

The Influence of Night Work on the Eating Habits of Workers

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Abstract

Introduction: Certain professions require constant readiness and shift work, so night shifts are inevitable and necessary. Such work is often very stressful and requires a great deal of concentration from the employees. Performing night work causes employees to change day to night, which leads to many changes in the body and can worsen the quality and standard of life. Working at night can increase the risk of many health problems and conditions due to a changed sleep rhythm and a changed diet. *Methods:* In the article, we were interested in the connection between performing night work and workers' nutrition during the night shift. For searching, we used the PubMed database using the keywords „eating at work at night“, „nutrition at the workplace“, and „night work nutrition“ for scientific literature published in the period from 2018 to 2023. As search criteria, we considered accessibility of the full text of the article and searching for articles in English. *Results:* With proper nutrition and adequate nutrition at the workplace, we can influence productivity, reduce fatigue, and improve concentration at the workplace, enabling us to perform tasks more successfully and with high quality. The active working population is a group at risk in terms of eating habits at the workplace. In the research, we found that workers who work in shifts, especially night shifts have a disordered eating rhythm, low intake of fruits and vegetables, high-energy intake of inadequate nutrients, and too high a proportion of sugar and salt in the diet. Research articles also describe hormonal disturbances, increased subjective hunger, stomach problems, and increased sleepiness in shift workers. It turns out that it would be very good to introduce and adopt new healthy eating habits in the work environment. *Discussion and conclusions:* Fulfillment of conditions such as a balanced diet, sufficient amount of sleep, concern about mental state, and sufficient amount of physical activity are some of the key factors in ensuring good

concentration and sufficient amount of energy for work. Proper nutrition at the workplace during the shifts and in night shifts, when the employee is doing his work, also has a great impact on the well-being and health of the workers. In this area, it would be necessary to carry out some more research into the connection between night and shift work and its impact on the quality of life of workers. In such types of training, it is good to implement multidisciplinary cooperation of experts from major fields of work, such as the fields of nutrition, exercise, and medicine.

Keywords: eating at work at night, nutrition at the workplace, night work nutrition.

Introduction

Certain professions require employees to work night shifts, which are essential for maintaining uninterrupted services 24/7. Shift work involves working outside of the regular daytime schedule, including late evenings, early mornings, and overnight hours. Approximately 20% of the global workforce is engaged in some form of shift work, which can be quite demanding and requires exceptional concentration from employees. Working night shifts can disrupt the body's natural rhythm and lead to various health issues, impacting overall quality of life. One of the primary challenges of shift work is managing a healthy diet and lifestyle alongside irregular eating and sleeping patterns. Shift workers are at a higher risk for health problems, dietary imbalances, obesity, disrupted sleep and eating patterns, and other related health issues. Night work is defined in Article 150. (ZDR-1, 2013). It is the type of work done between 11 p.m. and 6 a.m. the next day. If the working schedule specifies a night shift, eight continuous hours between 10 pm and 7 am on the following day are considered night work. Article 151. The ZDR-1 (2013) defines the rights of workers who perform night work or work at night. Employees who work night shifts are entitled to special protections, including extended holiday entitlement, proper nutrition during work hours, and skilled supervision of the work or production process. If a personal physician determines that a night shift worker's health may deteriorate, the employer must assign them suitable daytime work. Night work is limited to one week unless the employee gives written consent to work nights for a longer period. If the employee does not have organized transportation to and from work, the employer may not assign him to night work (Data, 2024).

Methods

In our research, we focused on examining the relationship between night shift work and the dietary habits of workers. Our approach involved a descriptive method, which included a critical review of literature obtained from the PubMed database using specific keywords such as „eating at work at night,“ „nutrition at the workplace,“ and „night work nutrition.“ We specifically sought scientific literature published between 2018 and 2023, with a focus on freely ac-

cessible full-text articles in English. Data collection occurred between January and March 2024, resulting in a qualitative analysis of 9 articles.

