



Nutritional behavior in shift work in health and social services

Challenges, risks and solutions

Elina Hemling, Sandra Pahr-Hosbach

Abstract

The rotation between morning, evening and night shifts leads to a disruption of the circadian rhythm, which is associated with health risks for shift workers. Health-promoting eating habits among shift workers can have a preventive effect on the development of diet-related diseases.

In semi-structured interviews, seven female shift workers in the health and social care system were asked about their nutritional and health behavior. The results show that working in rotating shifts can lead to an irregular meal structure and unhealthy snacking behavior. Based on the results, recommendations were developed for health-promoting operational management and for shift-specific dietary recommendation.

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Introduction

In 2019, 16% of German employees worked in shifts [1]. Due to demographic change, the number of shift workers is expected to increase, especially in the healthcare sector [2]. A long-term disruption of the circadian rhythm is known as chronodisruption, which is associated with health risks [3]. Therefore, shift workers have an increased risk of diseases such as obesity, type 2 diabetes mellitus and metabolic syndrome [4, 5]. Dietary behavior is considered to be an important factor, especially for the development of diet-related diseases. However, changes in working hours make it a major challenge to ensure a regular and healthy diet. ♦ Figure 1 shows the multidimensional effects of shift work.

Although the potential of health-promoting dietary behavior in shift work has been known for decades, there have been only a few studies in the health and social care system. The aim of the

study is to identify problem fields and necessary interventions based on the data collected. Moreover, recommendations for health-promoting management and for shift-specific dietary recommendations should be developed.

Methods

Due to the limited data available, qualitative methods were used in an empirical study in order to achieve the research objectives. New perspectives were created and the subjective behavior of shift workers was determined [6]. Between January and February 2023, seven semi-structured guided interviews were conducted in personal interviews. All interviewees had been working in the healthcare or social services system on a shift work basis for at least one year. Contact with the interviewees was established in the interviewer's private and professional environment. Consequently, there was already a basis of trust between the interviewees and the interviewer.

An interview guideline provided an orientation for the interview process. The interview structure could be adapted depending on the situation [6]. The main focus was on the shift work model, dietary and health behavior and previous education on the topic of "nutrition in shift work". In addition, an anamnesis questionnaire was used, which contained questions about the person, profession and consumer behavior.

Before the interview, all interviewees were informed about the research aim, the audio recording during the interview and data protection. All interviewees gave their written consent to participate.

The collected data was processed by transcription according to the rules of Dresing and Pehl (2012) [7]. Besides the simple rules, extended rules such as the use of filler words or pauses were also taken into account. These rules

made it possible to improve understanding of the interview situation and to record emotions [7].

After transcription, five main categories were formed based on the interview guide. These were the categories "Information on profession", "Eating and drinking habits", "Health behavior and condition" and "Education". The transcribed data was assigned to the individual categories and were coded with the "f4analyse" software.

Results

Baseline data and lifestyle factors

In this study, seven female shift workers in health and social care were interviewed (♦ Table 1). Three of the respondents were of normal weight, one was overweight, one was grade 1 obese and one was grade 2 obese [8]. Four of the respondents reported a weight increase of up to 25 kg since starting their shift work.

Information on profession

Six interviewees were working shifts at the time of the interview (♦ Table 2). Five interviewees worked in stationary care, one interviewee in ambulatory care and one interviewee in the social sector.

Meal plan

The interviewees stated that they eat two to three main meals and several snacks a day. Irregular meals were mentioned due to shift work. Five respondents regularly ate fruit and vegetables as well as high-fiber foods. On the other hand, two interviewees reported regularly consuming convenience foods.

Morning shift

Only two interviewees ate a small breakfast before the morning shift. The usual breakfast foods listed were porridge, muesli, yoghurt, bread with spread and fruit. Two participants eat a snack after the morning shift and a warm meal in the evening, five participants eat a warm meal in the afternoon and a small meal in the evening.

