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Nutritional variables and work-related accidents: A case-control study

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Abstract.
BACKGROUND: Nutritional aspects are important for the prevention of diseases and disorders, and few studies have focused on the relationship between risk of work injury and nutritional variables.
OBJECTIVE: This study aimed to verify whether nutritional variables constitute risk factors for work-related accidents.
PARTICIPANTS: 1,422 industrial workers (600 cases plus 822 controls).
METHODS: A case-control study was carried out in an industrial city in south-east Brazil. A multiple logistic regression model was adjusted using work-related accidents as the response variable and nutritional variables as predictors. The associations were assessed by *Odds Ratio* (OR), with a p-value < 0.05.
RESULTS: 47.29% of the workers were overweight or obese. Protective factors for work-related accidents were (a) attending formal education for an above average number of years (OR $= 0.91$, $p < 0.0001$) and (b) eating a traditional dinner (OR $= 0.67$, $p = 0.0087$). Risks factors were (a) hard physical effort in the workplace (OR $= 1.37$, $p < 0.0001$), (b) having lunch in the workplace (OR $= 1.57$, $p < 0.0001$) and (c) receiving government benefits in the form of food stamps (OR $= 1.39$, $p = 0.0350$) or food baskets (OR $= 1.30$, $p = 0.0414$).
CONCLUSION: Our findings suggest an association between nutritional variables and work-related accidents. This indicates the need, during the formulation of policies for these kinds of government benefits, to include nutrition aspects in order to minimize work-related accidents risks.

Keywords: Work-related accidents, occupational health, nutritional status, nutrition policies, food practices

1. Introduction

Work-related accidents are an important public health concern in Brazil. According to official data, 723,452 occurrences were registered in 2009, which represent a 12.2% increase, compared with the previous year [1].

Concerning the investigation of the causes, researchers focused on risk factors related to socio-economic, demographic, occupational or chemical agent variables [2–5]. Nevertheless, there appears to have been no previous research on the association between work-related accidents and nutritional variables. Investi-

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gations into the relationship between dietary habits, lifestyle and the increase in the prevalence of obesity and chronic diseases among workers, have identified the epidemiological factors of obesity [6–12]. In a cohort investigation with Japanese workers, it was found that work overload was positively associated with total energy consumption as well as intake of fiber, vitamins and saturated fat [12].

Work-related accidents can occur due to symptoms of weakness or indisposition, because of nutritional disorders including iron deficiency anemia [13] and other typical signs of hypoglycemia [14]. Thus, addressing workers' nutritional needs is of utmost importance for the full accomplishment of work tasks.

In Brazil, the recognition of the role of nutritional variables in the prevention of work-related accidents was one of the reasons for the creation of a public policy. This was the Programa de Alimentação do Trabalhador (PAT – Worker Food Program), which allows companies to make tax deductions when investing in employees' food. This program was established by the Brazilian Ministry of Labor in the 1970s, when extremely high levels of work-related accidents were recorded. Improvements in workers' health and a reduction in work-related injuries were among the aims of the PAT [15]. This research aimed to investigate whether nutritional variables were associated with work-related accidents.

2. Methods

In 2005, a hospital-based, case-control study was carried out in an industrial city with an estimated population of 318,383, in south-east Brazil [16]. The target population was the economically active population (EAP) of this city, estimated at 138,913 workers; 86,543 and 52,370 of whom were formally and precariously employed, respectively. The following criteria were used for sample calculation: sample size was designed so that a relative risk of 2.0 could be detected; a critical α of 0.05; a β of 0.2 (statistical power of 0.8); a ratio between cases and controls of 1:1. Thus, a minimum of 559 cases and 559 controls were necessary.

Cases were defined as industrial workers aged between 15 and 60 years who had been recently injured in the workplace, resided in this municipality and had sought immediate assistance from the Orthopedics and Traumatology Governmental Centre (OTC) [17]. The participants were those considered clinically able to answer a questionnaire during treatment, and signed, informed consent was provided by all. Two groups of workers were selected as control: (a) non-injured workers, who accompanied the injured workers to be treated, and (b) workers who had been injured but not while performing occupational activities. The members of both groups were aged between 15 and 60, resided in this municipality, and agreed to participate.