Results

Studies conducted by Cunha et al., (2020) have demonstrated that non-shift workers exhibit poorer glucose tolerance after evening meals, which can disrupt the endogenous circadian cycle at night. Various factors, including sleep restriction, reduced brain glucose utilization, and insulin resistance, may contribute to abnormal glucose metabolism. The findings of the study suggest that night-time food consumption may not be metabolically optimal. This is particularly pertinent for shift workers, as elevated triglyceride levels pose a significant risk for ischemic heart disease. The study also noted heightened triglyceride levels following the consumption of a high-fat meal at 5:00 and 6:00 am, indicating a potential link to increased triglyceride concentrations in the bloodstream of shift workers. Furthermore, the type and frequency of meals consumed by night workers appear to be more influenced by habit and time availability than by appetite. Nonetheless, it is essential to establish better nutritional choices by taking into account metabolic considerations, personal habits, and individual preferences. Quian et al., (2022) have indicated that the timing of meals can significantly impact mood levels related to depression and anxiety, particularly during simulated night work. A recent cross-sectional study involving 502,494 individuals revealed that an unhealthy diet is associated with poorer sleep quality and overall mental well-being. Many individuals have reported consuming poor-quality diets characterized by high-carbohydrate meals.

A systematic review by authors Clark et al., (2023) incorporated studies on total energy intake and dietary patterns associated with day work, shift work, and rotating shift work revealed that individuals in the rotating shift workers group recorded a higher average 24-hour energy intake. Rotating shift workers tended to have irregular and more frequent meals, engage in more snacking or eating at night, consume lower amounts of core foods, and have a higher intake of discretionary foods. This pattern was associated with an increased risk of cardiometabolic conditions among rotating shift workers.

This study by authors Gupta et al., (2020) examined the effects of consuming a meal during a simulated night shift on driving performance. It was observed that driving performance was impaired from 01:30 to 07:30, particularly for those who consumed a meal compared to those who had a snack or didn't eat at all during the night. Those who consumed a meal showed significant impairment during their commute home, indicating that reducing food intake during the night shift could potentially improve safety. Additionally, participants who consumed a snack did not report feeling excessively full throughout the night shift, suggesting that consuming a snack could be a viable option for satisfying hunger during the night shift. The study also revealed an increase in subjective sleepiness during the night shift, with the highest levels reported at

04:00. Notably, participants who consumed a meal during the night shift experienced greater sleepiness compared to those who had a snack. The findings suggest that opting for a snack during the night shift may be more beneficial for post-shift driving performance than consuming larger meals. Furthermore, the study demonstrated that consuming either one or three low-glycemic index meals during the night shift did not negatively impact glucose regulation, unlike fasting. Conversely, providing high-glycemic-index meals during the night shift led to an anticipated increase in glucose levels. In summary, the results indicate that choosing low-glycemic index meals, regardless of frequency, could be a favorable option over fasting during night shifts, promoting better glucose regulation.

The aim of the study by Garrido et al., (2021) was to examine the connection between circadian disruption, eating patterns, sleep behaviors, and dyslipidemia indicators in night shift workers. The study employed a randomized, double-blind, crossover-controlled clinical trial and involved 36 overweight female nurses working fixed night shifts (12 x 36 hours). The average age of the participants was 39.4 years, and their average nighttime sleep duration was 5.76 hours.

The findings revealed a correlation between reduced nighttime sleep duration and increased levels of very-low-density lipoprotein cholesterol (VLDL-C) by 2.75 mg/dL and triacylglycerides by 3.62 mg/dL. Conversely, each additional hour of sleep was associated with a 3.06 mg/dL increase in high-density lipoprotein cholesterol (HDL-C) levels. In summary, insufficient nighttime sleep and high social jet lag were identified as risk factors for dyslipidemia, while being a late chronotype and having a longer interval between the last meal and sleep onset were deemed protective factors against dyslipidemia.

