

Inter Dependence between Circadian Rhythm and Aging

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Abstract

Directly or indirectly light plays important physiological roles to regulate our body. It affects another master switch, the pineal gland, producer of melatonin- the sleep hormone. In addition to this hormone age is also big factor for regulating sleep. In this review we have put forth evidence for the relationship between the two important regulators for sleep.

Keywords: age and sleep; artificial eye lens; day time naps

Introduction

Long before humans evolved on this planet circadian system was set in; it depends on the earth's movement around the sun. Thus, day and night were formed. Physiologically, humans prefer to work in light hours and sleep during dark hours [1,2]. Although, our sleep-wake cycle is dependent in circadian system, it is also regulated by many intrinsic and extrinsic factors

including aging [3-5]. For example, new-born sleep ignores 12h light-12h dark cycle and can sleep anywhere from 16-22 hours per day, broken up by feeding, wake every couple of hours to eat. Breastfed babies feed often; about every 2-3 hours (*see* Table 1).

•	Newborns, 0 to 3 months: 14 to 17 hours
•	Infants, 4 to 11 months: 12 to 15 hours.
•	Toddlers, 1 to 2 years: 11 to 14 hours.
•	School-age children, 6 to 13 years: 9 to 11 hours.
•	Teenagers, 14 to 17 years: 8 to 10 hours.
•	Young adults, 18 to 25 years: 7 to 9 hours.
•	Preschool children, 3 to 5 years: 10 to 13 hours.
•	Adults, 26 to 64 years: 7 to 9 hours

Table 1: Sleep hours with growing age.

Sleep patterns also tend to change as with age. Alterations in sleep quantity and quality (duration and sleep stages and sleep oscillations) occur as we age. Most people find that aging causes them to have a harder time falling asleep. They wake up more often during the night and earlier in the morning. Total sleep time stays the same or is slightly decreased (6.5 to 7 hours per night) [6]. Age-related changes in sleep include advanced sleep timing, shortened nocturnal sleep duration, increased frequency of daytime naps, increased number of nocturnal awakenings and time spent awake during the night, decreased slow wave sleep, and other changes. In other words, Circadian rhythms shift throughout our lifespan [3,7].

Circadian Rhythms Change with Age

Researchers still don't know for sure why the circadian rhythm shifts earlier as we age, but it's likely a combination of biological and environmental factors. In later adulthood, outside cues for the circadian rhythm appear to become less effective. Researchers believe that certain clock genes may lose their rhythm [8] and be replaced with other genes that act a little differently.

Based on studies in mice, researchers also suspect the SCN in humans may become weaker, leading to less pronounced fluctuations in the circadian rhythm. In turn, less melatonin is produced at night, so older adults may experience less of a distinction between sleep and wake. This results in sleeping less soundly at night and feeling sleepier throughout the day.

Since light plays such a critical role in regulating the circadian rhythm, many studies have focused on to know, how light exposure changes as we age through the eye. It may be that aging eyes don't let as much light in particularly blue light [9-11] that is important for regulating the circadian rhythm. It might also be that we spend less time outdoors and more time in weak artificial light, which is not as effective at controlling our sleep-wake cycle. Old age most people already had cataract and undergone cataract surgery; the artificial lens lets more light into the eyes and seems to improve sleep quality [11].

Additional considerations about light exposure apply to residents of care homes, as they may spend less time outside in the sunlight and tend to be less active. Therefore, seniors staying in long-term institutions may find

themselves disturbed by noise and light during the night, especially if they share a room with someone else. Compared with more independent adults, care home residents are more likely to suffer from poor sleep and may spend most of the day drifting in and out of sleep [12].

Advanced or delayed sleep timing

Older adults suffer more with advanced sleep phase disorder (ASPD). This disorder is an inability to stay awake until the desired bedtime and difficulty in maintaining sleep until the desired wake time [13]. Nocturnal sleep duration for short sleepers usually is less than 6 hours and chronic sleep deprivation was defined as mean nocturnal sleep duration of less than 5 hours [14]. Frequent naps during the day may be due to old age when these people miss sleep at nights. That is why frequency of daytime naps are increased. A sudden increased need for naps during light hours indicates a health problem.

Awaken whole night

Sleepless nights take a toll on physical health. Without good sleep at night body's tiredness, fatigue and low energy levels are not recovered. Frequent Nighttime wake-ups, also known as "nocturnal awakenings," are pretty common in adults. For a 2010 study in Psychosomatic Research, researchers interviewed 22,740 people about their sleep habits, finding that 31.2 percent of participants reported waking up at least three nights per week [15]. Reasons this might happen include drinking caffeine or alcohol late in the day, a poor sleep environment, a sleep disorder, or another health condition. In epidemiological studies, it is commonly accepted that the presence of nocturnal awakenings occurring at least 3 nights per week is sufficient to indicate an insomnia symptom [16,17].

Some of the most serious potential problems associated with chronic sleep deprivation are high blood pressure, diabetes, heart attack, heart failure or stroke [18] the potential problems include obesity, depression, reduced immune system function and lower sex drive.

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