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Eating Habits of Paramedics Working in the City of Québec: A Pilot Study

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Abstract

Background: Many studies have shown a possible association between working conditions and unhealthy behaviours that could lead to overweight and obesity. For paramedics, unpredictable lunch periods could lead to changes in eating behaviour during work.

Objective: This study examines paramedics' eating behaviours in day and night shift workers in comparison with eating behaviours during one day off.

Method: Twenty two paramedics, night (n=12) and day (n=10), shift workers recorded their energy intake and energy expenditure during one day-off and one day on duty. Energy intake was calculated using a self-reported dietary intake through three-day food record. Energy expenditure was calculated via indirect calorimetric method. The differences between day and night shift groups (between factors) and day on duty with day off conditions (within factor) were tested using two way ANOVA (2 groups *2 conditions) with age as covariate. Analyses were conducted using SPSS (v13.0, IBM, Ontario, Canada) software

Results: Paramedics were 34 ± 11 years old, and 77% of paramedics presented overweight or obesity (BMI ≥ 25 kg/m²). Energy intake was significantly higher during the day off compared with the day on duty in both groups ($F(1,19)= 17.07$, $p=0.001$). Energetic balance was also higher during day off compared with the day on duty in both groups ($F(1,19)=14.11$, $p=0.001$). No statistically significant differences were found among shifts in energy intake, and energy expenditure between groups (respectively, $F(1,19)=1.77$, $F(1,19)=3.43$, all $p>0.05$), however energetic balance was significantly higher in night workers compared with day workers ($F(1,19)=4.82$, $p=0.04$).

Conclusion: This study showed a reduction of energy intake during the day on duty and energetic imbalance between a day on duty and a day off. To help paramedics maintain energetic balance whatever their workload, emergency medical should pay attention to meal period availability and meal place. Also, preventive measures should target individual perceptions of health in paramedical service

Keywords: Paramedics; Eating habits; Working conditions; Energy balance

Introduction

Many studies have shown a possible association between working conditions and unhealthy eating habits that could result in obesity and cardiovascular diseases [1-4]. Stressful working conditions can influence eating patterns and result in emotional disinhibition of eating [5]. Notably, emotional eaters who consume food during stress have increased consumption of sweet and fatty foods or sugary drinks when compared to unstressed and non-emotional eaters [6,7]. Also, shift work contribute to overweight or obesity and disrupt healthy habits such as the preparation of well balanced and nutritious meals or regular physical activity and physical work or long shift work lead to excessive fatigue, a reduction of available time to practice physical activities and changes in eating behaviours [3,8-10].

Paramedics and other emergency workers represent groups of workers who are required to rescue people as quickly and efficiently as possible. To achieve this goal, workers may put their own lives at risk and they work during the night and day shifts [11]. Their everyday work burden is characterised by organisational and psychosocial challenges that represent stressors [12]. The organisational and psychosocial challenges include, for example, the pressure to achieve speedy response times, economic efficiency and variable waiting periods between calls and time meals [11,13]. Among paramedics, two groups of research have reported a high risk of obesity linked to occupational stress perception, lack of leisure time, lack of physical activity and poor mental health [14-16] and others researches reported a gain of body mass index over the period of employment associated with tobacco consumption, low supervisor support, and emotional disinhibition of eating [17]. However, a lack of eating behavior field study was noted and it is difficult to understand eating patterns at work could lead to overweight or obesity.

The aim of this study was to examine eating patterns at work in day and night shift paramedics of Quebec to understand possible dynamics between several organisational challenges (workload, responses time and time meals) and eating behaviors that could lead to overweight or obesity.

Methods

Participants

Thirty eight participants were voluntary to participate in this study. Participants included in the study should be voluntary, completed all steps of the protocol, male and regular night or day shift workers. Excluded criteria were irregular shift work. Day shift workers included paramedics working on usual day shift since 2 to 25 years, as well as paramedics working over 80% on day shift. Of note, these workers had a history of night shifts (from 0 to 19 years). Night shift workers included paramedics working on regular night shift, as well as paramedics working over 80%

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on night shift. Day shift usually started at 5h00 and ended at 18h00. Night shift usually started at 22h00 and ended at 8h00. Thus, day and night paramedics included in the study worked an 8 to 12-hour shift.

Only twenty-one day shift (n=10) and night shift (n=12) workers have completed all steps of the protocol. All subjects were male working for two ambulance companies of Quebec City and they were all 34 ± 11 years old. The study was approved by the Ethic Committee and all participants signed informed consent.

