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Sleep and quality of life in long-term lung cancer survivors☆

Nalaka S. Gooneratne[a,d,*], Grace E. Dean[b], Ann E. Rogers[c,d], J. Emeka Nkwuo[d], James C. Coyne[e], Larry R. Kaiser[f]

[a] *Division of Geriatric Medicine, University of Pennsylvania, Philadelphia, PA, United States*
[b] *School of Nursing, State University of New York, Buffalo, NY, United States*
[c] *School of Nursing, University of Pennsylvania, Philadelphia, PA, United States*
[d] *Center for Sleep and Respiratory Neurobiology and Division of Sleep Medicine, School of Medicine, University of Pennsylvania, Philadelphia, PA, United States*
[e] *Department of Psychiatry, University of Pennsylvania, Philadelphia, PA, United States*
[f] *Department of Surgery, University of Pennsylvania, Philadelphia, PA, United States*

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Summary
Background: Sleep problems are common in lung cancer survivors, yet little is known about the prevalence, determinants, and effects on quality of life (QoL) of these sleep problems in long-term lung cancer survivors.
Methods: A case—control study design comparing 76 elderly lung cancer survivors (LCS, >5 years post diagnosis with mean survival time of 8 years ± 2.1 years) and 78 elderly non-cancer controls (NCC). Measurements included a standardized questionnaire for sleep (Pittsburgh Sleep Quality Index—PSQI), and analogue scales for dyspnea, pain, and other comorbid symptoms, as well as demographic factors and cancer history.
Results: Overall, 56.6% of LCS had poor sleep (PSQI global score > 5) as compared to only 29.5% of NCC ($p < 0.001$), and 49.2% of LCS who did not have sleep difficulties prior to their lung cancer diagnosis ultimately developed them. There was also evidence of significant impairments in sleep efficiency in LCS (78.3%) relative to NCC (89.6%, $p < 0.001$), predominantly due to increased nocturnal awakenings. A single-item analogue scale for sleep quality was not as effective in identifying sleep problems as more specific questions about sleep duration and sleep efficiency. Poor sleep quality was significantly correlated with impairments in quality of life, even when controlling for other factors, such as dyspnea.

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* Corresponding author at: Ralston House, Rm. 220, 3615 Chestnut St., Philadelphia, PA 19104, United States. Tel.: +1 215 349 5938; fax: +1 215 573 8684.
E-mail address: ngoonera@mail.med.upenn.edu (N.S. Gooneratne).

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Conclusions: Even 8 years after diagnosis, LCS continue to have significant sleep difficulties. By asking specific questions about sleep medication use, nocturnal awakenings and sleep efficiency, health care providers can identify sleep problems that could be treated and potentially improve the quality of life of their patients.

1. Introduction

Improvements in the diagnosis and treatment of lung cancer have resulted in increased opportunities for long-term survival [1,2]. Indeed, approximately 26,000 Americans per year with lung cancer will go on to survive for more than 5 years from the time of initial diagnosis [3]. This has led to a growing interest in addressing issues faced by these long-term survivors [4]. Sleep disorders are particularly common in lung cancer survivors, with 31—52% reporting insomnia symptoms [5—8]; these prevalence rates were found to be markedly higher than controls [7,9].

Furthermore, these sleep disorders lead to pronounced symptom distress: Sarna and colleagues gathered symptom distress data on female lung cancer patients an average of 1.8 years after treatment and found that insomnia was a major concern; it ranked as the third highest cause of distress after fatigue and pain [8]. Of note, research in non-cancer patients has shown that insomnia is associated with significant sequelae [10], such as an increased risk of accidents [11], depression [12] and impaired quality of life [13]. Even in relatively healthy adults, while controlling for baseline medical status and using objective criteria for insomnia, the presence of insomnia led to a 1.93 times greater risk of death over 4—19 years of follow-up [14]. Despite these concerns, insomnia is often undetected and under-treated when detected [15,16], with only 16.6% of patients in one study having spoken to their physician about their sleep problems [17].

Past studies that have examined sleep disturbances in lung cancer survivors have been helpful in providing estimates of prevalence and potential risk factors, but there are several limitations in this literature. First, many of these studies have had only a sparse assessment of sleep disturbances, relying on the symptom complaint of difficulty initiating or maintaining sleep [7,8], and have not inquired about other sleep disorders or used standardized clinical or research diagnostic criteria for insomnia as a syndrome [18,19]. This can lead to high estimates for the prevalence of the insomnia symptom that exceed the prevalence of insomnia as a syndrome/disease [20]. The one prior study that used more rigorous criteria was limited by a small sample size [21]. Second, these studies have sampled patients who, on average, were not long-term (>5 years) lung cancer survivors [7,17,22]. Third, many of these studies have included a broad range of cancer types, not just lung cancer [7,21]. The observation that lung cancer survivors have some of the highest rates of insomnia when compared to other cancer survivors suggests that there may be unique factors related to lung cancer survivorship that influence sleep [7,23]. Candidate factors that may be associated with sleep disruption include pain [6] and depression [24]. Furthermore, lung cancer survivors may also face additional problems from increased rates of dyspnea [25].

In order to address these issues, we conducted the first case—control study, to our knowledge, of sleep disturbances in an elderly lung cancer survivor population that had survived for more than 5 years since the initial diagnosis. We used a validated standardized sleep disturbance questionnaire, and included a control population of elderly patients without a cancer history. Our aim was to provide a more detailed description of sleep disturbances in lung cancer survivors by determining prevalence rates and risk factors for these sleep problems, with a particular focus on insomnia symptoms.

2. Methods

2.1. Participants

Subjects were drawn from the clinic records of the Hospital of the University of Pennsylvania, an academic teaching university which has a catchment area extending across eastern Pennsylvania, Delaware and southern New Jersey. We limited our study to subjects over the age of 60. Lung cancer is often a disease of older adults [3], however, past studies tend to include subjects across age groups. Given that there are significant age-related effects on a variety of sleep disorders [26,27], we decided to only enroll subjects over the age of 60. Subjects with lung cancer were drawn from the Hospital of the University of Pennsylvania Thoracic Oncology Clinic. To be eligible, subjects had to be at least 5 years post-diagnosis of their lung cancer (long-term lung cancer survivors, LCS). Non-cancer controls (NCC) were also drawn from the Hospital of the University of Pennsylvania clinic population and had no history of cancer. The Hospital of the University of Pennsylvania maintains an elder outreach and education program, Penn Partner's in Healthy Living. Patients who attended the out-patient clinics of the hospital were invited to enroll in the program. An additional function of the Penn Partners in Health Living program is to assist in notifying elders of ongoing research projects and thereby serve as a research study recruitment tool, as in the case with this study. NCC over the age of 60 were randomly selected from this database.

2.2. Instruments

All sleep data were obtained from the Pittsburgh Sleep Quality Index (PSQI) [28]. It is a self-rated questionnaire that consists of 11 questions, some of which contain sub-questions so that there are a total of 20 questions. Questions include bedtime, wake time, and time spent sleeping. These were used to calculate sleep efficiency: (wake time − bedtime)/time spent sleeping. A range of sleep disturbances are also assessed in the PSQI, including sleep quality, insomnia, sleep apnea and limb movement disorders, as well as daytime consequences of sleep and