The participants were described according to gender, age, socio-economic status, nutritional status and dietary habits. Data on the causes of the occupational accidents were collected for all the cases. Educational status was quantified as complete years of formal education. Occupation type was characterized using questions on shift work (day shift, alternated, night shift, irregular or mixed), working hours, extra hours per week and length in the present job position. The type of employment contract; the workplace (fixed or not), and whether the workers had a formal employment contract or were self-employed, were also investigated.

Participants' weight and height were used to calculate their Body Mass Index (BMI). Waist circumference was used to estimate the risk of cardiovascular diseases [18]. Information about changes in workers' body weight during the 12 months prior to the investigation, as well as the level of physical effort in work tasks, were obtained.

Qualitative data on dietary practices were collected, using an instrument developed specifically for this study, to verify whether workers' diets were structured into regular meals, including the various food groups comprising the standard Brazilian diet [19]. The instrument consisted of asking open and closed questions. Experts evaluated the responses to validate its global quality. After the evaluation, a pilot test was carried out.

The quality of meals was classified using three categories, as follows. (1) *Good Dietary Practice*: daily intake of fruit/vegetables, rice/beans, dairy products and meat in general; occasional consumption (two or three times a week) of bread and flour derivatives; and rare ingestion (once or less a week) of fried food/snacks, sweets/soft drinks. (2) *Reasonable Dietary Practice*: daily or occasional consumption of fruit/vegetables, rice/beans, meats and bread and flour derivatives; and rare intake of fried food/snacks, sweets/soft drinks. (3) *Bad Dietary Practice*: rare intake of fruit/vegetables; daily ingestion of rice/beans, bread and flour derivatives, fried food/snacks, sweets/soft drinks; daily or occasional consumption of meats; occasional or rare consumption of dairy products. Rice and beans were grouped together for assessing the consumption fre-

quency of these foods, which are typical of the lunch and dinner of the Brazilian population, in the diet of the participants. Other classifications were applied: i) Traditional lunch or traditional dinner: consisting of rice, beans, meat, salad and slide dishes. ii) Fast lunch or fast dinner: sandwich, stuffed pasta (fried or baked), or other kind of fast food. iii) Lunchbox food provided by the company: traditional meal transported in disposable wrapping.

The participants' dietary patterns were identified using a single variable with two categories: "Individual who had three daily meals (breakfast, lunch and dinner)" and "Individual who had two daily meals (lunch and dinner)". The consumption of food between meals, during the work shift, was identified as a variable with three categories: "Worker who ate daily between meals", "Worker who ate occasionally between meals", and "Worker who ate rarely between meals". Occasional consumption was defined as two or more times per week (but less than daily), and rare consumption, once or less per week.

Whether the participants received the PAT was also investigated. Companies participating in this program can offer meals in different forms: (i) on-site, produced by the company itself; (ii) on-site, by an outsourced caterer, or (iii) off-site, from an outside supplier. Another alternative is the distribution of food baskets or food stamps for employees to purchase food at selected shops and restaurants [15].

A non-conditional logistic regression model was employed to investigate the association between nutritional variables and work-related accidents. In this model, the dichotomous response variable was the occurrence of a work-related accident (case = 1 and control = 0), whereas the predictor variables were those representing socio-demographic and occupational variables, an assessment of dietary practices, the nutritional status, the time elapsed between meals, BMI, and waist circumference. The presence of an association between these variables was assessed using adjusted Odds Ratio (OR) statistics, with a 95% Confidence Interval (CI).

