

Does the shift work of nurses influence their eating behaviors?*

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ABSTRACT

Introduction: Shift work is one of the key elements influencing the nutritional behaviors of health care workers. Nursing staff are particularly vulnerable to the destructive effects of poor nutrition. The aim of the study was to compare nutritional behaviors among nursing staff working different shift patterns.

Materials: The research was conducted among 177 nurses. The study group consisted of 70 people working in a 1-shift system and 107 people working in a 2-shift system (day and night work). The average age of the surveyed people was 40 years. The study used the Questionnaire of Eating Behavior (QEB) as a basis to study eating behavior and opinions about food and nutrition. The Mann–Whitney U test was used to determine the correlation between the indices of meal frequency in both groups. The results were recorded in Statistica 13 software. Statistical significance was assumed at $p < 0.05$.

Results: The results obtained in the study indicate a more frequent occurrence of unhealthy nutritional practices among nursing staff working in a 2-shift system, compared to those working in a 1-shift system. Incorrect eating habits primarily include a lack of variety in the foods consumed and irregular mealtimes which are associated with snacking between meals during the day. The Mann–Whitney U test did not show statistical significance between the indices of meal frequency in the examined groups.

Conclusions: There were no significant differences between the diets of nurses working in the 2-shift system and the 1-shift system. For both study groups, the intensity of eating characteristics regarding a healthy and unhealthy diet was low.

Keywords: nutritional behavior; nursing shift work; metabolic diseases; eating habits.

INTRODUCTION

Nutritional behaviors are attitudes and behaviors that are directly related to the satisfaction of nutritional needs [1]. Satisfying nutritional needs is a complex process consisting of a number of factors related to food selection, acquisition, storage, preparation and consumption.

It is well known that one's employment has an impact on eating behaviors. Long working hours and shift work can lead to poor eating habits and a number of metabolic diseases such as obesity, metabolic syndrome, gastrointestinal complaints, glycemic disorders and more [1, 2, 3, 4]. Many studies document the relationship between shift work and metabolic health. In addition to the quality of diet and irregular consumption of meals, the metabolism of people working in shifts may be affected by quantity of sleep and a disturbed circadian rhythm, a lack of physical activity, a lack of or insufficient amount of rest and psychosocial stress [2]. A disturbed circadian rhythm can be a central mechanism influencing changes in eating behaviors. This daily rhythm maintains human physiology and is controlled by the circadian clock [5]. The superior biological clock responsible

for the coordination of signals arriving from the external and internal environment are hypothalamic supramuscular nuclei. The biological clock coordinates cellular and physiological processes, synchronizing them with the circadian rhythm. Desynchronization of the biological (central) clock with the circadian rhythm of food intake and diet composition (peripheral clock) can lead to the development of metabolic disorders [6, 7]. The circadian clock regulates hunger and appetite in healthy people, regardless of the fasting and feeding rhythm, as well as the rhythm of sleep and wakefulness. However, people working in shifts have not been tested in this regard [8]. In laboratory tests, it was found that the greatest feeling of hunger occurred in the evening. This can cause an increased tendency toward obesity in people working shifts as they sleep for a shorter amount of time during this period [8]. In addition, it has been shown that a diet high in fat and sugar can change the function of the circadian clock and can lead to metabolic disorders and diabetes [7]. People working at night are more likely to reach for sweet snacks and fast food [9, 10].

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Shift work is the main form of employment in the health-care system. Most nurses employed in outpatient clinics work in a 12-hour or 8-hour 1-shift system. Working hours are different among nursing staff working in hospitals, where shift work of day and night shifts dominate. The health behaviors of nurses are the subject of many studies which show that, although nurses have knowledge about health behaviors, they do not always follow recommendations [10]. Shift work and stress contribute to sleep disorders, job dissatisfaction and health consequences [11].

The aim of the study was to compare nutritional behavior among nursing staff working in different shifts. An additional goal was to assess the frequency of the consumption of selected foods and drinks depending on shift patterns.