Evening shift

Six interviewees eat breakfast in the morning or shortly before starting work. Five participants eat their second main meal during working hours. The meals taken along are

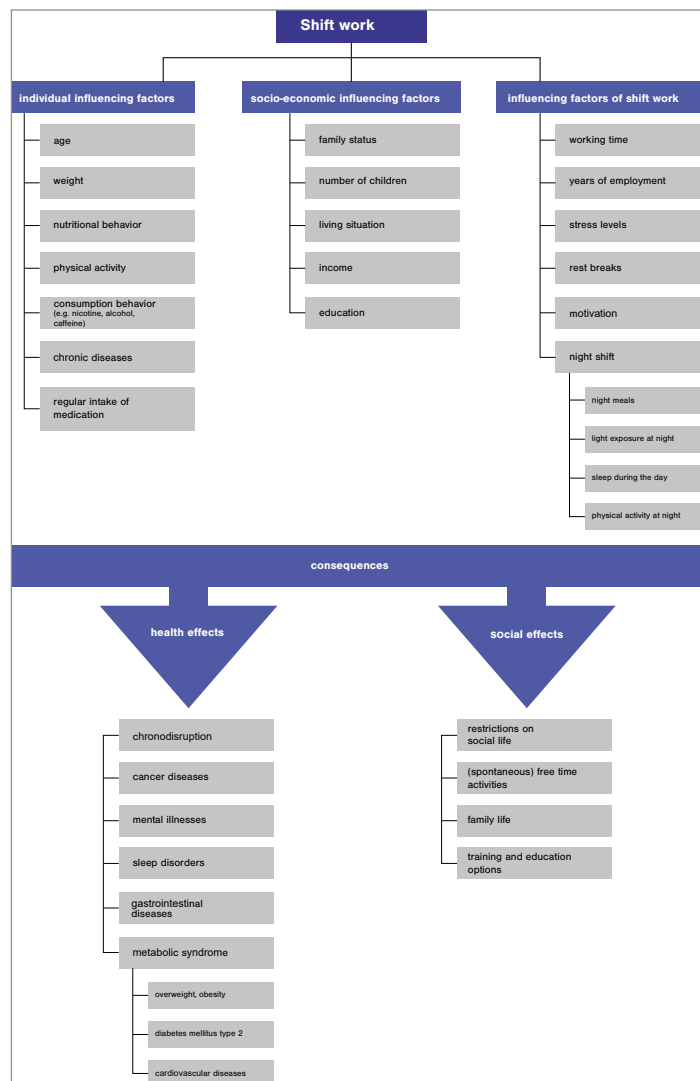


Fig. 1: Influencing factors and effects of shift work (own presentation based on [4, 5, 11, 16, 18, 19, 22, 23])

sandwiches, wraps, salad, vegetables, fruit, warm meals or convenience products. "[...] So cooking something for the evening shift before the evening shift is definitely much easier for me than getting up after the morning shift and then actually picking up the cooking spoon. Then it's more likely to eat the convenience products quickly. [...]" (B2, para. 102). Only one interviewee admitted to eating a warm meal after the evening shift.

Interviewee	Gender	Age	BMI (kg/m ²)	Chronic disease	Physical activity/week
B1	w	28	20	-	2x
B2	w	27	32.2	-	1x
B3	w	50	23	-	-
B4	w	35	-	endometriosis	4x
B5	w	61	23.1	arthrosis	3x
B6	w	24	37.6	-	-
B7	w	24	27.5	-	3x

Tab. 1: Basic data and lifestyle factors



Interviewee	Job title	Years of employment in shift work	Shifts currently being worked
B1	Specialist health and pediatric nurse for intensive care and anesthesia care	9	morning shift evening shift night shift
B2	Health and pediatric nurse	10	morning shift intermediate shift evening shift
B3	Nursing assistant	1.5	morning shift evening shift partial shift
B4	Educator, coach	10	-
B5	Pediatric nurse	42	morning shift evening shift
B6	Health and nursing assistant	4	morning shift evening shift night shift
B7	Health and pediatric nurse (B.Sc.)	6.5	morning shift evening shift night shift

Tab. 2: Information on profession

Night shift

During the night shifts, a change in eating habits was reported. Two interviewees mentioned that they eat an additional meal during the first night shift. One interviewee explained that she eats less warm food during night shifts: "[...] Well, when I normally eat warm food in the evening, um, somehow I don't feel like it yet. Then I eat something else and at night that would probably be too much for my stomach. That's why something lighter, salad or bread, [...] is always more pleasant." (B1, para. 56).

Salad, bread, fruit, yogurt or raw vegetables were mentioned as meals in the evening. It was also reported that meals were ordered together, e. g. pizza, as well as food that was brought in by colleagues: "[...] Often someone brings something for everyone – that we eat a salad together or someone bakes bread and, well, we always try to prepare something tasty together [...]. It's always very pleasant to eat something together." (B1, para.52).

