Available online at www.sciencedirect.com
SCIENCE DIRECT®
International Journal of Nursing Studies 42 (2005) 843–850
INTERNATIONAL JOURNAL OF NURSING STUDIES
www.elsevier.com/locate/ijnurstu

# Improving day and night sleep problems in infants by changing day time sleep rhythm: a single group before and after study

Arna Skuladottir[a,*], Marga Thome[b], Alfons Ramel[c]

[a]*Outpatient Clinic for Sleep Disturbed Infants, Landspitali—University Hospital, IS-101 Reykjavik, Iceland*
[b]*Faculty of Nursing, University of Iceland, Eirberg, Eiriksgata 34, IS-101 Reykjavik, Iceland*
[c]*Institute of Nursing Research, University of Iceland, IS-101 Reykjavik, Iceland*

Received 24 June 2004; received in revised form 23 November 2004; accepted 9 December 2004

**Abstract**

This study explores the duration and timing of day time waking periods required for sleep disturbed infants to improve day and night sleep. Seventy-nine sleep disturbed outpatients with day and night sleep problems were investigated before and two weeks after a brief sleep intervention. Data were collected by interviewing parents on their infants' day and night sleep patterns. Besides instructing the parents on night sleep regulation, they were advised to regulate day sleep. After the intervention, duration of day and night sleep increased and frequency of night waking decreased. The mean duration of the first waking period in the morning did not change, but the range decreased. The mean duration of the last waking period in the evening increased. The frequency of short and irregular day naps and the need for assistance in falling asleep decreased after the intervention. It is recommended that the last waking before night sleep is lengthened to reduce day and night sleep problems.


*Keywords:* Sleep disorders; Day sleep; Infants; Sleep intervention; Nursing; Iceland

## 1. Introduction and literature review

### 1.1. Sleep and sleep problems

Cross-sectional studies from various countries show that the rate of sleep problems in early childhood is high and ranges from 15% to 35% (Richman, 1981; Lozoff et al., 1985; Ingadottir et al., 1992; Blum and Carey, 1996; Thunström, 1999). Sleep problems in infants or toddlers are defined as difficulties in falling asleep or sleeping through the night (Anders et al., 2000; Minde et al., 1993; Richman, 1981; Sadeh, 1996). Anders and Keener (1985) found that all infants wake up at night. However, only the parents who notice the waking, will report a sleep problem because their night sleep becomes disturbed by the infant who may signal waking by crying. Well regulated infants soothe themselves effectively back to sleep after quiet awakening and consequently their wakings pass unnoticed by the parents (Anders et al., 2000; Anders and Keener, 1985; Schieche et al., 2004; Zaiwalla and Stein, 1993). Sleep protocols based on parents' report have been used in several clinical studies and have been found to be reliable in assessing a sleep problem (Anders and Keener, 1985; Schieche et al., 2004; Zaiwalla and Stein, 1993). Infant sleep problems constitute a common regulatory disorder and they are often interrelated with other regulatory disorders such as excessive crying, feeding difficulties

*Corresponding author. Fax: +354 543/3021.
*E-mail address:* arnasku@landspitali.is (A. Skuladottir).

0020-7489/$ - see front matter © 2005 Elsevier Ltd. All rights reserved.
doi:10.1016/j.ijnurstu.2004.12.004

and emotional disturbance. In addition to difficulties in falling asleep or sleeping through the night, disregulated night sleep is characterised by crying or fussing associated with wakings, long waking periods, fussing and irritability during day time and fewer hours of total circadian sleep (Anders and Keener, 1985; Schieche et al., 2004).

Although several characteristics of infant sleep problems have been described, a general valid definition is lacking and individual variability, transient and age-dependent changes of sleep and sleep behaviour make it difficult to propose a definition that distinguishes sleep problems clearly from related developmental changes and adaptations in infancy (Schieche et al., 2004; St James-Roberts and Plewis, 1996).

Infant sleep problems need to be considered in a matrix of relationships of the family as they can have a negative impact on family life (Jimmerson, 1991). Untreated sleep problems are associated with adverse health outcomes later in childhood (Thunström, 2002). Furthermore, complaints about infant sleep problems can be costly for health services if they are not dealt with effectively for reasons of absent policies or a lack of agreed practices (Morris et al., 2000).

### 1.2. Day time sleep problems

Persistent night time sleep problems in infants have been associated with day time sleep pattern in a few studies (Fukuda and Sakashita, 2002; Kohyama et al., 2002; Minde et al., 1994). Schieche et al. (2004) found a lack of total circadian sleep in sleep disordered infants to be related to day time behaviour such as sleepiness and irritability. Consequently, these authors propose that a diagnosis of a sleep problem should include day time parameters, such as total day sleep in hours and wakefulness and sleepiness during the day. The length and frequency of day sleep depend on the age and characteristics of the infant and decrease with age (Armstrong et al., 1994; Messer and Parker, 1998). Fukuda and Sakashita (2002) report that afternoon naps cause delayed onset of night sleep and are related to difficulties in falling asleep. Kohyama et al. (2002) show that nocturnal sleep onset is correlated with the nocturnal sleep duration, i.e. late onset of night sleep leads to short duration of night sleep. The results of that study support the need for a more precise estimation of an appropriate duration of waking before night sleep. Furthermore, there is uncertainty about an appropriate duration of the first waking period in the morning after disturbed night sleep. In the outpatient clinic where the study was conducted, the parents of sleep disturbed infants frequently report fatigue and irritability of the infants during daytime and atypical day sleep periods. From this experience it seems obvious that day and night sleep problems are interrelated, and this observation is supported by work of clinicians working with sleep disturbed infants (Schieche et al., 2004).

### 1.3. Sleep interventions

The majority of intervention studies in infants with sleep problems focuses on night sleep (Eckerberg, 2002; Hiscock and Wake, 2002; Kerr et al., 1996; Minde et al., 1993; St James-Roberts et al., 2001).

Nevertheless, some interventions for night sleep problems have been reported to impact positively on day time behaviour (Leeson et al., 1994; Messer and Parker, 1998; Minde et al., 1994). A principle of sleep intervention, that is assumed to apply equally to night and day time sleep regulation relates to the support of infants' innate self-soothing capabilities. These are sucking of a pacifier, thumbsucking, grasping a comforting toy or object. Parent directed soothing practices are considered dysfunctional as they tend to maintain or to aggravate the sleep problem (Schieche et al., 2004). Examples are rocking or any other vestibular stimulation, close bodily contact or giving a drink (breast, bottle, etc.). The passive presence of a parent to settle for sleep can however be functional and the need for it has been found to vary with age (Skuladottir, 2001). Infants, aged 12–24 months, who need more than 30 min to settle for sleep and do so only in the presence of a parent, are diagnosed as having a sleep disturbance (Anders et al., 2000).

It is not known whether the duration and timing of the first waking period in the morning influences the infant's tolerance for waking and is related to the total number of day naps required by any infant, although our clinical experience leads us to assume that this is so. An appropriate duration of the first and last waking period of the day is also unknown.

## 2. Methods

### 2.1. Aim and context of the study

The purpose of the current study was to test the hypothesis that duration and timing of the first and last waking period in the day will change after the sleep intervention and improvement in day and night sleep will follow. It is hypothesised that a waking period of 4–6 h, depending on age and development, before settling for night sleep and omitting brief naps in the late afternoon (i.e. from 5 to 7 p.m.), can reduce night waking.

The study was conducted with a caseload of sleep disturbed children attending a nurse led outpatient clinic at the Landspitali University Hospital in Reykjavik,