Background: Night shift work is common is many warehouses, manufacturing facilities, hospitals, and many other industries. However, given that the Circadian rhythm is regulated by largely by sensing light and darkness, it can be challenging for the body to adapt to this schedule without lasting consequences. Night shift work can alter metabolic, cardiovascular, and metabolic signals which can cause Circadian rhythm misalignment. The disruption of Circadian rhythm has even been linked to obesity, metabolic diseases, type II diabetes, gastrointestinal dysfunction, compromised immune function, cardiovascular disease, fatigue, mood and social disorders, and increased cancer risk [1]. Given that night shift work is a common occurrence today, there is a need to adapt Circadian rhythm without causing other side effects. Some current methods that have shown promise include bright light therapy [2] and darkening goggles [3].

AIM: To study the alteration of Circadian rhythm in primates in order to observe metabolic and mental effects of night shift work with and without use of light therapy and dark goggles.

Research Plan: Chimpanzees were selected for this study as they are diurnal animals and the alteration of Circadian rhythm will more closely mimic the alteration that occurs in humans. The chimpanzees will be segmented into three groups:

1. Group A: Control group allowed to continue normal sleep schedule without nighttime disruption. The group will be given a task to do during the day.
2. Group B: Night shift with no environmental alterations. The group will perform the same task as the control group overnight.
3. Group C: Night shift with bright lights used during waking hours and darkened enclosures during resting hours.

During the study, blood levels of cortisol, melatonin, and glucose will be monitored using continuous blood monitoring technology similar to continuous glucose monitoring options used in diabetes. Additionally, each group will be monitored when completing the task to determine the time it takes the group to complete the task.

Curves will be generated for each group in order to determine Circadian rhythm alterations. Cortisol and glucose circulating should increase with waking activity while melatonin would decrease. The circulating levels of these hormones and glucose in the blood would indicate whether Circadian rhythm has shifted or has been disrupted and cognitive ability will be confirmed by the amount of time it takes the chimpanzees to complete a complex task.

References

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