MATERIALS

The research was conducted among 177 nurses. The study group consisted of 70 people working in a 1-shift system and 107 people working in a shift system (day and night shift). The average age of the participants was 40 years. The study used the Questionnaire of Eating Behavior (QEB) as a basis to study eating behaviors and opinions on food and nutrition. Questionnaire of Eating Behavior was developed by the Group of Behavioral Nutrition Conditions of the Committee on Human Nutrition Sciences of the Polish Academy of Sciences. The questionnaire used for this study was a modified version of QEB with the acronym KomPAN. The questionnaire allowed, among other things, the assessment of the frequency of consumption of food products and drinks. In order to facilitate the preparation and interpretation of the results, recommended indicators for individual categories of consumption frequency, expressed as times/day, were used. Six categories were used with the following daily frequency indicators, given in brackets: never (0), 1–3 times a month (0.06), once a week (0.14), several times a week (0.5), once a day (1) and several times a day (2). The obtained parameters were recorded in a single database and developed statistically. To assess variables, arithmetic mean (\bar{x}) and standard deviation (SD) were used, among others. The Mann–Whitney U test was used to determine the correlation between the indices of individual consumption frequency in both groups. The results were recorded in Statistica 13 software. Statistical significance was assumed at $p < 0.05$.

RESULTS

Table 1 shows the dietary habits of nurses in the last year. People working in shifts in most cases do not eat meals at fixed times of the day (67.3%), and 54.2% of them eat 4 meals per day. Over 40% of the respondents claim that they eat between meals several times a day. Employees working in a single shift system usually eat 4 meals per day (42.9%) and most of those surveyed eat between meals several times a week (44.3%).

TABLE 1. Eating habits in the last year

	I shift employees	II shift employees	Total	p
	n (%)	n (%)	n (%)	
Number of meals consumed during the day				
1 meal	–	–	–	
2 meals	2 (2.9)	2 (1.9)	4 (2.3)	
3 meals	20 (28.6)	31 (29.0)	51 (28.8)	0.99
4 meals	30 (42.9)	58 (54.2)	88 (49.7)	
5+ meals	18 (25.7)	16 (15.0)	34 (19.2)	
Regularity of meals				
Irregular	29 (41.4)	72 (67.3)	101 (57.1)	
Sometimes regular	31 (44.3)	30 (28.0)	61 (34.5)	1.00
Regular	10 (14.3)	5 (4.7)	15 (8.5)	
Frequency of snacking between meals				
Never	3 (4.3)	7 (6.5)	10 (5.6)	
1–3 times a month	3 (4.3)	4 (3.7)	7 (4.0)	
Once a week	3 (4.3)	5 (4.7)	8 (4.5)	1.00
Several times a week	31 (44.3)	28 (26.2)	59 (33.3)	
Once a day	13 (18.6)	20 (18.7)	33 (18.6)	
Several times a day	17 (24.3)	43 (40.2)	60 (33.9)	

I shift employees – employees working in a 1-shift system; II shift employees – employees working in a 2-shift system

There was no statistically significant difference between nursing staff working in a 1-shift or 2-shift system.

Another aspect analyzed was the type of food consumed between main meals on weekdays. Employees working in a 1-shift system most often consume fruit (64.3%), followed by sweet snacks (48.6%), followed by nuts, almonds and seeds (34.3%). In the case of people working in a 2-shift system, fruit was also the most frequently chosen item (62.6%), followed by sweet snacks (56.1%), and then by salty snacks (29.9%). There was no statistically significant difference between nursing staff working in a 1-shift or 2-shift system ($p = 0.99$) – Table 2.

As shown in Table 3, the food group with the most frequent daily intake was found to be fruit and vegetables in both groups. Respondents declared the lowest frequency of consumption of powdered soups, energy drinks, juices and canned fruit and vegetables. Statistical analysis of the obtained results showed that the shift pattern does not affect the frequency of consumption of these foods. Employees working in a 1-shift system

TABLE 2. Foods usually eaten between meals on weekdays

What kind of food do you usually eat between meals on weekdays?	I shift employees	II shift employees	Total
	n (%)	n (%)	n (%)
Fruit	45 (64.3)	67 (62.6)	112 (63.3)
Vegetables	15 (21.4)	16 (15.0)	31 (17.5)
Unsweetened milk drinks and desserts, e.g. yogurt, cottage cheese, milk	18 (25.7)	22 (20.6)	40 (22.6)
Sweetened drinks and milk desserts, e.g. homogenised cheese, sweetened milk drinks, flavored milk	14 (20.0)	19 (17.8)	33 (18.6)
Sweet snacks, e.g. candies, cookies, cakes, chocolate bars, muesli bars, wafers	34 (48.6)	60 (56.1)	94 (53.1)
Salty snacks, e.g. crackers, sticks, chips, fries	19 (27.1)	32 (29.9)	51 (28.8)
Nuts, almonds, seeds	24 (34.3)	27 (25.2)	51 (28.8)

I shift employees – employees working in a 1-shift system; II shift employees – employees working in a 2-shift system

consumed fruit and vegetables, milk, sweets and wholemeal bread most often. In the case of the 2nd study group, fruit and vegetables were also listed first, followed by sweets, milk and wholemeal bread.

