Psychiatry Research 200 (2012) 368–373

Contents lists available at SciVerse ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

The influence of daytime napping versus controlled activity on the subjective well-being of patients with major depression

Judith Peth [a,*], Francesca Regen [b], Malek Bajbouj [b], Isabella Heuser [b], Ion Anghelescu [b], Orla Patricia Hornung [c]

[a] Department of Systems Neuroscience, University Medical Center Hamburg-Eppendorf, Martinistr. 52, 20251 Hamburg, Germany
[b] Department of Psychiatry and Psychotherapy, Charité-University Medicine Berlin, Campus Benjamin Franklin, Eschenallee 3, 14050 Berlin, Germany
[c] Institute of Medical Psychology, Charité-University Medicine Berlin, Luisenstr. 57, 10117 Berlin, Germany

ARTICLE INFO

Article history:
Received 27 September 2011
Received in revised form
13 June 2012
Accepted 15 June 2012

Keywords:
Depression
Sleep
Subjective well-being
Activity
Nap

ABSTRACT

While the impact of sleep on cognitive functions such as memory is under extensive study, the role of sleep in modulating a persons' subjective well-being remains largely uncharacterized, especially in groups with psychiatric disorders. To gather more information on this topic a study was conducted with 20 patients suffering from Major Depression (MD) and 20 healthy controls, matched for age, gender and education. All subjects rated their subjective well-being at 10 a.m. in the morning. Half of the subjects in each experimental group were given the opportunity to nap in the afternoon between 2 p.m. and 3.30 p.m., while the other half stayed awake accompanied by controlled activity. All subjects rated their subjective well-being again at 4 p.m. Only the group of patients with MD who were given the opportunity to sleep during the day showed a significant improvement in subjective well-being from morning to afternoon. All the other subgroups showed no significant changes across the time interval. The results of this study suggest that depressive patients benefit from daytime naps with regard to their subjective well-being. Further research is needed to determine the exact mechanisms of this improvement.

1. Introduction

There are several studies reporting positive effects of daytime napping on different cognitive functions in healthy adults. For example, a positive influence of napping on processes of memory consolidation has been reported and is one of the main topics currently discussed in the field of sleep research (Backhaus and Junghanns, 2006; Lahl et al., 2008; Nishida et al., 2008). Sleep can be divided into different stages, with each sleep stage being defined by specific characteristics, for details see the American Academy of Sleep Medicine (AASM) manual for the scoring of sleep (Iber et al., 2007). Rapid eye movement (REM) sleep is characterized by high-frequency, low-voltage EEG activity and bursts of rapid eye movements of the eye muscles, coupled with atonia of major skeletal muscles. NonREM (NREM) sleep stages include stage 1 (the lightest stage of sleep), stage 2 (defined by the emergence of K-complexes and sleep spindles) and slow-wave-sleep (SWS) (characterized by increased delta activity). During a short phase of daytime sleep different stages of the sleep cycle can be reached, including REM sleep (Dhand and Sohal, 2006). Daytime sleepiness and nodding off often occur between 2:00 p.m. and 4:00 p.m. (Dinges, 1989, 1992). Naps with a duration between 10 and 45 min were found to have restorative effects for healthy young and elderly adults (Dhand and Sohal, 2006).

Very few studies on sleep and memory consolidation have been conducted in patients with psychiatric disorders. Investigations are scarce due to the great heterogeneity of the patient groups and the great number of confounding aspects like medication, comorbidities or drug intake typical of these populations (Diekelmann et al., 2009).

The results reported from studies in patients with psychiatric disorders suggest a relationship between disorder specific sleep patterns and memory performance for patients with schizophrenia or major depression (Göder et al., 2004, 2007; Hornung et al., 2008; McNamara et al., 2009; Seeck-Hirschner et al., 2009). Other psychological aspects, such as a person's mood, have been reported to benefit from a 20 to 30-min daytime nap in healthy young adults (Taub et al., 1976; Kaida et al., 2007). Subjective well-being seems to be modulated by specific sleep factors such as sleep pressure and circadian phase (Birchler-Pedross et al., 2009).