Univariate logistic regression models were initially adjusted by using nutritional variables as predictors. Dummy variables were created in order to represent the different levels of the categorical variables. After that, multivariate logistic regression models [20] were adjusted by using predictor variables that generated OR estimations with p values lower than, or equal to, 0.25 in the univariate analysis. The adjustments were achieved using the backward method, where a p value less than 0.05 was the maintenance criterion [20]. For adjustment of the multivariate model, the possible confounders of these associations were controlled by considering the following socio-economic and occupational variables: educational status, fixed or changeable workplace, type of work shift, daily working hours, and extra hours worked per week. In view of the small number of women among cases and controls, sex was not included as an independent variable in the final model. For the sake of quality control, data were entered using a double-entry system and then analyzed using the software The SAS® System for Windows, Version 8.

Table 1
Occupational variables of workers included in the case-control study ($n = 1422$). Piracicaba/SP, Brazil, 2005

Variable	Cases (%)	Controls (%)
Type of contract		
Fixed employment	55.53	62.04
Formal employment	84.22	80.29
Typical work contract	86.07	79.80
Work shift		
Fixed, day shift	90.60	90.63
Alternated	3.36	2.07
Fixed, night shift	2.35	4.50
Irregular distribution	0.33	–
Mixed	3.35	2.79
Most frequent occupations		
Industry worker	59.75	43.14
Services sector	22.38	26.26
Physical effort by work tasks		
Light	20.47	25.43
Average	35.91	42.34
Hard	43.62	32.24

This research was approved by the Research and Ethics Committee of the Faculty of Medicine of Botucatu, Universidade Estadual Júlio de Mesquita Filho – UNESP/Botucatu/Brazil (Process number 445/2004 – CEP).

3. Results

The study comprised 1,422 workers: 600 cases and 822 controls, most of whom were male (87.41% of cases and 78.47% of controls), with a mean age of 33 years (Standard Deviation [SD] = 10.41), and attended formal education for an average of 8.39 years (SD = 3.36). Table 1 presents the profile of the participants according to occupational variables.

The participants worked an average of 8.99 hours daily (SD = 1.59), which corresponded to an average of 3.58 extra hours worked per week (SD = 7.00). The

Table 2
Nutritional and dietary features of workers included in the case-control study ($n = 1422$). Piracicaba/SP, Brazil, 2005

Variable	Cases (%)	Controls (%)
Nutritional status		
Low weight	3.85	4.14
Normal weight	50.00	47.45
Overweight	28.26	27.62
Obesity I	13.54	15.94
Obesity II	4.35	4.87
Cardiovascular risk		
Moderate	16.39	18.25
High	13.04	17.64
Weight gain during the previous 12 months	59.43	61.46
Included in the PAT*	85.33	82.36
Type of food benefit		
Employer-based restaurant or canteen	23.63	26.55
Outsourced restaurant or canteen	13.48	13.01
Food stamp	21.48	19.56
Food baskets	37.30	33.43
Others	1.57	1.24
No information	2.54	6.21

most common immediate causes of work-related accidents were machinery and equipment (23.67%), falling objects (23.67%), excessive effort or load (13.00%), and falls (8.63%), resulting in contusion (46.67%), torsion (14.83%), contusion-cut wounds (10.33%) and fractures (9.00%). The most common areas of the body injured were hands (36.50%), feet (18.50%), upper limbs (14.67%), lower limbs (14.00%), and back (9.33%).

Table 2 lists issues related to the nutritional status and participation in the PAT. The high prevalence of overweight/obese individuals among cases and controls is noteworthy. Referring to the PAT, 37.30% of cases and 33.43% of controls received food baskets.

Tables 3 and 4 summarize the OR estimations achieved by univariate logistic regression. Variables associated with occupational accidents with p values < 0.25, are highlighted.

Table 5 displays the OR and CI estimations obtained by the multivariate logistic regression model, adjusted from variables that had p values < 0.25 in the univariate analysis, and controlled according to socio-economic and occupational variables. Analysis of the regression residuals gave no evidence of violations of the variables assumed in the logistic model. There was no indication of interaction or confounding between the selected variables.

The socio-economic, occupational and lifestyle variables that maintained an association with work-related accidents were (1) alternating or mixed-work shifts, (2) work requiring hard physical effort and (3) smoking habitually. The nutritional variables associated with an increased risk of work-related accidents were (1) having lunch in the workplace and (2) receiving benefits in the modality of food stamps or food baskets. Eating a traditional dinner was associated with a lower risk of work-related accidents.

