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Assessment of sleep disturbances in patients with cancer: Cross-sectional study in a radiotherapy department

Escarlata López ^a, Alejandro de la Torre-Luque ^{b,*}, Antonio Lazo ^a, Julia Álvarez ^c, Gualberto Buela-Casal ^d

^a Radiotherapy and Oncology Department, ONCOSUR, Granada, Spain

^b Research Institute of Health Sciences, University of Balearic Islands, Palma de Mallorca, Spain

^c Radiotherapy and Oncology Nursery Department, ONCOSUR, Granada, Spain

^d Psychophysiology Laboratory, Mind, Brain and Behaviour Research Centre, CIMCYC, Granada, Spain

A B S T R A C T

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Purpose: To explore sleep-related problems reported by patients with cancer prior to undergoing radiotherapy, and to analyse the effect of cancer severity, history of treatment and psychosomatic symptomatology on these problems.

Method: A descriptive cross-sectional study was conducted. One hundred and five patients with cancer were evaluated prior to radiotherapy. The primary endpoint was the sleep problem score measured by a self-rated version of the Oviedo Sleep Questionnaire. Secondary variables were impact of pain on sleep, anxiety and asthenia.

Results: Patients reported important levels of insomnia and hypersomnia. Insomnia-related problems were significantly higher in patients with more-severe disease ($P < 0.05$), and led to higher levels of hypnotic drug intake. Prior chemotherapy was significantly associated with hypersomnia-related problems ($P < 0.05$). Anxiety was significantly associated with both sleep-related problems.

Conclusions: Sleep problems are significant among patients with cancer prior to undergoing radiotherapy, and were found to be associated with progression of cancer, prior treatments and other psychosomatic symptoms (e.g. anxiety). Sleep problems within this context must be explored to provide adequate guidelines to palliate their effects on quality of life.

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Introduction

Patients with active cancer often display multiple complex symptoms during treatment (Kirkova et al., 2011; Tsai et al., 2010). These symptoms can interfere with their daily functioning and hinder recovery (Costa-Requena et al., 2013; Zimmermann et al., 2010).

In this sense, it is important to consider the impact of sleep problems. The most common of these problems are related to insomnia and hypersomnia. Insomnia is defined as sleeping for a very small amount of time each day, having unrestful sleep and/or feeling unrested after waking. Conversely, hypersomnia is defined

as long periods of sleep each day and excessive sleepiness (American Academy of Sleep Medicine, 2001). Both syndromes affect quality of life, and can increase the effect of other symptoms on quality of life (Palesh et al., 2007; Reimer and Flemons, 2003).

It is noteworthy that sleep difficulty is one of the most prominent concerns among patients with cancer (Davidson et al., 2002; Roscoe et al., 2007; Sharma et al., 2011). In fact, patients with cancer make more complaints about their sleep than other populations (Fiorentino et al., 2011; Le Guen et al., 2007). A significant prevalence of sleep problems is found among patients with various types of cancer. Price et al. (2009) reported that 17% of patients with ovarian cancer reported significant levels of insomnia. The same levels have been observed among patients with prostate cancer (Dirksen et al., 2009; Gibbins et al., 2009). In the context of breast cancer, 20–70% of women suffer from insomnia (Fiorentino et al., 2011). The most common complaints are difficulty staying asleep, difficulty falling back to sleep at night and sleeping less overall. Furthermore, some studies have supported the fact that patients

* Corresponding author. Research Institute of Health Sciences, University of Balearic Islands, Carretera de Valldemossa, km. 7.5, 07122 Palma de Mallorca, Spain. Tel.: +34 971172580.

E-mail address: a.delatorre@uib.es (A. de la Torre-Luque).

with breast cancer take important levels of hypnotic drugs to manage these sleep problems (Colagiuri et al., 2011; Fortner et al., 2002). Additionally, various inflammatory markers have been associated with several sleep problems in various types of cancer (Alfaro et al., 2014; Clevenger et al., 2012; Liu et al., 2012).

Various factors may play significant roles in sleep-related problems in patients with cancer. Firstly, disease progression must be considered. Generally, greater levels of disease progression are usually related to more psychosomatic symptomatology (Berger, 2009). Hence, individuals with advanced cancers tend to show higher levels of sleep quality and more disrupted sleep parameters (Gibbins et al., 2009; Mosher and DuHamel, 2012; Mystakidou et al., 2007, 2009). However, when cancer has been overcome, sleep-related complaints decrease but do not disappear completely. A significant proportion of patients who overcame cancer reported that they had suffered from insomnia for many years, and had lower sleep quality and higher levels of daytime sleepiness than controls (Forsythe et al., 2012; Otte et al., 2010).