Snacking behavior at the workplace

All respondents referred to the regular consumption of snacks during working hours. Examples of snacks listed included chocolate, cakes and sweets. The increased snacking behavior was explained by an intensified stress level and limited time: "[...] Or there was no time to eat because of the stress. Or you somehow quickly grabbed a piece of chocolate when you were stressed, but couldn't take the time to actually eat something [...]" (B4, para. 26). The frequent availability of unhealthy snacks was also reported: "[...] we very often get a packet of 'Merci' or cake from patients who were discharged [...]. So we almost always have sweets on the station. [...]" (B6, para. 92). In addition, snacks are sometimes consumed as a reward: "[...] Or, if you just have a second, you can reward yourself with something sweet." (B7, para. 54).

Break organization at the workplace

All respondents bring their own food to the workplace. Five interviewees reported that the planned break during working hours is regularly not possible due to a limited amount of time. One interviewee from the ambulatory care service reported that she does not have a planned break due to the shorter working hours. There were also reports of frequent interruptions and time pressure during the break: "[...] And sometimes I have the feeling that you are so stressed yourself that you just take advantage of the moment when you have time. [...] And you shovel everything into yourself. And you're actually full after one bread roll or one and a half bread rolls." (B2, para. 118).

Education about a shift-specific diet

All respondents mentioned that specific topics on dietary behavior in shift work are neither included in education nor in training. Six interviewees are interested in nutrition education: "[...] for me, this is also part of employee welfare." (B4, para. 108). The interviewees would prefer a flyer with shift-specific nutritional recommendations, group presentations and individual consultations on specific implementation proposals.



Discussion

Eating behavior

Meal rhythm

The majority of respondents showed an irregular meal rhythm during the working days. Other studies also show variable meal times and a redistribution of meals among shift workers [9, 10]. As in the study by Nea et al. (2018), regular skipping of meals in favor of snacks was found [11]. Among the respondents, skipping breakfast before the morning shift was especially noticeable. Furthermore, insufficient breaks during working hours often led to increased snacking with a high sugar level among the respondents.

Eating habits

Data is indicating that there is a relationship between cooking habits and food choices. Regular cooking habits were associated by respondents with healthy food choices. In contrast, irregular cooking habits were related to the frequent consumption of unhealthy convenience foods. In contrast to the present study, two other studies found a lower consumption of fruit, vegetables and whole grain products and a higher consumption of fast food among the majority of shift workers [9, 12]. The discrepancy between the results may be due to the small number of participants and the absence of a dietary survey method in this study.

Moreover, shift workers often consumed less warm food in favor of fast, cold meals, which is mainly due to time constraints. In another study, the time factor, comfort and long working hours are mentioned as influencing factors for the food choices of shift workers [11].

Eating habits during the night shift

In particular, night shift work was associated with a change in eating behavior. Similar to another study, increased food intake was observed during the night shift due to the larger time slot in the waking phase [13].

In addition, a change in appetite and hunger was noted during the night shift, with a preference for cold and lightly digested meals. The results are consistent with the data from the study by Shaw et al. (2019), in which a preference for snacks or foods with a lower energy content was noticed during the night shift [12]. However, this was explained by the physiological decrease in hunger and appetite as well as the reduction of gastrointestinal symptoms. The reduced availability of warm meals is also suspected to be a further reason [12].

Social influencing factors

Bringing food among colleagues is considered a ritual to make the night shift more pleasant. Light meals are consumed, but also high-fat meals. The data from the study by Bonnell et al. (2017) shows that bringing food in the team can have both positive and negative effects on food quality [14].

Break times and snacking behavior

As in other studies, a connection between increased stress levels and higher consumption of high-energy, sugary snacks was noted by respondents [15]. Regular interruptions and time pres-

sure due to insufficient breaks often led to an increased rate and quantity of food intake. Furthermore, snack consumption was noted as a reward. Similar results were found in another study in which increased food intake was observed as a coping strategy for negative moods for example [15]. As in other studies, an extended supply of unhealthy snacks at the workplace was also recorded, which encourages snacking behavior [11, 14].

Health behavior

Overall, the available studies show that shift work is associated with a higher risk of overweight or obesity [16–18]. In the present study, weight increases since shift work were reported due to irregular meal times, consumption of sugary snacks and convenience foods and less physical activity. The review by Ahluwalia (2022) also associates frequent weight gain in shift workers with irregular meal times [19]. In addition, night-time meals are thought to be associated with an increased risk of weight gain [18].

Limitations

Due to the limitation to only female respondents and the small sample, the study is not representative.