Table 3
Estimation of risk of work-related accidents according to socio-economic, occupational and nutritional variables (univariate logistic regression) Piracicaba/SP, Brazil, 2005

Co-variables	Odds ratio (CI* 95%)	p-value
Sex	1.91 (1.42–2.56)	<0.0001
Years of formal education	0.90 (0.87–0.93)	<0.0001
Type of work		
Precarious employment	0.76 (0.58–1.01)	0.0576
Formal employment	1.31 (1.06–1.62)	0.0139
Daily working hours	1.07 (1.00–1.15)	0.0368
Extra hours per week	1.02 (1.00–1.03)	0.0146
Administrative	0.56 (0.35–0.89)	0.0138
Agricultural	0.58 (0.22–1.53)	0.2738
Management	0.29 (0.08–1.02)	0.0529
Maintenance	1.21 (0.80–1.82)	0.3662
Industry worker	1.96 (1.57–2.43)	<0.0001
Services	0.76 (0.59–0.98)	0.0347
Technical	0.34 (0.19–0.61)	0.0003
Lifestyle		
Ingestion of distilled beverages	1.62 (0.87–3.02)	0.1292
Ingestion of beer	0.94 (0.76–1.16)	0.5538
Ingestion of wine	0.69 (0.23–2.02)	0.4952
Smoker	1.38 (1.10–1.75)	0.0061
Ex-smoker	0.99 (0.72–1.35)	0.9447
Physical effort at work		
Light physical effort	0.76 (0.61–0.95)	0.0146
Hard physical effort	1.63 (1.31–2.02)	<0.0001
Type of Food Benefit (PAT)		
Included in PAT	0.73 (0.58–0.92)	0.0064
Outsourced service	1.08 (0.96–1.57)	0.6386
Food stamp	1.16 (1.31–2.02)	0.0398
Food baskets	1.29 (1.02–1.63)	0.0306
Others	0.84 (0.64–1.10)	0.2012
Nutritional status		
Weight loss	0.99 (0.97–1.00)	0.1506
Weight gain	1.06 (0.86–1.31)	0.0866
BMI**	0.99 (0.96–1.01)	0.2494
Obesity	1.24 (0.92–1.66)	0.1599
Overweight	0.80 (0.60–1.08)	0.1430
Waist Circumference	0.99 (0.98–1.00)	0.1095

*CI – Confidence Interval. **BMI – Body Mass Index.

4. Discussion

With respect to the socio-economic variables, workers with a higher number of years of formal education were at lower risk of work-related accidents (OR

Table 4
Estimation of the risk of work-related accidents according to the variables related to dietary practice (univariate logistic regression). Piracicaba/SP, Brazil, 2005