Furthermore, the influence of different types of psychosomatic symptomatology must be considered. Thus, it seems likely that emotional and physical distress related to cancer tend to have significant effects on sleep disturbances (Mosher and DuHamel, 2012; Mystakidou et al., 2009; Sharma et al., 2011). In this sense, anxiety levels have been shown to be the main significant predictor of sleep problems in different studies (Die Trill, 2013; Price et al., 2009). The risk of mortality and disability associated with cancer often leads to very high levels of somatic anxiety and persistent worry about the future, which have a significant effect on the sleep process. Levels of fatigue and asthenia have also been associated with sleep problems. Some studies have even stressed common mechanisms between sleep problems and fatigue in the cancer context (Liu et al., 2012; Roscoe et al., 2007; Wu et al., 2012). Pain has also been considered as a significant factor that could explain the severity of sleep problems in patients with cancer. Several studies have suggested associations between pain and problems with falling asleep, shorter sleep duration and presence of sleep disturbances in patients with advanced cancer (Mystakidou et al., 2007, 2009; Palesh et al., 2007).

Finally, the healing process that patients with cancer must undergo also plays an important role in the onset of sleep problems. Sleep complaints are more common when cancer treatments are administered (Cheng and Yeung, 2013; Colagiuri et al., 2011; Fiorentino et al., 2011; Hanisch et al., 2011). In the context of chemotherapy, greater sleep–wake activity impairment was shown prior to and during the administration of successive cycles (Berger et al., 2010; Palesh et al., 2010; Savard et al., 2009).

Sleep problems are also reported in the context of radiotherapy. Various studies have reported sleep complaints and disturbed daily rhythms prior to and during radiotherapy (Dhruva et al., 2012; Miaskowski et al., 2011). The present study was designed to study sleep-related problems prior to the start of radiotherapy. Patients consider coping with radiotherapy to be a challenging episode within cancer recovery (Andersen et al., 2009; Stiegelis et al., 2004). Several symptoms and clinical concerns may arise before undergoing radiotherapy (Lazarus and Folkman, 1984; Monroe, 2008). Thus, it is important to examine how sleep problems are exhibited among patients with cancer in order to plan suitable therapeutic strategies.

The effects of different factors on sleep should also be studied in this context. As such, the primary objective of this study was to analyse the nature of sleep problems in patients with cancer attending a radiotherapy department for treatment. The specific goals were: (1) to examine the presence of sleep problems in this sample; (2) to study the effect of cancer severity on reported sleep problems; and (3) to determine the explanatory role of clinical symptomatology on these sleep problems.

Patients and methods

Patients

Patients referred from other departments (medical oncology, surgery, gynaecology, etc.) who attended the radiation oncology department were eligible for inclusion in this study if they met the following criteria: age ≥ 18 years; provided informed consent; scheduled to receive any radiotherapy for cancer treatment; and able to read, write and understand Spanish. Patients were excluded from the study if they had been diagnosed previously with a sleep disorder.

The sample size was calculated, *a priori*, in order to estimate how many participants should be selected. The sample size was estimated in relation to the most demanding analysis upon consideration of the statistical requirements. Thus, the sample size estimation was based on visualising significant effects among the cancer-severity groups (created according to the four levels of the Tumour, Node and Metastasis Staging System). Additionally, it was considered whether any covariate should be added due to its significant effect on dependent variables or baseline between-group differences according to this factor (Miller and Chapman, 2001). With $\alpha = 0.05$, $1 - \beta = 0.95$ and two covariates, it was estimated that 19 participants were needed per group (i.e. at least 76 participants). All calculations were made using the nQuery Version 7.0 (Statistical Solutions, Ltd.).

Despite these requirements, more participants could be involved in a prospective study, not selected recruitment method in order to counteract the effects of missing data, provided that the aforementioned criteria were fulfilled.

Settings and procedures

This descriptive, cross-sectional study was undertaken between October 2010 and March 2012. The study was approved by the Medical Ethics Committee at the Inmaculada Hospital, Granada, Spain. This study investigated sleep problems among patients with cancer who were awaiting radiotherapy, and the relationships between sleep problems and pain, asthenia and anxiety were evaluated.

Approximately 1 week prior to the initiation of radiotherapy, patients attended a 60-min registration visit at the radiation oncology department. At this time, a doctor invited every patient to participate in the study. If they accepted, a clinical interview and some questionnaires (see *Instruments*) were administered. Afterwards, each patient was invited to complete a self-reported questionnaire about sleep concerns. All questionnaires were filled out in the department. No patients declined to participate.

Instruments

The Oviedo Sleep Questionnaire (OSQ; Bobes et al., 2000) assesses the presence of sleep problems over the previous month, and reports the patient's satisfaction with their sleep. The OSQ consists of 15 items to assess different aspects of sleep, insomnia-related symptoms, hypersomnia-related symptoms, other problems related to sleep and aids to improve sleep. The structure of the instrument is defined by two factors (insomnia and hypersomnia), a scale for other problems related to sleep, and the self-perceived sleep satisfaction index. The original version of the OSQ was designed for application by clinicians (Bobes et al., 2000; García-Portilla et al., 2009). However, a patient self-rated version was used in this study (López et al., 2013). Psychometric properties of the self-rated version were analysed and found to be acceptable with adequate reliability ($0.806 < \alpha < 0.809$ between factors).

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