Patients with Major Depression (MD) show abnormal sleep characteristics like reduced SWS and a higher amount of REM sleep as well as shorter REM latencies and higher REM densities (Riemann et al., 2001). Moreover, decreased sleep efficiency is typical of MD patients, defined by difficulties falling asleep,

* Correspondence to: Department of Systems Neuroscience, University Medical Center Hamburg-Eppendorf, Martinistr. 52, Bldg W34, D-20248 Hamburg, Germany. Tel.: +49 40 7410 55781; fax: +49 40 7410 59955.
E-mail address: j.peth@uke.uni-hamburg.de (J. Peth).

0165-1781/$ - see front matter © 2012 Elsevier Ireland Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.psychres.2012.06.020

nocturnal awakenings, and early-morning awakenings (Thase, 2006). There is some evidence for a relationship between excessive daytime sleepiness and depressive symptoms, indicating that daytime sleepiness is a regular feature of depression (Fava, 2004; Lessov-Schlaggar et al., 2008; Mume, 2010).

A large amount of research has focused on the influence of sleep deprivation (SD) as a therapeutic option for this group of patients (Riemann et al., 1995; Giedke and Schwärzler, 2002). Today a positive influence of SD is assumed, although no comprehensive explanation for the phenomenon is known (Svestka, 2008). Furthermore, the high risk of a relapse limits the use of SD as a long term therapy (Martiny et al., 2007). Studies which investigated the influence of naps on the efficiency of SD in MD patients reported heterogeneous results (Gillin et al., 1989; Wiegand et al., 1993; Hemmeter et al., 1998). Wiegand et al. (1993) reported that depressed patients having responded to total sleep deprivation therapy relapsed more frequently into depression after morning naps compared to afternoon naps. In contrast, Gillin et al. (1989) looked at the effects of 10-min naps scheduled either at 8:30 a.m. or at 3:00 p.m. on mood in sleep-deprived depressed patients. They found that naps did not alter mood in the responders to total sleep deprivation, but did improve measured depression on the Hamilton Rating Scale for Depression in the non-responders (Gillin et al., 1989). It seems likely that, based on circadian changes in MD, the time when the nap takes place (in the morning versus in the afternoon) is an important determinant of the outcome of the SD treatment. In sum, a strong relationship between sleep, sleep alterations and depressive symptoms is assumed in MD (Riemann et al., 2001; Tsuno et al., 2005).

Most of the napping studies in MD have concentrated on patients who were sleep deprived. There is a lack of information on the relationship between daytime sleep and subjective well-being in patients suffering from MD who are not sleep deprived. To our knowledge, no study has been published yet exploring this topic outside the scope of a SD paradigm. In contrast, there are some therapeutic concepts that focus on behavioral activation treatments and report an improvement in depressive symptoms after resuming activity (Cuijpers et al., 2007; Hautzinger, 2008). Following this idea, taking a nap would be a dysfunctional intervention for treating a patient with depression.

The present study was part of a research project focusing on the effects of napping on emotional memory consolidation and subjective well-being in patients with MD. Based on prior findings with regard to the positive effect of daytime sleep on mood in healthy adults (Taub et al., 1976; Kaida et al., 2007) it was hypothesized that healthy controls who slept during the day would show an improvement in their subjective well-being in comparison to controls who stayed awake. For the clinical group, it was expected that MD patients who took a nap would show a worsening in their subjective well-being compared to patients who did not sleep during the day. This hypothesis takes into account the marked changes in sleep architecture typically observed in depressed patients (Riemann et al., 2001; Thase, 2006) and the findings from studies investigating the effects of a nap within a SD paradigm (Gillin et al., 1989; Wiegand et al., 1993; Hemmeter et al., 1998). Moreover, the hypothesis is based on findings within psychotherapy research showing a positive correlation between activation during the day and a reduction in depressive symptoms (Cuijpers et al., 2007; Hautzinger, 2008).

2. Methods

2.1. Participants

Twenty patients with MD and twenty healthy controls, matched for age, gender, and years of education, were included in this study. For demographic data and descriptive results of measures of depression and psychopathological symptoms see Table 1. Participants allocated to the sleep or wake condition did not differ in these measures, neither in the group of MD patients nor in the group of healthy controls.

Table 1
Demographic data (age and years of education), premorbid intelligence (WST), self-reported grade of depression (BDI), the grade of depression appointed by an expert (HAMD) and results from self-reports of psychopathological symptoms (SCL-90R) (mean ± SD).