Co-variables	Odds ratio (CI 95%)	p-value
Dietary Practice: meals		
No breakfast	1.41 (0.93–2.15)	0.1067
Occasional lunch	1.61 (0.88–2.96)	0.1254
No lunch	0.46 (0.12–1.70)	0.2424
Lunch in the workplace	1.64 (1.32–2.03)	<0.0001
Lunch outside the workplace	0.69 (0.49–0.98)	0.0396
Traditional lunch	0.66 (0.40–1.09)	0.1059
Fast-food lunch	0.69 (0.49–0.98)	0.0396
Meal provided by the company	1.28 (1.02–1.61)	0.0308
Lunchbox food provided by the company	1.39 (1.10–1.77)	0.0064
Occasional dinner	0.82 (0.49–1.38)	0.4530
No dinner	1.62 (0.54–4.83)	0.3904
Traditional dinner	0.56 (0.42–0.74)	<0.0001
Fast-food dinner	0.71 (0.43–1.18)	0.1860
Dinner provided by the company	1.02 (0.56–6.17)	0.9324
Three meals daily	1.16 (0.92–1.46)	0.2166
Two meals daily	0.96 (0.66–1.40)	0.8254
Occasional food between meals	0.84 (0.64–1.11)	0.2254
No food between meals	1.2 (0.97–1.48)	0.0964
Dietary Practice: food		
No ingestion of vegetables	0.82 (0.51–1.32)	0.4251
Occasional ingestion of vegetables	1.10 (0.89–1.36)	0.3874
No ingestion of fruit	1.18 (0.82–1.70)	0.3716
Occasional ingestion of fruit	0.9 (0.72–1.11)	0.8956
No ingestion of rice/beans	0.55 (0.32–1.26)	0.4763
Occasional ingestion of rice/beans	0.32 (0.13–0.79)	0.0139
No ingestion of milk/dairy products	1.17 (0.78–1.75)	0.4583
Occasional ingestion of milk/dairy products	1.12 (0.88–1.41)	0.3475
Frequent ingestion of bread/flour derivatives	0.87 (0.66–1.15)	0.3178
No ingestion of bread/flour derivatives	4.16 (0.84–2.70)	0.0812
No ingestion of meat	0.23 (0.03–1.90)	0.1724
Occasional ingestion of meat	1.05 (0.73–1.51)	0.7993
Frequent ingestion of fried food	1.04 (0.84–1.30)	0.7017
Occasional ingestion of fried food	0.98 (0.79–1.21)	0.8387
Frequent ingestion of sweets/soft drinks	0.95 (0.77–1.17)	0.6122
No ingestion of sweets/soft drinks	1.09 (0.88–1.35)	0.4205
Classification of dietary practice		
Good	0.86 (0.59–1.26)	0.4550
Reasonable	1.11 (0.87–1.40)	0.3994
Bad	4.37 (0.52–36.41)	0.1724

= 0.91, CI = 0.88–0.95). This is possibly because the higher educational status of these employees enables them to perform jobs with lower risks, e.g. management positions, which have less exposure to high physical work demand [2]. The chances of accidents were higher for individuals working mixed (OR = 2.07, CI = 1.11–3.86) and alternating shifts (OR = 1.99, CI = 1.01–3.93). This corroborates the already documented studies about the role of changing workplaces with the aim of facilitating the adaptation of the worker's body, to reduce internal desynchronization, in order to prevent accidents [9,21,22]. Work tasks demanding hard physical effort increased the probability of accidents (OR = 1.37, CI = 1.08–1.73). These findings concur with those of Lima et al. [2], who analyzed workload and concluded that intense physical effort elevates the chances of work accidents.

Table 5
Estimation of risk of work-related accidents according to nutritional variables, controlled by socioeconomic and occupational variables (multivariate logistic regression). Piracicaba/SP, Brazil, 2005

Co-variables	Odds ratio (CI 95%)	p-value
Socio-economic and occupational		
Years of formal education	0.92 (0.88–0.95)	<0.0001
Alternated shift	1.99 (1.01–3.93)	0.0464
Mixed shift	2.07 (1.11–3.86)	0.0229
Smoking habit	1.29 (1.01–1.65)	0.0388
Hard physical effort	1.37 (1.08–1.73)	0.0087
Nutritional		
Lunch in the workplace	1.57 (1.25–1.98)	0.0001
Traditional dinner	0.67 (0.50–0.90)	0.0087
Food stamps	1.39 (1.02–1.89)	0.0350
Food baskets	1.30 (1.01–1.68)	0.0414
Weight gain	0.96 (0.92–0.1)	0.0365

Population-based surveys indicate a deterioration of dietary patterns in Brazil over the last three decades, especially with an increased consumption of processed foods. The growth in the number of people in the workforce, who are overweight/obese and have comorbidities, confirms the trend that this deterioration in food patterns contributes to weight gain and its comorbidities [23].

In the present study, eating a traditional dinner, instead of a fast-food meal, remained a protective factor for workplace accidents. This seems reasonable, since health improvement depends, among other factors, on a good nutritional status [23,24].