Chronic circadian disruption, such as occurs during rotating shift work, and insufficient sleep are each independently associated with poor health outcomes, including obesity and glucose intolerance. This is the thesis of authors McHill et al., (2022), in a 32-day in-laboratory study, examined seventeen healthy young adults to evenly distribute sleep, wakefulness, and energy intake throughout all phases of the circadian cycle. Our carefully controlled conditions allowed us to measure subjective hunger, appetite, and food preference, indicating that other factors may contribute to the negative health effects associated with shift work. Table 1 contains comprehensive overviews of the studies used, including their research objectives, methodologies, and results.

Table 1: Overview of studies.

Author(s) and year	Aim of research	Methodology	Results
Cunha et al., 2020	This study aimed to compare the acute effect of a high-protein/moderate carbohydrate versus low-protein/high-carbohydrate meal served at night on the postprandial metabolic response of male night workers.	controlled, randomized, crossover clinical trial	A night meal with a higher percentage of protein and a lower percentage of carbohydrates led to minor postprandial glucose levels during the night shift but exerted no effect on the metabolic response of the following meal.
Saulle et al., 2018	The aim was to conduct a systematic review of the literature and to assess the relationship between night shift and overweight and obesity among health professionals.	systematic review of the literature	The meta-analysis did not produce significant results on the prevalence of obesity in the population of nurses
McHill et al., 2022	To uncover the impact of hunger, dietary preferences, and physiological appetitive hormones, studied healthy individuals	randomized, crossover clinical trial	The findings of the study are decreases in most measured outcomes of subjective hunger, appetite, and food preference in our highly controlled conditions likely suggest that other mechanisms promote the observed adverse health consequences of shift work.
Garrido et al., 2021	This study aimed to evaluate the relationship between proxy for circadian disruption, eating habits, sleep characteristics, and dyslipidemic parameters.	randomized, double-blind, crossover-controlled clinical trial	The short duration of nighttime sleep and high social jetlag are risk factors for dyslipidemia, whereas the late type and the longer time interval between the last meal and sleep onset appear to be protective factors for dyslipidemia.
Sooriyaarachchi et al., 2023	This study focuses on the qualitative aspects of this intervention, aiming to explore the experiences and perceptions of shift workers who participated in the trial.	randomized controlled clinical trial with qualitative interviews	Participants experienced weight loss by replacing their dinner with the MR. This study offers valuable insights for tailoring future workplace-based dietary interventions for this vulnerable population.

Author(s) and year	Aim of research	Methodology	Results
Suyoto et al., 2023	This study evaluated the effect of fasting compared with the consumption of meals with different combinations of glycemic index and frequency (1 or 3 times) during the night shift on continuous glucose monitoring metrics	randomized cross-over trial	High meal GI but not higher meal frequency during the night shift increased in female night shift workers. Results for 1 low-GI meal during the night shift were not different from a glucose profile after no meal.
Qian et al., 2022	Shift workers often experience a misalignment between the central circadian clock and daily environmental/behavioral cycles, and circadian misalignment can negatively affect mood and emotional well-being in non-shift workers and shift workers	parallel-design randomized clinical trial	These findings offer a proof-of-concept demonstration of an evidence-based meal timing intervention that may prevent mood vulnerability in shift work settings.
Gupta et al., 2020	This study investigated the relationship between food intake during the night shift and simulated driving performance post-shift.	Laboratory study and underwent four simulated night shifts.	Driver safety during the simulated commute home is greater following the night shift if a snack, rather than a meal, is consumed during the shift.
Clark et al., 2023	This review investigates how rotating shift work schedules affect dietary energy intake and dietary patterns compared with regular day and fixed shift schedules. In addition, intraperson energy intake and dietary pattern comparisons within rotating shift schedules were investigated.	Systematic Review and Meta-Analysis	This review highlights that dietary intake in rotational shift workers is potentially higher in calories and features different eating patterns as a consequence of rotating shift work schedules.