Protocol

Data were collected during the summer of 2011. Protocol is divided in two steps. Step one, each participant completed a three-day food journal (two days off and one day on duty). Also, the heart rate was recorded during 24 hours on duty and 24 hours off duty [18]. Step two, within a maximum delay of two months, each participant came to the laboratory for a two-hour period to evaluate their metabolism during exercise via indirect calorimetry [19]. Those two-hour periods were scheduled between 8 a.m. and 10 a.m. or between 1 p.m. and 3 p.m. The day before the visit to the laboratory, participants were asked to refrain from intense physical activity and to hydrate themselves properly (1 L to 1.5 L of water per day). They were also asked to avoid eating, drinking coffee or any other energy drink two hours prior to their visit to the laboratory. The Figure 1 below shows the chronobiology of data collection and recorded variables.

Variables

Descriptive variables: Ages (years), body mass index (BMI, kg/m^2), percent of paramedics with overweight (BMI ≥ 25 kg/m^2), cardiorespiratory physical activity (min/week), shift hours (hours), number of waking hours during the day off (hours), heart rate (bpm) during the day on duty and day off. The number of interventions per shift and the driving time response to go to the intervention (min) and time to rescue the beneficiaries on the spot (min) were reported in a diary during the day on duty.

Food variables

Energy intake: Self-reported dietary intakes (food and drinks) was determined through the three-day (two days off and one work day) food journal; this measure being considered valid and reproducible [18]. Participants were asked to declare amounts of food and drink as accurately as possible. Information obtained on the amount of food and drink consumed on each occasion was used to calculate daily energy consumption. Food intake was assessed using NUTRIFIQ software, version 0.99, Département de nutrition et des sciences de l'alimentation, Université Laval, Québec, Canada [20].

Energy expenditure: Energy expenditure during the day on duty and day off was estimated using a calibration curve based on the relationship between energy expenditure and heart rate. This calibration curve was established via indirect calorimetry during the visit to the laboratory of each participant [21]. This indirect calorimetry, used to estimate energy expenditure, is considered valid and reproducible. It was also confirmed that establishing the calibration curve in the laboratory at any time of the day is representative of actual energy expenditure during a day [19].

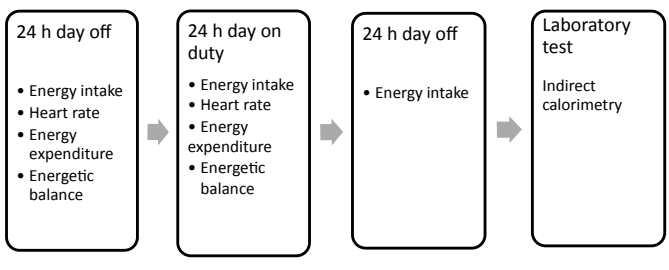

Figure 1: Chronobiology of data collection and recorded variables

Energetic balance: The energetic balance is the difference between energy intake and energy expenditure. A positive result indicates that energy consumption is greater than energy expenditure. A negative result indicates the opposite.

Time meals: Participants had to identify the duration of each meal in their three-day food journal.

Percentage of fast food: Participants had to identify the type of each meal, a meal being considered as breakfast, lunch and dinner taken at regular times. A snack was defined as all other occasions to eat at any given time during the day, evening or night [18].

Statistical analysis

Descriptive variables: The mean and standard deviation of age, BMI, shift hours, number of waking hours during the day off, heart rate and number of interventions were determined for both group and compared with ANOVA. Differences were considered statistically significant when $p<0.05$. Analyses were conducted using SPSS (v13.0, IBM, Ontario, Canada) software.

Food variables

Energy intake, energy expenditure and energetic balance: The differences between day and night shift groups (between factors) and day on duty with day off conditions (within factor) were tested using two way ANOVA (2 groups *2 conditions) with age as covariate. Differences were considered statistically significant when $p<0.05$. Analyses were conducted using SPSS (v13.0, IBM, Ontario, Canada) software.

Time meals and percentage of fast food: The mean and standard deviation of time meals were determined for each group during the day off and the day on duty and compared with ANOVA. Differences were considered statistically significant when $p<0.05$. Analyses were conducted using SPSS (v13.0, IBM, Ontario, Canada) software. The percentage of fast food were calculated with IC 95% for both group during the day off and the day on duty and compared. All data were compared with the results reported in Health survey among the Canadian population (Table 3).

Results

Descriptive variables

Day and night shift workers presented similar descriptive variables. Table 1 presented the results.

Food variables

Energy intake, energy expenditure and energetic balance: The two-way ANOVA with age as covariate showed no differences in energy intake, and energy expenditure between groups (respectively, $F(1,19)=1.77$, $F(1,19)=3.43$, all $p>0.05$), however energetic balance was significantly higher in night workers compared with day workers ($F(1,19)=4.82$, $p=0.04$). Within effect showed a significant increase in energy intake during the day off compared with the day on duty in both groups (day shift: 2722 ± 299 vs. 1629 ± 226 kcal/day, $p=0.001$; night shift: 2940 ± 273 kcal/day vs. 2152 ± 206; $F(1,19)=17.07$, $p=0.001$) and a significant increase in energetic balance during the day off compared with the day on duty in both groups (respectively (night shift: +602 ± 369 vs.-259 ± 259 kcal/day; day shift: -184 ± 405 vs. -1231 ± 284 kcal/day; $F(1,19)=14.11$, $p=0.001$) (Figure 2).