However, the finding that having lunch at work increased the chances of accidents (OR = 1.57, CI = 1.25 to 1.98) was not a conclusion supported by literature. In another study with this same population [17], it was found that most of the injured workers consumed three meals a day (62.50%) and 24.16% missed breakfast. One can hypothesize that workers going for a long period of time without food, consequently overate at lunch and had postprandial drowsiness, increasing the risks of having an accident [25,26]. Eating lunch at work plus an increased chance of having an accident

could possibly be explained by a lack of time for adequate rest after this meal and before the resumption of work activities. It might also be suggested that the nutritional quality of lunch would not be appropriate, containing excessive calories derived primarily from fats and simple carbohydrates, as shown by the Brazilian studies on the nutrition of workers [23,27–29].

Concerning the Worker Food Program, findings suggested that workers who received food stamps (OR = 1.39, CI = 1.02–1.89) and food baskets (OR = 1.30, CI = 1.01–1.68) were at higher risk of work-related accidents. These types of benefits could favor bad dietary practices since current research points to a trend for adult Brazilians to choose highly processed food [23, 30]. However, this result should be viewed with caution, as the scientific literature does not include data to support the hypothesis that these types of benefits are related to work-related accidents. Nonetheless, studies have shown a higher prevalence of work limitations in workers who are obese, compared with those of normal weight. In addition, research showed that being overweight or obese can be co-risk factors for the development of occupational asthma, cardiovascular disease, and further modifying the response of workers to occupational stress [6,7,10].

Nevertheless, the present finding should promote a discussion about the need for rethinking the types of benefits given to employees, in order to prioritize the consumption of food '*in natura*' and reduce the amount of processed food in workers' diets. Two points for this discussion are suggested by this study. The first is the need to improve the quality in the composition of the food baskets provided to workers, respecting the cultural diversity and regional of Brazil. The second is the need to implement strategies to promote healthy eating in the workplace, with a view to personal autonomy for the choice of high-quality food, to use food stamps.

The target population of food benefits is workers from the formal economy sector, mainly those from Brazil's more industrialized regions. The coverage of PAT is 9,329,234 employees, of which 17.08% are benefited by food baskets and 47.9% by food stamps [17]. These modalities are the most difficult to assess, since there is a great network of food shops engaged in the distribution of meals or other food, and it is difficult to determine workers' food choices [31].

Veloso et al. [28] evaluated the impact of PAT on weight-gain and concluded that, 30 years after implementation, instead of workers being nutritionally deficient as before, they had become overweight, and this weight gain was higher, compared with those not covered by PAT. It is worth noting that the present study detected a high percentage of weight gain among cases (59.43%) and controls (61.46%) and that the majority of workers receiving PAT reported weight gain over the year previous to the investigation.

A research was carried out on the relationship between nutritional status and the receipt of benefits in the form of food stamps or food baskets, with beneficiaries of the PAT programs from the south-east and north-east regions of Brazil. This study verified that these forms of food support were the most accessible to overweight workers, including those with lower incomes [32]. Other studies of workers have identified the inadequate quality of the meals consumed by beneficiaries of this government program [27–29,33].

In this study, relevant aspects of dietary practice maintained an association with a risk of work-related accidents in a logistical regression model, which is why these findings should prompt further investigations. There are some limitations to these findings because to date, there have been no reports on the relationship between risk of work injury and nutritional variables, which makes it difficult to compare results with other studies. In addition, there is a complex causal network involving work-related accidents, concerning not only nutrition levels but workers' job factors and the working environment, which may be associated with their education level or job contract status. On the contrary, this innovative work calls for additional research in order to increase knowledge about the connection between nutritional practices and work-related injuries. It also points to the need for intersectoral investigations to include areas such as health, work and food and nutritional security, to improve the feeding policies of Brazilian workers.

5. Conclusion

This study aimed to investigate the association between nutritional variables and work-related accidents. The main results suggest that receiving PAT benefits in the form of food stamps or food baskets are risk factors, and eating a traditional dinner is a lower risk factor. These findings reinforce the need for intensified surveillance programs, aiming to minimize the exposure of the beneficiaries to nutritional disorders and to work-related accidents.