The Mann–Whitney U test did not show statistical significance between the indices of individual categories of meal frequency in the groups studied (Tab. 3).

Interpretation of these indices is intuitive – the higher the value of the index, the greater the intensity of beneficial or unfavorable effects to health. The idea of interpretation is the same for indices expressed as total multiplicity/day or in points. The suggested way of interpreting the index is presented in the Table 4.

In the case of people working in a 1-shift system, the intensity of eating characteristics is usually low. Among the respondents mentioned, only 21 people showed a moderate intensity of eating characteristics in the criterion of healthy diet, and 8 people in the criterion of unhealthy diet. The nursing staff working in a 2-shift system were also mostly characterized by a low intensity of nutrition features in both criteria. Among the respondents, only 24 people showed moderate intensity of nutrition features in the criterion of healthy diet, and 11 people in the criterion of unhealthy diet (Tab. 5, 6).

There was no statistically significant difference between the intensity of nutrition features and the index of healthy and unhealthy diet. In the case of employees working in a 1-shift system, a higher index of unhealthy diet was demonstrated with a moderate intensity of nutrition features $p = 0.06$ (Tab. 7). These findings were close to statistical significance $p = 0.05$.

TABLE 3. Frequency of consumption of food products by employees of I and II shifts expressed by means of indices

Food products	I shift employees		II shift employees		Mann–Whitney U test
	x	SD	x	SD	
Fruit	1.09	0.71	0.99	0.66	$p = 0.53$
Vegetables	0.91	0.62	0.79	0.54	$p = 0.29$
Processed meat	0.25	0.29	0.29	0.30	$p = 0.35$
Fruit and vegetable juices	0.17	0.25	0.12	0.22	$p = 0.11$
Cheese	0.50	0.35	0.48	0.38	$p = 0.51$
Fermented milk drinks	0.53	0.33	0.53	0.39	$p = 0.71$
Potatoes	0.44	0.37	0.37	0.31	$p = 0.11$
Fried foods	0.43	0.29	0.37	0.25	$p = 0.09$
Milk	0.72	0.53	0.62	0.57	$p = 0.09$
Cottage cheese	0.48	0.32	0.45	0.34	$p = 0.40$
Wholemeal bread	0.58	0.45	0.58	0.56	$p = 0.49$
Fizzy drinks	0.51	0.46	0.40	0.29	$p = 0.24$
Powdered soups	0.03	0.07	0.05	0.10	$p = 0.26$
Alcoholic drinks	0.43	0.25	0.44	0.31	$p = 0.82$
Canned vegetables and fruit	0.18	0.29	0.19	0.22	$p = 0.23$
Processed fish and cooked fish	0.42	0.22	0.42	0.22	$p = 0.80$
Legumes and seeds	0.44	0.24	0.37	0.26	$p = 0.09$
Fast food	0.47	0.24	0.44	0.26	$p = 0.56$
Energy drinks	0.11	0.22	0.16	0.32	$p = 0.68$
Sweets	0.58	0.43	0.66	0.49	$p = 0.33$

I shift employees – employees working in a 1-shift system; II shift employees – employees working in a 2-shift system

TABLE 4. Suggested interpretation of the healthy diet index and unhealthy diet index for the KomPAN questionnaire

Intensity of nutrition features	Range (times/day)		Range (in points)	
	healthy diet index	unhealthy diet index	healthy diet index	unhealthy diet index
Low	0–6.66	0–9.33	0–33	0–33
Moderate	6.67–13.33	9.34–18.66	34–66	34–66
High	13.34–20	18.67–28	67–100	67–100

TABLE 5. The average value of the healthy diet index and unhealthy diet index in people working in a single-shift system

Intensity of nutrition features	Range (times/day)				Range (in points)			
	n	healthy diet index	n	unhealthy diet index	n	healthy diet index	n	unhealthy diet index
Low	49	5.02	62	6.06	49	25.10	62	21.64
Moderate	21	8.17	8	11.07	21	40.85	8	39.54
High	–	–	–	–	–	–	–	–

TABLE 6. The average value of the healthy diet index and unhealthy diet index in persons working in a two-shift system