This study is restricted in the interpretation of results due to the use of the qualitative research method. The results may be biased by possible data discrepancies on a different occasion and the exclusive consideration of retrospective data.

In the course of data collection, the general conditions, shift work models and working hours of employees in the stationary and ambulatory care sector as well as in the social services sector differed. Consequently, the heterogeneous group of shift workers in the healthcare and social services sector represents a limitation.

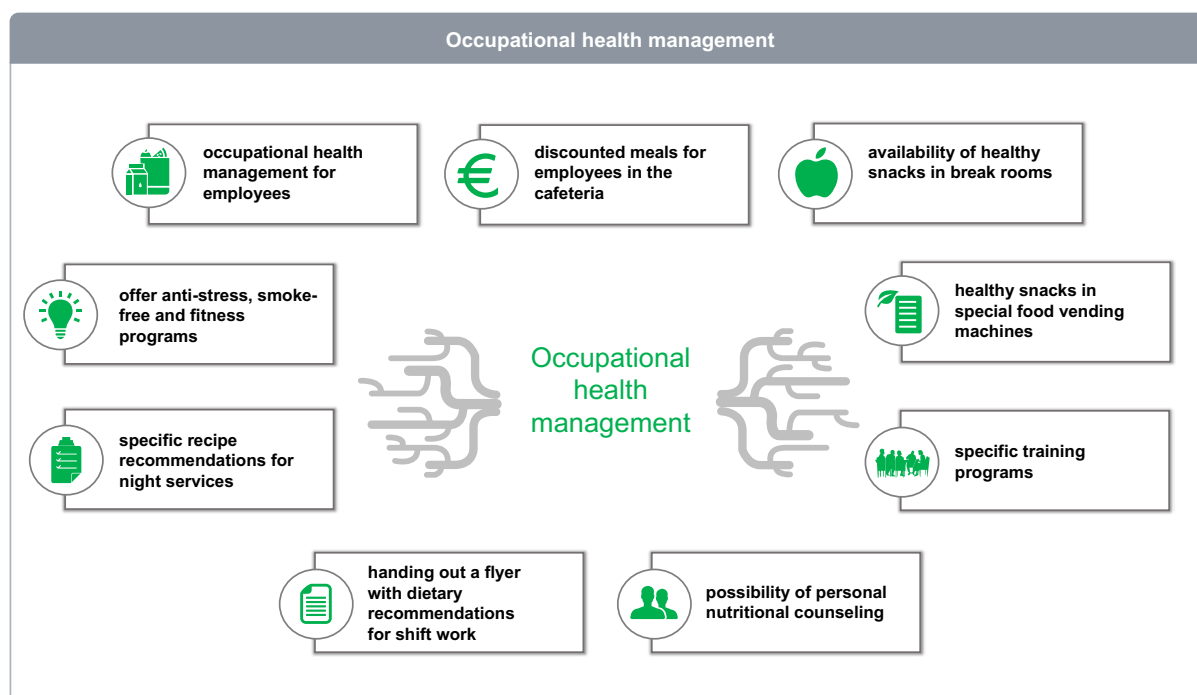


Fig. 2: Recommendations for action for occupational health management (own presentation based on [9, 22, 23])

Recommendations

The following recommendations are based on the results of this study and quantitative data from subject-specific literature.

A healthy lifestyle for shift workers can be promoted by adapting the general conditions of occupational health management. According to the interviewees, meal preparation is a major challenge. A workplace meal service can provide employees with a healthy meal.

Furthermore, the stress-related consumption of sugary snacks could be reduced by providing healthy snacks in the break rooms. In addition, high-fiber snacks provide a quick energy boost and a prolonged feeling of satiety during insufficient breaks [8, 20]. The interviewees expressed a preference for specific educational opportunities on shift-specific dietary recommendations. Such educational opportunities could provide a positive impulse for health-promoting dietary behavior. Possible steps to improve the nutritional situation of shift workers are shown at ♦ Figure 2.

♦ Figure 3 shows shift-specific dietary recommendations. To prevent chronodisruption, similar meal times are recommended independent of the shift [10]. As glucose tolerance and insulin sensitivity are reduced in the late evening and at night, foods with a high glycemic index should be avoided at these times. High-fiber foods that lead to a slow rise in blood sugar are recommended [8, 20]. Night-time meals often lead to gastrointestinal complaints due to impaired digestive functions. Low-fat, light, digestible foods are advised [19, 22]. A warm meal at midnight should prevent lower body temperature and improve physical activity [16]. Drinks containing caffeine should be avoided at least four hours before going to bed to prevent problems with sleep disorders [21].