References

[1] Brasil. Ministério da Previdência e Assistência Social. Empresa de Tecnologia e Informações da Previdência Social. Anuário Estatístico da Previdência Social. AEPS 2010 [Internet]. Brasília, DF; 2010 p. 872. Available from: http://www.mpas.gov.br/conteudoDinamico.php?id=1161.

[2] Lima R da C, Victora CG, Dall'Agnol M, Facchini LA, Fassa A. Associação entre as características individuais e sócio-econômicas e os acidentes do trabalho em Pelotas, Rio Grande do Sul, Brasil. Cadernos de Saúde Pública [Internet]. 1999 Sep [cited 2012 Jul 28]; 15(3): 569–580. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X1999000300014&lng=pt&nrm=iso&tlng=pt.

[3] Souza CAV de, Freitas CM de. Análise de causas de acidentes e ocorrências anormais, relacionados ao trabalho, em uma refinaria de petróleo, Rio de Janeiro. Cadernos de Saúde Pública [Internet]. 2003 Oct [cited 2012 May 26]; 19(5). Available from: http://www.scielosp.org/scielo.php?script=sci_arttext&pid=S0102-311X2003000500008&lng=pt&nrm=iso&tlng=pt.

[4] Almeida IM, Nobre Jr H, M.D.A. D, Vilela RAG. Safety illusion and error trap in a collectively-operated machine accident. Work (Reading, Mass.) [Internet]. 2012; 41(Supl 1): 3202–3206. Available from: http://iospress.metapress.com/content/axv236u876734284/fulltext.pdf.

[5] Marchetti A, Mantovani J, Di Lallo D, Di Napoli A, Guasticchi G. Epidemiology of work-related accidents in the Lazio Region of Italy. La Medicina del lavoro [Internet]. 2011 [cited 2012 Jul 18]; 102(6): 473–483. Available from: http://www.ncbi.nlm.nih.gov/pubmed/22332483.

[6] Hertz RP, Unger AN, McDonald M Lustik MB B-KJ. The impact of obesity on work limitations and cardiovascular risk factors in the U.S. workforce. J Occupational and Environmental Medicine. 2004; 46(12): 1196–1203.

[7] Betters CJ. Weight gain and work comp: A growing problem in the workers' compensation rehabilitation system. Work (Reading, Mass.) [Internet]. 2010 Jan [cited 2012 Jul 18]; 37(1): 23–27. Available from: http://www.ncbi.nlm.nih.gov/pubmed/20858984.

[8] Assis MAA, Nahas M V., Bellisle F, Kupek E. Meals, snacks and food choices in Brazilian shift workers with high energy expenditure. Journal of Human Nutrition and Dietetics [Internet]. 2003 Aug [cited 2012 Jul 18]; 16(4): 283–289. Available from: http://doi.wiley.com/10.1046/j.1365-277X.2003.00448.x.

[9] Sudo N, Ohtsuka R. Nutrient intake among female shift workers in a computer factory in Japan. International Journal of Food Sciences and Nutrition [Internet]. 2001 Jul [cited 2012 Jul 18]; 52(4): 367–378. Available from: http://www.ncbi.nlm.nih.gov/pubmed/11474902.

[10] Schulte PA, Wagner GR, Ostry A, Blanciforti LA, Cutlip RG, Krajnak KM, et al. Work, obesity, and occupational safety and health. American Journal of Public ealth [Internet]. 2007 Mar [cited 2012 Jul 27]; 97(3): 428–436. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1805035&tool=pmcentrez&rendertype=abstract.

[11] Apostolopoulos Y, Sönmez S, Shattell M, Belzer MH. Environmental determinants of obesity-associated morbidity risks for truckers. International Journal of Workplace Health Management [Internet]. 2012 [cited 2012 Jul 27]; 5(2): 120–138. Available from: http://www.emeraldinsight.com/10.1108/17538351211239162.

