



Unraveling the Significance of Circadian Rhythms for Health

Heon-Jeong Lee^{1,2}

¹Department of Psychiatry, Korea University College of Medicine, Seoul, Korea

²Chronobiology Institute, Korea University, Seoul, Korea

Modern humans are experiencing more disturbances in biological rhythms than in human history. The biological rhythm of modern humans is assumed to be quite different from that of our ancestors in the past. This phenomenon is due to the disturbances in the biological rhythm caused by artificial light and the lifestyle patterns adopted by us. Therefore, it is crucial to investigate the influence of circadian rhythm disturbances on human health. Recently, several interesting papers have shown that circadian rhythms are important for human health; a recently published paper particularly requires attention [1].

Eating and sleeping are two essential behaviors that humans engage in, on a daily basis [2]. Caloric restriction is known as one of the ways to live a long life. Several studies and experiments have shown that eating less increases the lifespan of animals by reducing the rate of aging. Reducing calorie intake reduces weight, in addition to lowering blood pressure and inflammation levels, and also regulates blood sugar in a better manner [3]. Furthermore, another study added that along with the amount of food eaten, the timing at which it is eaten is also important for extending the life span. Acosta-Rodríguez et al. [1] reported that a four-year experiment on hundreds of mice showed that eating only during active hours of the day contributes to an increase in life expectancy. The researchers examined these mice by dividing them into six groups and used an automatic feeder to control the amount of food and meal times. One group allowed them to eat as much as they wanted, while the other five groups were given 30%–40%

less feed. These groups were further divided into five sub-groups according to the meal intervals. While two groups were supplied with an intensive daily feeding amount within 2 hours from the start of either the day or night, the other two groups ate at regular intervals of 90 minutes within 12 hours during the day or night and starved for the rest of the time. The last group was given a steady supply of feed once every 160 minutes for 24 hours a day, regardless of biological rhythm.

The classification of meal supply methods was performed to investigate the influence of time-based meal plans such as intermittent fasting and biological rhythm along with the amount of food consumed. The average life expectancy of mice that ate less was 10% longer. The group that ate only at night when the mice were active had a longer lifespan compared to the group that ate meals in daytime. The mice that consumed less feed during the day had a 20% increase compared to the mice without restrictions on feed, whereas the mice that consumed food for only a short period of time at night showed a 35% increase in their lifespan, respectively. The lifespan of mice that ate only at night was nine months longer compared to that of the mice that ate without any time-bound restrictions, with an average lifespan of two years.

The results of this study also have great implications for the recent trend of intermittent fasting. It suggests that eating for a short period of time during the day and not eating at all at night is a healthy way to live a long life in humans. This study emphasizes the importance of adopting a lifestyle according to the circadian rhythm to maintain good health. It further describes the flaws of previous studies that did not consider the issue of timing, particularly, circadian rhythm. In the future, thus, to conclude, research designs based on circadian rhythms should be considered in future biomedical studies.

Received: September 14, 2022 Revised: September 16, 2022

Accepted: September 17, 2022

Corresponding author: Heon-Jeong Lee, MD, PhD, Department of Psychiatry, Anam Hospital, Korea University College of Medicine, 73 Goryeodae-ro, Seongbuk-gu, Seoul 02841, Korea.

Tel: 82-2-920-6721, E-mail: leehjeong@korea.ac.kr

© This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Funding Statement

This study was supported by the Korea Health 21 R&D Project funded by the National Research Foundation of Korea (2019R1A2C2084158).

ORCID iD

Heon-Jeong Lee 

<https://orcid.org/0000-0002-9560-2383>

REFERENCES

1. Acosta-Rodríguez V, Rijo-Ferreira F, Izumo M, Xu P, Wight-Carter M, Green CB, et al. Circadian alignment of early onset caloric restriction promotes longevity in male C57BL/6J mice. *Science* 2022;376:1192-1202.
2. Kim S, Lee HJ. Sleep and circadian rhythm disturbances in eating disorders. *Chronobiol Med* 2020;2:141-147.
3. Colman RJ, Anderson RM, Johnson SC, Kastman EK, Kosmatka KJ, Beasley TM, et al. Caloric restriction delays disease onset and mortality in rhesus monkeys. *Science* 2009;325:201-204.