Time meals, percentage of fast food: Only night workers reduced their time meals ($p<0.05$) at work, while night and day workers eat most of fast food at work compared with day off ($p<0.05$) (Table 2).

	Day shift (n=10) Mean ± Std	Night shift (n=12) Mean ± Std	p-value
Age	41 ± 11	27 ± 5	ns
Body mass index (kg/m²)	27 ± 3	26 ± 4	ns
% of overweight [IC 95%] (BMI ≥ 25 kg/m²)	70 [41-98%]	75 [50-99%]	ns
Cardiorespiratory physical activity (min/week)	0	30 ± 90	ns
Day on duty			
Shift hours	9 ± 2	10 ± 2	ns
Heart rate (bpm)	70 ± 7	72 ± 7	ns
Number of intervention	3 ± 1	3 ± 1	ns
Driving time response (min)	5 ± 10	6 ± 9	ns
Time to rescue the beneficiaries (min)	25 ± 12	22 ± 12	ns
Day off duty			
Nb of waking hours	12 ± 4	10 ± 5	ns
Heart rate (bpm)	71 ± 7	71 ± 7	ns

Table 1: Characteristics of participants

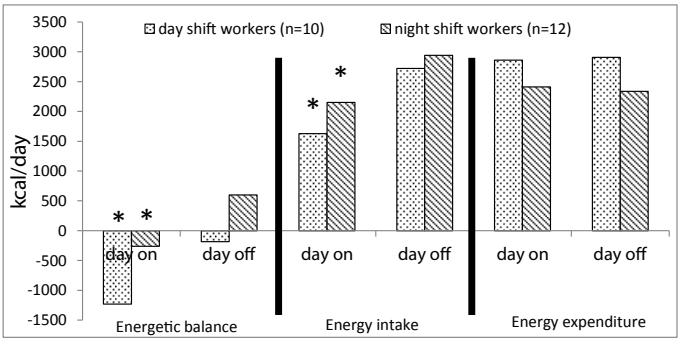

Figure 2: Energetic balance, energy intake and energy expenditure during the day off and the day on duty for night and day shift workers. Asterix indicate significant differences between the day off and the day on duty for both groups (p <0.05). Two- way ANOVA with age as covariate showed no differences between day and night shift workers.

Discussion

Results of this study suggest a reduction of food intake during the day on duty compared with the day off. Also, energetic balance of paramedics is negative during the day on duty while it is positive during the day off.

Results offer a better understanding of potential dynamics between occupational and eating habits that could result in overweight or obesity. In our study, seventy seven percent of paramedics were overweight with a BMI greater than 25 kg/m² (BMI ≥ 25 kg/m²: 77% and BMI ≥ 30 kg/m²: 23%). During the day on duty, paramedics had insufficient food intakes to meet their energy expenditure resulting in negative energetic balance. Also, food intake during the day on duty among night and day paramedics was lower than food intake among Canadian population (n=10786) [22]. In contrast, during the days off, foods intakes were excessive resulting in positive energetic balance in both groups with greater IC 95% than Canadian population [22]. Then, the excess of body weight in paramedics could be caused by the difference in energetic balance clearly demonstrated in the results of this study. Surprisingly, no change in energy expenditure during the day off was observed. Physical activity represents 20% to 35% of daily energy expenditure [23]. In this study, night and day paramedics reported none or very low physical activity per week. The lack of physical activity is associated with increased energy consumption can only result in weight gain. According to literature, the difference in energetic balance could lead in body resistance mechanisms to compensate for imposed periods of privation that can be important or brutal [24].

It has been reported that acute stress results in a reduction of food intake, as observed during the day on duty, while chronic stress is associated with increased food intake, which is what we observed in this study during the day off [25,26].

Several studies report that paramedics are subject to various stressful events during their work day, events such as accidents, childbirth, suicide or simply interventions that deal with young children [27,28]. Also, studies have shown that paramedics cope with acute stress at work that on the long term, could lead to post-traumatic stress, mental fatigue and sleep problems [14,29-31]. The results of this study suggested that acute stress at work could promote the difference in energetic balance observed. For example, several studies suggest that paramedics have to cope with occupational stress caused by different performance indicators, such as driving time response and time to rescue the beneficiaries on the spot [32,33]. Driving time response refers to the maximum time allowed to answer calls from patients in a non-traumatic state with no cardiac arrest. This time is limited to 8 minutes maximum. In the case of a traumatic patient or patient with risk of cardiac arrest, this time is reduced to 5 minutes [33]. Time to rescue the beneficiaries on the spot refers to efficiency and ability of paramedics to act during interventions [33].

