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A COMPARATIVE STUDY OF THE SLEEP-WAKE SCHEDULE AND THE LIGHT ENVIRONMENT BEFORE ONE THOUSAND YEARS WITH THE MODERN SOCIETY; FOR THE NEXT GENERATION LIGHTING

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In modern Japanese society, sleep time shortening caused by a phase delay becomes social problems. Changes of light environment are supposed to affect the sleep-wake schedule. It is necessary to evaluate the historical changes of sleep-wake schedules and artificial lighting. In this study, we inferred the sleep customs and the artificial light in the Heian era, before approximately one thousand years in Japan, and try to consider how the sleep-wake cycle had been entrained by light environment.

In order to infer the sleep-wake schedules in the Heian era, we analyzed the expressions about the timing of awakening and social life in "the Tale of Genji" and "the Diary of Lady Murasaki". As a characteristic of the sleep custom, we found the many descriptions in which the people wake up and start activity on the astronomical twilight, several hours earlier than modern society. However, bedtime is indistinct and the people may not always go to sleep immediately after sunset, and especially in the court service, shift work was sometimes assigned.

Artificial lighting in the Heian era was the lamplight using vegetal oil. We reproduced an illumination tool of those days and measured the optical characteristics. The luminous flux of the flame light was less than quarter of a present incandescent 5W miniature bulb. Therefore, it is supposed that there was not the possibility of increasing vigilance level or circadian phase delay in the nighttime. On the other hand, also in the daytime, indoor illuminance was much lower than in the modern room.

In the Heian era, it is suggested that the sleep-wake cycle can be entrained by the astronomical twilight before sunrise. Regardless of whether people of those days were able to get regularity of bedtime, periodical awakening schedules would be maintained because the parametrical photic entrainment was not disturbed by excessive nocturnal light everywhere in the modern society. For the next generation lighting, it is considered necessary to secure gradually increasing dawn light with balanced spectral distribution after stable nocturnal darkness.

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WITHDRAWN

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SUBJECTIVE SLEEPING PROBLEMS AND SELF-REPORTED SLEEP LENGTH DURING FOUR SEASONS IN ARCTIC NORTHERN NORWAY

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Introduction: Arctic Northern is a natural laboratory for the study of seasonality of sleep. During two midwinter months the sun is below the horizon, and during two summer months the sun is above the horizon 24 hours a day, while at spring and autumn equinox, day and night are of equal length. If there were any effect of length of daylight on sleep, the population of Northern Norway, should experience this.

Material and methods: The study was part of a screening for cardiovascular disease, done by the National Screening Institute of Norway. All persons aged 23–71, living in Gamvik municipality, 460 persons, were asked to participate. Of 312 persons attending, 250 were invited to answer a questionnaire in January, March, June and September. The questionnaire asked about sleep length, subjective seasonal complaints, seasonal sleep complaints, and the actual time they woke up on the day of completion of the questionnaire. In December, the Centre for Epidemiologic Studies Depression Scale (CES-D) was added to the questionnaire.

Results: The sample was 196 persons, 108 (55%) women, mean age 50.7 (SD 10.7). Eighty-one persons (41%) reported subjective seasonal complaints, and 49 persons (21%) reported specific midwinter sleeping problems. Persons with midwinter sleeping problems slept more in all seasons, compared to persons reporting other problems, but only significantly more in spring (ANOVA, $df = 3$, $F = 3.158$, $p < .03$). Persons reporting midwinter sleeping complaints reported waking up later than persons with other complaints, but only significantly later in autumn (ANOVA, $df = 3$, $F = 5.313$, $p < .002$). Subjective seasonal complaints was significantly related to depressive symptoms (CES-D) (Beta -0.092 , $p < .000$) in a logistic regression model controlling for age and gender.

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SLEEP AND FATIGUE MANAGEMENT IN EXTREME ENVIRONMENT: CASE OF SOLO SAILORS

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Introduction: Solo offshore sailboat racing require skippers to face 24-hour/day readiness to perform under sleep loss. The objective was to measure the effectiveness of an Individual Fatigue Management Program (IFMP) during a solo-transatlantic race.

Method: Before a 3542 nm race, 15 sailors (men; 39 ± 9 yrs) completed a self-questionnaire about their sleep management in race. Following that, a 45-minute individual course about sleep regulation and consequences of sleep loss was given. In addition, they were offered to use an interactive sleep diary (software Scextan) that we designed to help users to manage fatigue during sleep restriction. Within 48 hours after arrival, sailors were asked to answer an interview based on a pre-established grid. A fatigue management feedback of the race was