, frequent daytime napping, mild depression, and a desire to be left alone (4,9). This description was followed by ISO 5805, in which sopite syndrome was defined as "inordinate sleepiness, lassitude or drowsy inattention induced by vibration, low-frequency oscillatory motion (e.g., ship motion) or general travel stress…" (6). Depending on the stimulus, sopite syndrome may be the only reported manifestation of motion sickness (4,11). Soporific symptoms have been shown to appear before nausea and to remain after the cessation of a nauseogenic motion stimulus (9).

Sopite syndrome is important operationally for a number of reasons: a) a person with sopite syndrome may have degraded performance, but may not be identified as motion sick; b) drugs for nausea may not improve degraded performance due to sopite effects; and c) medication side effects might exacerbate existing drowsiness due to sopite syndrome (1,4,9). Soporific effects are operationally important because they are common and frequent. Research has shown that drowsiness is among the most frequent symptoms associated with motion sickness (2). Lastly, it has been suggested that sopite syndrome can lead to inefficiency and being accident prone and that it could have profound effects in transport environments where, for other reasons, sleep disturbances exist (4,9).

Graybiel and Knepton's (4) work describes evidence from earlier research, identifies the major attributes of the syndrome, and discusses why there is a need to define a symptom-complex centering around drowsiness. However, their work did not provide a structured definition of sopite syndrome. Existing descriptions/definitions have limitations in fully conveying the appropriate information to the reader. We identified three issues of concern: nonspecificity of soporific symptoms; the health state of the individuals; and the existence of a motion stimulus.

Symptoms and signs of motion sickness and sopite syndrome are nonspecific (4,7,8), i.e., they also can be observed in the absence of a nauseogenic stimulus, because of stress, illness or other reasons.

Hill (5) discussed the association between seasickness and drowsiness, apathy, and mental lethargy, emphasizing that these symptoms occur in the absence of actual somnolence. Similarly, Lawson and Mead (9) indicated that sopite syndrome is distinct from the state of fatigue. The ISO 5805 definition addressed this issue by noting the "inordinate" attribute of sleepiness and lassitude when referring to soporific symptoms. Underlying pathological conditions may lead to many of the symptoms associated with motion sickness, for example nausea because of stress, or lethargy because of depression, etc. The investigation of motion sickness with healthy individuals partially alleviates the problem of nonspecificity, to the extent that this relates to pathognomonic reasons. Therefore, nonspecificity of symptoms is a critical issue when discussing sopite syndrome and should be emphasized in the corresponding definition.

Furthermore, the existence of a motion stimulus is a causal factor when discussing sopite syndrome (4,9). Soporific symptomatology is evident both in real and apparent motion settings (7,9,10). Yet the definition

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provided in ISO 5805 does not clarify that sopite syndrome can be observed even in optokinetic stimulation environments (6). Furthermore, the ISO 5805 definition associates sopite syndrome with "… general travel stress." However, the effect of general stress on the development of sopite syndrome is not confirmed by existing research (4,9). Existing research indicates that sopite syndrome often may be confounded by other forms of fatigue coexisting in operational settings (e.g., airplanes, cars, trains) because of stress or other reasons (9). Therefore, sopite syndrome should not be confused with other stressors.

Our objective is to propose the following revised definition of sopite syndrome which addresses the aforementioned shortfalls:

> Sopite syndrome is a symptom complex that develops as a result of exposure to real or apparent motion and is characterized by excessive drowsiness, lassitude, lethargy, mild depression, and reduced ability to focus on an assigned task. Sopite syndrome is most clearly distinguished in a healthy individual free from pathological conditions that engender similar symptoms and not suffering from sleep deprivation, mental or physical fatigue, or increased levels of physical activity.

In summary, existing descriptions and definitions of sopite syndrome raise a number of concerns. The definition given above addresses the limitations of earlier approaches and provides an adequate conceptual framework for research.

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