2018

The impact of circadian misalignment on cardiometabolic health

Cynthia Marie Mills
University of North Dakota

Follow this and additional works at: https://commons.und.edu/pas-grad-posters
Part of the Cardiovascular Diseases Commons, and the Nutritional and Metabolic Diseases Commons

Recommended Citation
https://commons.und.edu/pas-grad-posters/18

This Poster is brought to you for free and open access by the Department of Physician Studies at UND Scholarly Commons. It has been accepted for inclusion in Physician Assistant Scholarly Project Posters by an authorized administrator of UND Scholarly Commons. For more information, please contact zeinebyousif@library.und.edu.
The circadian clock is an endogenous timekeeping system that Killick et al. (2015) found that three nights of catchup sleep. Circadian disruption is associated with obesity, insulin Circadian misalignment (meal timing adverse to the Extending sleep time by one hour each night lowers The behavioral cycle (normal meal timing, meaning Adequate sleep can help mitigate the damage done by Buxton et al. (2013) found that glucose levels increased 8 % lifestyle changes currently recommended for improving cardiometabolic health; however, sleep hygiene is rarely addressed. Individuals experience circadian misalignment when they artificially curtail their weekday sleep via the use of alarm clocks, use artificial light at night, or work a shift adverse to the natural light/dark solar cycle. The finding of insulin insensitivity and glucose intolerance has been consistently replicated in individuals who experience circadian misalignment, with or without chronic sleep loss, indicating a close relationship between sleep and cardiometabolic health. Sleep extension as a behavioral intervention effectively curbs the development and progression of cardiometabolic disease risk factors. The data indicates that circadian misalignment and sleep deprivation impede cardiovascular function and cause a decrease in glucose tolerance and insulin sensitivity Therefore, every effort should be made to reduce the health impact of sleep deprivation by focusing on sleep hygiene and circadian realignment as a means of reducing cardiometabolic disease risk factors.

The circadian system is important in all living organisms because it generates a 24-hour rhythm for physiological and behavioral processes enabling anticipation and adaptation to daily changes in the environment. The prevalence of cardiometabolic diseases, which are linked to lifestyle choices, has been rising at an alarming rate. Modernization and globalization are two of many factors to blame for lifestyle changes resulting in circadian disruption. The purpose of this literature review is to explore circadian misalignment with regards to its mechanism and impact on cardiometabolic health and to determine possible interventional measures. The primary focus is on lifestyle change, particularly sleep, as an interventional measure for circadian misalignment. Studies were included if they included a cardiometabolic disease risk factor studied in the context of circadian alignment/ misalignment or sleep duration/architecture. The data indicates that circadian misalignment and sleep deprivation impede cardiovascular function and cause a decrease in glucose tolerance and insulin sensitivity; however, restoring circadian rhythmicity and correcting for sleep deprivation improves several health indices including glucose tolerance, insulin sensitivity, blood pressure, and cardiac remodeling.

The circadian system serves one of the most important functions present in almost all organisms because it generates 24-hour rhythms in physiological and behavioral processes enabling anticipation and adaptation to daily changes in the environment (Baron & Reid, 2016). Globalization and modernization, night shift work, and nighttime light exposure have resulted in disruption of sleep which in turn disrupts the circadian system, causing increased prevalence of cardiovascular disorders and metabolic diseases (Chen & Lyons, 2015; Paschos, 2015). The circadian system is vital in the regulation of glucose metabolism; if a disturbance occurs in the circadian system, cardiovascular and metabolic diseases will likely be experienced. Therefore, the purpose of this paper is to review the literature about causes, effects, and interventions for circadian misalignment. The primary focus of the literature review is to establish whether lifestyle changes, especially sleep extension, can address circadian dysregulation in order to improve an individual’s circadian profile.

Weight loss, physical activity, and nutritional modification are all lifestyle changes currently recommended for improving cardiometabolic health. However, sleep hygiene is rarely addressed though mounting evidence suggests that both sleep deprivation and circadian misalignment contribute to the development of cardiometabolic diseases.

References