	MD patients ($n=20$)	Healthy controls ($n=20$)	Statistics
Age (years)	43.2 ± 12.0	43.3 ± 12.6	$t(38)=0.026$
Education (years)	14.5 ± 2.8	14.9 ± 2.7	$t(38)=0.457$
WST (IQ)	100.9 ± 9.5	104.8 ± 6.9	$t(38)=1.467$
BDI (total score)	20.9 ± 10.0	2.8 ± 2.5	$t(38)=7.818$**
HAMD (total score)	15.2 ± 4.0	1.1 ± 1.1	$t(38)=15.294$**
SCL-90 R (global severity index)	68.1 ± 11.4	39.8 ± 12.8	$t(38)=7.373$**

WST (MWT-A): "Wortschatz-Intelligenztest" (premorbid intelligence); BDI: Beck Depression Inventory; HAMD: Hamilton Rating Scale for Depression, SCL-90-R: Symptom Checklist-90-Revised, global severity index (*T*-values).

** $p < 0.001$.

Of the 40 participants 24 were female (60%). All patients fulfilled the DSM-IV criteria for MD and were recruited as inpatients from the Department of Psychiatry and Psychotherapy, Charité-University Medicine Berlin, Campus Benjamin-Franklin. For ethical reasons the intake of antidepressant medication was continued in the clinical group. However, any intake of benzodiazepines and other drugs, which are known to affect sleep characteristics, was stopped at least 3 days prior to study participation. Healthy controls were mainly recruited by a list based on newspaper advertisements and were paid for their participation. A telephone screening as well as a clinical examination was conducted to exclude present or life-time psychiatric disorders, medical conditions interfering with study participation, intake of drugs known to affect sleep or presence of sleep disorders. Written informed consent was obtained prior to study participation. The present study was conducted in accordance with the Declaration of Helsinki and the study protocol was approved by the ethics committee of the Charité-University Medicine Berlin, Campus Benjamin Franklin.

Standard measures such as the Beck Depressions Inventory (Beck et al., 1961) and the Hamilton Rating Scale for Depression (Hamilton, 1960) were used for assessing severity of depression. The Symptom Checklist-90-Revised (Derogatis et al., 1973) was applied to measure general psychopathological symptoms. The "Wortschatztest" (WST) is a multiple-choice test asking for the correct word in a line of five words and was used to evaluate premorbid intelligence (Schmidt and Metzler, 1992). All patients were on antidepressant medication during study participation, including citalopram ($n=3$), escitalopram ($n=4$), trazodone ($n=2$), bupropion ($n=3$), duloxetine ($n=3$), mirtazapine ($n=5$), sertraline ($n=4$), venlafaxine ($n=2$) and trimipramine ($n=4$).

2.1.1. Participants sleep behavior

The Pittsburgh Sleep Quality Index (PSQI) (Buysse et al., 1989) was applied to gather general information on subjective sleep quality 4 weeks prior to data collection. The PSQI consists of several subscales and each scale can reach a score between 0 and 3. The cutoff for the total score (sum of subscales) is 5 to identify persons with sleep disorders respectively problematic sleep behavior. Norms are available for the German version based on 1049 participants (Zeitlhofer et al., 2000). The Epworth Sleepiness Scale (ESS) (Johns, 1991) was used to measure general levels of daytime sleepiness. The critical cutoff score is 10. To further control for subjective differences in sleep quality, like the restorative value of sleep, within the group of depressed patients and healthy controls, a standardized sleep questionnaire (DGSM; Hoffmann et al., 1997) was presented the night and the morning before the study.

Measurement of sleep quality, general daytime sleepiness and the restorative value of sleep the night before the study are presented separately for depressed patients and healthy controls. As shown in Table 2 significant differences between the two groups are found for different aspects of sleep quality during the last 4 weeks, such as sleep quality, sleep efficiency and daytime sleepiness as well as the restorative value of sleep the night prior to study participation. No differences in general daytime sleepiness and duration of sleep were found. Within the groups (depressed patients and healthy controls) no differences in PSQI scores, ESS scores and restorative value of sleep before the study were found.

To collect additional information about the participants napping habits several questions were asked. The questionnaire applied was not standardized and purely explorative in nature. A qualitative picture of the participants napping habits is displayed in Table 3. No significant differences between conditions were found, neither for the patient group nor for the healthy control group.