Intensity of nutrition features	Range (times/day)				Range (in points)			
	n	healthy diet index	n	unhealthy diet index	n	healthy diet index	n	unhealthy diet index
Low	83	4.82	96	5.97	83	24.1	96	17.57
Moderate	24	8.14	11	10.09	24	40.7	11	36.04
High	–	–	–	–	–	–	–	–

TABLE 7. Assessment of the intensity of nutrition features based on the healthy diet index and unhealthy diet index depending on the shift system

Intensity of nutrition features	Range (times/day)					
	healthy diet index			unhealthy diet index		
	I shift employees	II shift employees	p	I shift employees	II shift employees	p
Low	5.02	4.82	0.275	6.06	5.97	0.77
Moderate	8.17	8.14	0.940	11.07	10.09	0.06

I shift employees – employees working in a 1-shift system; II shift employees – employees working in a 2-shift system

DISCUSSION

The nutritional behaviors of people working in shifts are often equated with unhealthy eating habits that can lead to the development of a number of metabolic diseases [9, 12, 13]. Despite a knowledge of the principles of healthy eating, most nurses eat irregularly, and their diet mainly consists of highly processed foods that are low in minerals. The justification for poor food choices is a lack of time resulting from an overload of professional duties and stress related to trying to improve unhealthy eating attitudes [14, 15, 16, 17].

In our study, nurses were asked to subjectively assess their diet using a standardized KomPAN nutritional behavior questionnaire. Incorrect eating habits include a lack of variety in foods consumed and irregular meals times which result in snacking between meals. According to dietary recommendations, the number of meals consumed per day should be between 4–5 [18]. Our analysis showed that, regardless of the nature of the shift pattern, most nurses eat 4 meals per day.

About 29% of nurses working in either shift system consume 3 meals. The most popular snacks between meals are fruit (63.3%) and sweets (53.1%). Most of the respondents eat meals irregularly. This is clearly noticeable in the group of nurses working in a 2-shift system (67.3%). In a study by Sińska et al., irrespective of the shift pattern, 50% of the nurses surveyed consumed 4–5 meals per day, 3 meals per day were eaten by 40% of nurses working one shift and 43% working in shifts [15].

In our research, in addition to fruits and sweets, the respondents consume vegetables, milk and whole-wheat bread between meals. The respondents declare the lowest frequency of consumption of powdered soups, energy drinks, fast food, juices and canned fruit and vegetables, which is seen as healthy eating behavior. The Mann–Whitney U test did not show statistical significance between the indices of individual categories of meal frequency in either group. The Almajwal study showed that an increase in the consumption of unhealthy products was observed in a group of nurses working in very stressful conditions [10]. In addition, Wong et al. confirm that nurses

working in a 2-shift system preferred fast food and snacks so as not to fall asleep and to maintain energy levels for their heavy workload [13]. Sahu and Dey found that the daily intake of carbohydrates, proteins and fats is much lower when working in a 2-shift system than in a 1-shift system [19].

Our study found a low intensity of healthy and unhealthy nutrition. Staff working in a 2-shift system reach for snacks between meals several times a day (40.2%), while staff working in a 2-shift system, several times a week (44.3%). However, no statistically significant differences were found. It was confirmed that eating habits do not differ significantly between nurses working in 1-shift and 2-shift systems [15, 20]. According to the literature, eating errors, such as eating in a hurry due to a lack of time, irregularity in the frequency of meals, snacking between meals and the excessive consumption of sweets are risk factors for diseases such as hypertension, heart disease, obesity or metabolic syndrome [21, 22, 9]. Nursing staff are particularly vulnerable to the destructive effects of poor nutrition on the body [23]. Factors that can help improve the diet include: better working conditions, promoting healthy eating, a place to eat, and food availability. The above factors may affect staff satisfaction with work, an increase in work efficiency of both individual employees and the entire hospital and an increase in the quality of health services [24].

Few studies refer to Polish nurses. However, the studies that have been carried out show nutritional irregularities. Shift work makes it difficult to follow the principles of healthy eating and to achieve an adequate level of physical activity. Studies conducted among nurses have shown that this professional group are particularly vulnerable to poor eating habits [14, 15, 16, 17]. In order to improve eating habits, one should strive to increase the regularity of meals [14]. The limitation of the conducted research was a lack of men in the study ($n = 10$). The group of 1-shift employees was comprised entirely of women.

CONCLUSIONS

There were no significant differences between the diet of nurses working in shifts and 1-shifts. For both study groups, the intensity of nutrition features regarding a healthy and unhealthy diet was low.

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