Conclusion and perspective

This research study provides detailed knowledge about the dietary and health behavior of the female shift workers interviewed in the health and social services sector.

Maintaining a regular meal rhythm proved to be the main challenge for dietary behavior during night and shift work. In addition, factors such as time constraints, exhaustion and the availability of unhealthy snacks were also identified as causes for an unfavorable choice of food. Insufficient breaks during working hours and increased stress levels were associated with increased consumption of sugary snacks. Night-time meals in particular were mentioned as a trigger for gastrointestinal complaints.

To collect more precise information on nutritional behavior during shift work, nutritional surveys such as food diaries are a possible method for future studies. It is necessary to carry out studies for specific shift work models as well as for individual occupational groups. In particular, specific dietary recommendations for night shifts represent a significant research need due to the numerous health risks.

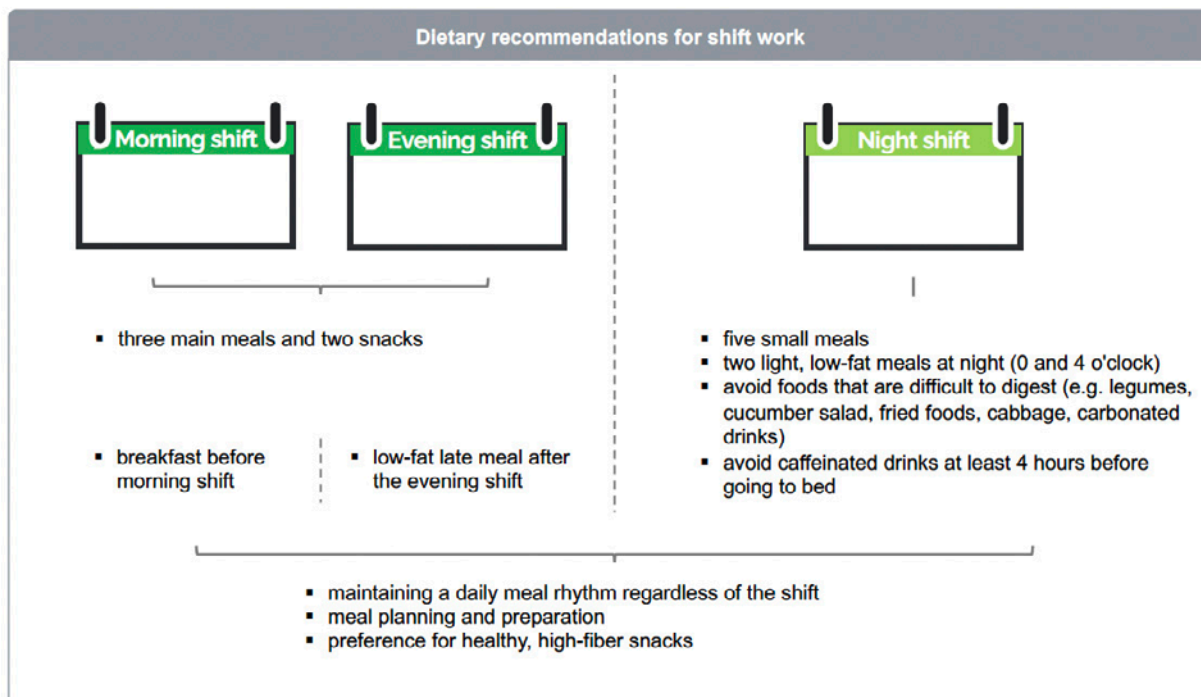


Fig. 3: Dietary recommendations for shift work (own presentation based on [10, 20, 21, 22])

Disclosures on Conflicts of Interest and the use of AI

The authors declare no conflict of interest. No AI applications were used in the preparation of the manuscript.

