Sleep Measured by Polysomnography in Patients Receiving High-Dose Chemotherapy for Multiple Myeloma Prior to Stem Cell Transplantation

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Sleep-wake disturbances are common among patients with cancer (Berger, 2009; Berger et al., 2005; Davidson, Maclean, Brundage, & Schulze, 2002; Sateia & Lang, 2008; Savard, Ivers, Villa, Caplette-Gingras, & Morin, 2011), and are multifactorial in origin (Vena, Parker, Cunningham, Clark, & McMillan, 2004). Among cancer populations, sleep has been studied extensively among patients with breast or lung cancer either subjectively or in combination with actigraphy (ACTG). Although convenient, ACTG assesses only motion or its absence as a proxy of wakefulness or sleep (Tyron, 1991). The sleep of patients with all types of cancer has been studied less extensively using polysomnography (PSG). PSG is considered the gold standard of objective sleep measurement because it assesses and records electroencephalographic sleep changes (Dement, 2011). The current study is the first to describe sleep using PSG in patients with multiple myeloma (MM).

MM involves the development of abnormal plasma cells that collect in bone marrow and damage bone. Myeloma cells produce abnormal antibodies called plasma M proteins that accumulate in organs such as the kidneys, resulting in renal damage and failure. An estimated 21,000 new cases of MM, the most common type of plasma cell cancer, were diagnosed in the United States in 2012 (National Cancer Institute [NCI], 2012). MM usually develops in adults older than 65 years and is most common among African Americans and men (NCI, 2012).

Disease-related risk factors that may impair sleep in patients with MM include bone pain and peripheral neuropathy, which are among the most common neurologic symptoms of plasma cell cancer (Mangan, 2005). Opiates, often used to manage bone pain, are associated with drowsiness (Rome, 2010), which may contribute to daytime activity and excessive daytime napping, decreasing the homeostatic sleep drive and disrupting circadian rhythms.

Purpose/Objectives: To describe the objective sleep of patients receiving chemotherapy for multiple myeloma (MM) prior to stem cell transplantation.

Design: A descriptive study with repeated measures.

Setting: An international referral center in an urban area of the southern United States.

Sample: A convenience sample of a subset of 12 patients with MM, recruited from a randomized, controlled trial.

Methods: Objective sleep was assessed using two nights of polysomnography, one obtained before and one after a second cycle of high-dose chemotherapy prior to stem cell transplantation. Demographic and clinical data were obtained through a retrospective chart review.

Main Research Variables: Objective sleep including sleep characteristics, sleep-related respiratory events, and periodic limb movements (PLMs) of sleep.

Findings: Sleep was characterized by a relatively short sleep time, excessive time spent awake after the onset of sleep, and poor sleep efficiency (objective sleep quality). Patients spent more than the expected percent of time in non–rapid eye movement sleep and less in rapid eye movement sleep. Arterial oxyhemoglobin saturation nadirs reflected episodes of low arterial oxygen saturation. PLMs during sleep were in the mildly elevated range.

Conclusions: Findings suggest that patients had poor sleep efficiency (objective sleep quality) and were slightly better sleepers after receiving a second cycle of high-dose chemotherapy. A number of patients also demonstrated obstructive sleep apnea and frequent PLMs.

Implications for Nursing: Findings support the need for additional investigation of sleep in patients with MM, particularly poor sleep efficiency and PLMs. Improving sleep may improve quality of life by decreasing associated symptoms such as pain, fatigue, and depression.

Knowledge Translation: Oncology nurses should consider assessing patients with MM for insomnia symptoms, excessive daytime sleepiness, obstructive sleep apnea, and a history of jerking or kicking their legs when asleep. Those symptoms may suggest the need for additional investigation of a possible sleep disorder, which may negatively influence mood and function.