Working irregular hours, such as in-shift work, presents distinct challenges for maintaining a healthy lifestyle due to disruptions in eating and sleeping patterns. Studies have shown that shift workers face an increased risk of dietary imbalances and health issues, including obesity. Even with similar daily energy intake as those who work regular hours, shift workers are 23% more likely to become obese. Being overweight or obese is associated with various chronic conditions and metabolic complications. (Sooriyaarachchi et al., 2023).

Shift work may have a significant impact on the health of the worker and has been connected to unhealthy lifestyles. Saulle et al., (2018) are authors that suggest more high-quality studies with a larger number of participants should be conducted to determine if there is a real link between exposure to night shifts and weight gain or obesity.

Discussion

Shift work presents a great challenge in ensuring regular and healthy eating. During the nighttime shift, the use of caffeine and snacks is more frequent, and it is very difficult for the human body to adapt to such a rhythm of work. Shift work is an important risk factor for obesity, sleep disorders, high blood pressure, and cardiovascular diseases. The longer the shift work lasts, the greater the risks. Inadequate nutrition (improper eating habits, excessive consumption of sugar, frequent unhealthy snacks), lack of sleep, low physical activity, negative emotions, and increased stress pose greater health risks. The related body weight increases the risk of various cardiovascular diseases, diabetes, diseases of the musculoskeletal system, and cancer. Obesity is associated with various functional limitations: limited mobility and flexibility, low endurance, and a greater number of acquired injuries when performing strenuous tasks. All these negative health factors are interconnected and intertwined and cause problems for shift workers in all areas of life (Drenovec and Vošner, 2023). Research suggests that consuming low-glycemic index meals, regardless of frequency, may be a beneficial option for managing glucose levels during night shifts, potentially supporting improved glucose regulation (Suyoto et al., 2023). Studies have shown that getting an insufficient amount of nighttime sleep and experiencing high social jet lag can increase the risk of dyslipidemia. On the other hand, being a “night owl” and having a longer time gap between the last meal and bedtime seem to have protective effects against dyslipidemia (Garrido et al., 2021). We have drawn the following conclusions from our review of the articles. In certain professions, night shifts are an unavoidable reality. Working at night can lead to an increased risk of numerous health issues, including obesity and diabetes. Night workers often experience difficulties with insomnia, reduced concentration and cognitive abilities, digestive problems, and challenges in managing their personal lives due to differing work and rest schedules from their loved ones. The dietary habits of shift workers typically involve excessive fat consumption and insufficient fiber, fruits, and vegetables. In addition to sleep, physical activity, and mental well-being, maintaining a balanced diet is crucial for a healthy lifestyle (Kranjc, 2022). Hence, it is crucial to give careful consideration to the arrangement of shift schedules, ensuring that the physiological, psychological, and social needs of employees are duly acknowledged. Further research is required to formulate strategies tailored to the needs of shift workers, as well-designed measures can mitigate the adverse impacts of shift work (Lavrič and Štukovnik, 2021). According to the research, driver safety during the simulated commute home is improved following the night shift when a snack, rather than a meal, is consumed during the shift (Gupta et al., 2020). The findings offer a proof-of-concept demonstration of an evidence-based meal timing intervention that may prevent mood vulnerability in shift work settings. Future studies are required to establish if changes in meal timing can prevent mood vulnerability in night workers (Quian et al., 2022).

Conclusion

Shift work entails following a schedule that divides the day into equal parts or multiple shifts, which can be either fixed or variable. All types of shift work disrupt the body's natural circadian rhythm, leading to health issues, particularly sleep disturbances. Furthermore, shift work often results in lifestyle changes, such as irregular schedules, increased alcohol consumption, smoking, reduced physical activity, and an unhealthy diet. Research suggests that it also adversely affects mental health. However, with support from employers and access to appropriate services, workers can address these challenges and make positive changes in their lives. Further research is needed to develop effective strategies tailored to the specific needs of shift workers, as these measures could help alleviate the negative impact of shift work.

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