References

1. Radtke R: Anteil der Erwerbstätigen in Deutschland, die Schichtarbeit leisten, bis 2021. Statista 2023. <https://de.statista.com/> (last accessed on 25 November 2023).
2. Bundesministerium für Gesundheit (BMG): Arbeitsbedingungen in der Akut- und Langzeitpflege. Ressortforschung im Handlungsfeld „Demografie und Pflege“. 2021. www.bundesgesundheitsministerium.de/ministerium/ressortforschung-1/handlungsfelder/demografischer-wandel/arbeitsbedingungen.html (last accessed on 25 November 2023).
3. Haus E, Smolensky M: Biological clocks and shift work: circadian dysregulation and potential long-term effects. *Cancer Causes Control* 2006; 17 (4): 489–500.
4. Cagampang FR, Bruce KD: Horizons in nutritional science. The role of the circadian clock system in nutrition and metabolism. *Br J Nutr* 2012; 108 (3): 381–92.
5. Laermans J, Depoortere I: Chronobesity: Role of the circadian system in the obesity epidemic. *Obes Rev* 2015; 17(2): 108–25.
6. Misoch S: *Qualitative Interviews*. 2nd ed., Berlin: Walter de Gruyter 2019.
7. Dresing T, Pehl T: *Praxisbuch Interview & Transkription. Regelsysteme und Anleitungen für qualitative ForscherInnen*. 4th ed., Marburg: Eigenverlag 2012.
8. Biesalski HK, Bischoff SC, Pirlich M, Weimann A: *Ernährungsmedizin*. 5th ed., Stuttgart: Thieme 2018.
9. Meßmer J, Nössler C, Carlssohn A: Ernährungsverhalten von Gesundheit- und Krankenpflegern im Nachtdienst. *Prävention und Gesundheitsförderung* 2018; 13(3): 233–66.
10. Pereira Marot L, Tibiletti Balieiro LC, do Vale Cardoso Lopes T, et al.: Meal timing variability of rotating shift workers throughout a complete shift cycle and its effect on daily energy and macronutrient intake: a field study. *Eur J Nutr* 2023; 62(4): 1707–18.
11. Nea FM, Pourshahidi LK, Kearney JM, Livingstone MBE, Bassul C, Corish CA: A qualitative exploration of the shift work experience: the perceived effect on eating habits, lifestyle behaviours and psychosocial wellbeing. *J Public Health (Oxf)* 2018; 40(4): e482–92.
12. Shaw E, Dorrian J, Coates AM, et al.: Temporal pattern of eating in night shift workers'. *Chronobiol Int* 2019; 36(12): 1613–25.
13. Teixeira BS, Silva CM, Silva ATF, et al.: Influence of fasting during the night shift on next day eating behavior, hunger, and glucose and insulin levels: a randomized, three condition, cross-over trial. *Eur J Nutr* 2022; 62(3): 1281–93.
14. Bonnell EK, Huggins CE, Huggins CT, McCaffrey TA, Palermo C, Bonham MP: Influences on Dietary choices during day versus night shift in shift workers: a mixed methods study. *Nutrients* 2017; 9 (3): 193.
15. Heath G, Dorrian J, Coates A: Associations between shift type, sleep, mood, and diet in a group of shift working nurses. *Scand J Work Environ Health* 2019; 45(4): 402–12.
16. Karlsson B, Knuttson A, Lindahl B: Is there an association between shift work and having a metabolic syndrome? Results from a population based study of 27 485 people. *Occup Environ Med* 2001; 58 (7): 747–52.
17. Vidafar P, Cain SW, Shechter A: Relationship between Sleep and hedonic appetite in shift workers. *Nutrients* 2020; 12(9): 2835.
18. McHill AW, Melanson EL, Higgins J, et al.: Impact of circadian misalignment on energy metabolism during simulated nightshift work. *Proc Natl Acad Sci USA* 2014; 111(48): 17302–07.
19. Ahluwalia MK: Chrononutrition - when we eat is of the essence in tackling obesity. *Nutrients* 2022; 14(23): 5080.
20. Lowden A, Moreno C, Holmbäck U, et al.: Eating and shift work - effects on habits, metabolism, and performance. *Scand J Work Environ Health* 2010; 36(2): 150–62.



21. Deutsche Gesellschaft für Ernährung e.V. (DGE): Essen, wenn andere schlafen. Praktische Ernährungsempfehlungen bei Nacht- und Schichtarbeit. www.dge-medien-service.de (last accessed on 25 November 2023).
22. Petschelt J, Behr-Völtzer C, Rademacher C: Was essen, wenn andere schlafen? Gesundheits- und Ernährungssituation bei Schichtarbeit. *Ernährung* 2007; 1(10): 454–61.
23. Paridon H, Ernst S, Harth V, Nickel P, Nold A, Pallapies D: Schichtarbeit – Rechtslage, gesundheitliche Risiken und Präventionsmöglichkeiten. Deutsche Gesetzliche Unfallversicherung (DGUV) 2012. <https://publikationen.dguv.de/widgets/pdf/download/article/2554> (last accessed on 25 November 2023).