In this study paramedics put about 6 ± 9 min to go to the spot and 24 ± 12 min to rescue the beneficiaries on the spot. The driving time response observed in this study showed that paramedics try to respect the 8 minutes maximum. Otherwise, in the companies paramedics observed, workers are entitled to lunch breaks (30 min per 8 shift hours and 45 min per 10 or 12 shift hours), but they must be ready to leave urgently at any time and arrive on the scene within the limits of the time response. Taken together, these elements could lead to a voluntary reduction of energy consumption during the day at work, thus causing the yoyo effect observed through energy consumption between a work day and a day off.

During field observations with participants, two different eating behaviours could be identified as reported in health survey among Canadian population [22]. Many of the participants were preparing light meals at home. This result was similar at the Canadian population excepted for night shift workers at work [22]. These meals consisted mainly of small amounts of food and some snacks. The reasons given for this behaviour

	Age IC 95%	Day off Mean Std	Day on Mean ± Std	p-value
Time meals				
Night workers (n=12)	24-31	28 ± 5	16 ± 4	≠
Day workers (n=10)	37-50	21 ± 9	18 ± 10	ns
Percentage of fast food [IC 95%]				
Night workers (n=12)	24-31	16 [0-37%]	75 [50-99%]	≠
Day workers (n=10)	37-50	9 [0-25%]	27 [0-53%]	≠

Table 2: Time meals, percentage of fast food among day and night shift workers

		Food intake kcal/day, IC 95%		
	Age IC 95%	**Canadian population[1]**	**Day off paramedic**	**Day on paramedic**
Night workers	20-39	2585-2735	2098-3345	1156-2102*
Day workers	40-64	2280-2410	2390-3509	1720-2383*
		Percentage of fast food %, IC 95%		
Night workers	20-39	39.3%	16 [0-37%]	75 [50-99%]*
Day workers	40-64	29.8%	9 [0-25%]	27 [0-53%]

Table 3: Food intake and percentage of fast food in paramedics compared with Canadian population

[1]Data for Canadian population are provided to « l'Enquête sur la santé dans les collectivités canadiennes (ESCC) – Nutrition menée en 2004 ». *indicate significant differences between paramedics and Canadian population.

were anticipation of a heavy workload and lack of time to eat. Voluntary reduction of food quantities for meals may over time, disrupts healthy routines such as the preparation of well balanced and nutritious meals and snacks. Other paramedics chose to buy fast food meal types including, for example, soft drinks, sandwiches and Asian food and did not bring any other food, like snacks, to fill the long waiting periods between meals. The proportion of night shift workers have eaten fast food was higher than Canadian population. Fast food is energy-dense, fatty and poor in nutrients and can contribute to overweight and obesity [34].

How ambulance companies and paramedics could work together to help maintain a healthy weight?

Maintaining weight requires balancing energy consumption and energy expenditure every day. Any imbalance or deficiency can lead to weight problems [35]. In the case of paramedics, several actions are possible. These actions must be both organizational and individual. From an organizational point of view, the implementation of lunch breaks and other short breaks that could be taken without fear of being called to duty would be an absolute necessity. This would allow paramedics to reintroduce healthy eating habits into their work days and really take their time to eat properly. Also, several other organizational actions can be considered such as the possibility to stretch and get out of the ambulance during long waiting periods. Individual actions include the necessity to educate paramedics on the importance of healthy eating behaviours. For example, capsule information on health, nutrition and physical activity could be provided. However, before implementing any organizational change, a specific study should be conducted with each ambulance company to determine with them their actual needs and their ability to meet said needs.

Limitations

The number of participants was relatively small. Some limitations of this study result from the methods of calculating energy expenditure by indirect calorimetry. This method is less reliable beyond 125 beats per minute. However, in our study, the average heart rate was around 70 beats per minute, which greatly reduces the risk of overestimating energy expenditure. This study is also subject to volunteer bias. There is a possibility that paramedics with the worst health behaviours refused to participate in the study. If this is the case, then a higher percentage of paramedical staff would be exposed to a high risk of obesity.

Conclusion

This study showed an energy imbalance between the work day and the day off. Several circumstances related to the nature of the profession may explain these differences, such as the uncertainty of work tasks and limited lunch breaks. To help paramedics maintain energetic balance during and off work, emergency medical services should take into consideration the opportunity to take lunch breaks and their location. In addition, preventive measures should be taken into account in work organization to provide paramedics with better opportunities for lunch breaks and as for individuals, preventive measures should be taken in order to promote a healthy lifestyle regardless of working conditions.

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Conflict of Interest

None.

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