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Schizophrenia Research 47 (2001) 77–86

SCHIZOPHRENIA RESEARCH

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Actigraphic estimates of circadian rhythms and sleep/wake in older schizophrenia patients

Jennifer Martin [a], Dilip V. Jeste [b,c], Michael P. Caliguiri [b,c], Thomas Patterson [b,c], Robert Heaton [b], Sonia Ancoli-Israel [b,c,*]

[a] *San Diego State University/University of California, San Diego Joint Doctoral Program in Clinical Psychology, San Diego, CA, USA*
[b] *Department of Psychiatry, University of California, San Diego, CA, USA*
[c] *Department of Psychiatry, Veterans Affairs San Diego Healthcare System, San Diego, CA, USA*

Received 24 August 1999; accepted 18 January 2000

Abstract

Twenty-four hour circadian activity rhythms and light-exposure levels of 28 older schizophrenia patients (mean age = 58 years) were examined using an Actillume recorder. Sleep and wake were scored using the algorithm of the ACTION3 software which revealed that the patients slept for 67% of the night and napped for 9% of the day. Patients with more disturbed sleep and less robust circadian rhythms performed more poorly on neuropsychological tests. Patients with higher cognitive functioning and fewer extrapyramidal symptoms were more alert during the day. Few patients were exposed to high levels of illumination during the day, and older age was associated with lower levels of light exposure. Duration of antipsychotic use and higher antipsychotic doses were associated with decreased daytime alertness and less robust circadian activity rhythms. Patients taking antipsychotics were more sleepy both during the day and night than patients not taking antipsychotics. The circadian rhythm disturbances found in these patients did not seem to be due solely to low levels of illumination exposure. Life-style factors, behavioral factors, psychiatric symptoms and medications were likely contributors to the disturbed rhythms. The effects of the sleep disturbances did not seem to be benign. There were strong relationships between sleep and circadian rhythms and functioning.

Keywords: Aging; Antipsychotic; Circadian rhythm; Light; Schizophrenia; Sleep

1. Introduction

Patients with schizophrenia often complain of difficulties with sleep (Kempenaers et al., 1988; Sweetwood et al., 1976, 1980). Studies have shown differences in rapid eye movement (REM) sleep and slow wave sleep between patients with schizophrenia and controls (Jus et al., 1973; Ganguli et al., 1987; Hudson et al., 1993; Kempenaers et al., 1988). Sleep disturbances are seen in medicated and unmedicated patients, suggesting that schizophrenia and its symptoms directly affect sleep (Stern et al., 1969; Ganguli et al., 1987; Lauer et al., 1997). Benca et al. (1992) reviewed studies of sleep and psychiatric disorders, and reported that schizophrenia patients had decreased total sleep time, longer sleep-onset latency and reduced sleep efficiency compared with controls.

* Corresponding author. Present address: Department of Psychiatry 116A, Veterans Affairs San Diego Healthcare System, 3350 La Jolla Village Drive, San Diego, CA 92161, USA. Tel.: +1-858- 552-8585, ext. 3828; fax: +1-858-552-7536.
E-mail address: sancoliisrael@ucsd.edu (S. Ancoli-Israel)

0920-9964/01/$ - see front matter
PII: S0920-9964(00)00029-3

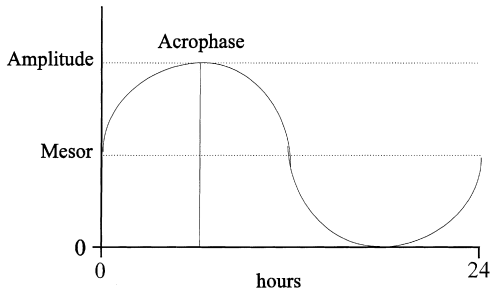

Fig. 1. Cosine model of circadian rhythms. Mesor represents the midpoint of the curve, amplitude is the distance from the mesor to the peak at its highest point and the acrophase is the time of the rhythm's peak (Batschelet, 1981).

Unfortunately, available data on sleep in schizophrenia come primarily from younger patients. Few studies have included patients over age 35, and almost none have included patients over age 50 (Benca et al., 1992). Some of the studies cited above included only unmedicated patients (Jus et al., 1973; Lauer et al., 1997), while others included both patients taking medications and patients not taking medications. None the less, the consistent finding across studies was that, regardless of medication status, patients have disturbed sleep compared with non-psychiatric individuals.

Sleep architecture generally changes over the lifespan. Older adults often have less robust (i.e. lower amplitude) and more advanced (i.e. earlier) circadian rhythms than younger adults (Dijk et al., 1999; Bliwise, 1993; Weitzman et al., 1982). Secretion of hormones, body temperature, activity and sleep/wake all follow circadian patterns, that is, rhythms with a phase of about 24 h (see Fig. 1) (Batschelet, 1981).

Circadian rhythms are controlled by environmental cues, the strongest of which is light. Reduced light exposure is thought to contribute to circadian rhythm and sleep/wake disturbances in older adults (Campbell et al., 1988; Espiritu et al., 1994). To our knowledge, there have been no reports of illumination exposure in older schizophrenia patients.

Another factor which affects the sleep/wake of schizophrenia patients is antipsychotic medications (Nicholson et al., 1994; Maixner et al., 1998). Antipsychotics are known to affect sleep, but their impact on circadian rhythms is largely unknown. One question being explored is the differential effects of typical vs. atypical antipsychotics. Wirz-Justice and colleagues recorded wrist activity in hospitalized schizophrenia patients. They found that changing the antipsychotic medication of one patient from haloperidol (a typical antipsychotic) to clozapine (an atypical antipsychotic) improved the organization of his rest/activity rhythm (Wirz-Justice et al., 1997). They also found that patients taking atypical antipsychotics had more stable rest/activity cycles than patients taking typical antipsychotics (Wirz-Justice et al., 1996). This suggests that traditional antipsychotics may adversely impact circadian rhythms.

Older schizophrenia patients are at risk for sleep and circadian rhythm disturbances, because of both their age and their psychiatric status. The goal of this study was to describe circadian activity rhythms and sleep/wake patterns of such patients and to examine specific clinical factors which may be related to circadian activity rhythms, sleep and wake. We hypothesized that sleep/wake patterns would be disturbed, circadian activity rhythms would be blunted and antipsychotics would account for much of these disturbances. Although our sample size was small, we also expected that patients taking atypical antipsychotic medications would have less disturbed sleep and circadian rhythms than patients taking typical antipsychotic medications. We expected that clinical symptoms would be associated with more sleep and circadian rhythm disruption, and more disturbed rhythms would be associated with poorer functioning.

2. Methods

2.1. Subjects

The participants were 14 men and 14 women enrolled in a larger study of late-life psychosis. All were diagnosed with schizophrenia using DSM-III-R criteria (American Psychiatric Association, 1987). The Structured Clinical Interview for DSM-III-R (SCID) (Spitzer and Williams, 1986) was administered to patients by geriatric psychiatry or psychology fellows. Diagnosis was confirmed at a