[12] Kawakami N, Tsutsumi A, Haratani T, Kobayashi F, Ishizaki MTH. Journal of Epidemiology Vol. 16, No. 2 March 2006. Journal of Epidemiology. 2006; 16(2): 79–89.

[13] Basta SS, Soekirman, Karyadi D, Scrimshaw NS. Iron deficiency of adult males anemia and the productivity in Indonesia1'. The American Journal of Clinical Nutrition. 1979; (April): 916–925.

[14] McAulay V, Deary IJ, Ferguson SC, Frier BM. Acute hypoglycemia in humans causes attentional dysfunction while nonverbal intelligence is preserved. Diabetes Care [Internet]. 2001 Oct; 24(10): 1745–1750. Available from: http://www.ncbi.nlm.nih.gov/pubmed/11574436.

[15] Brasil. Ministério do Trabalho e Emprego. Relatóios PAT [Internet]. Brasília, DF; 2010. Available from: http://portal.mte.gov.br/pat/ [Cited 2011 April 23].

[16] Cordeiro R, Vilela RAG, Medeiros MAT de, Gonçalves CG de O, Bragantini CA, Varolla AJ, et al. O sistema de vigilância de acidentes do trabalho de Piracicaba, São Paulo, Brasil. Cadernos de Saúde Pública [Internet]. 2005 Oct [cited 2012 Nov 21]; 21(5): 1574–83. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2005000500031&lng=en&nrm=iso&tlng=pt.

[17] Medeiros MAT De, Cordeiro R, Zangirolani LTO, Garcia RWD. Estado nutricional e práticas alimentares de trabalhadores acidentados. Rev. Nutr. 2007 Dec; 20(6): 589–602.

[18] Organization WH. Obesity: Preventing and Managing the Global Epidemic [Internet]. World Health Organization Technical Report Series. World Health Organization; 2000 p. 1–16. Available from: http://whqlibdoc.who.int/trs/WHO_TRS_894.pdf.

[19] Diez Garcia RW. Reflexos da globalização na cultura alimentar: considerações sobre as mudanças na alimentação urbana. Revista de Nutrição [Internet]. 2003 Dec [cited 2012 May 26]; 16(4). Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1415-52732003000400011&lng=pt&nrm=iso&tlng=pt.

[20] Hosmer Jr., DW, Lemeshow S. Applied logistic regression. New York: John Wiley and Sons; 1989.

[21] Fischer FM. What do petrochemical workers, healthcare workers, and truck drivers have in common? Evaluation of sleep and alertness in Brazilian shiftworkers. Cadernos de Saúde Pública [Internet]. 2004 Dec [cited 2012 May 27]; 20(6): 1732–1738. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2004000600033&lng=en&nrm=iso&tlng=en.

[22] Moreno CR de C, Louzada FM. What happens to the body when one works at night? Cadernos de Saúde Pública [Internet]. 2004 Dec [cited 2012 May 27]; 20(6): 1739–1745. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2004000600034&lng=en&nrm=iso&tlng=en.

[23] Monteiro CA, Levy RB, Claro RM, De Castro IRR, Cannon G. Increasing consumption of ultra-processed foods and likely impact on human health: evidence from Brazil. Public Health Nutrition. 2011 Jan; 14(1): 5–13.

[24] Godzik B, Manning WJ, Sichieri R, Everhart JE. Validity of a Brazilian food frequency questionnaire against dietary recalls and estimated energy intake. Nutrition Research [Internet]. Elsevier; 1998 [cited 2012 Oct 8]; 18(10): 11. Available from: http://www.ingentaconnect.com/content/els/02715317/1998/00000018/00000010/art00151.

[25] Kim SW, Lee BI. Metabolic state, neurohormones, and vagal stimulation, not increased serotonin, orchestrate postprandial

drowsiness. Bioscience Hypotheses [Internet]. 2009 Jan [cited 2013 Mar 5]; 2(6): 422–427. Available from: http://dx.doi.org/10.1016/j.bihy.2009.07.008.

[26] Grandner MA, Kripke DF, Naidoo N, Langer RD. Relationships among dietary nutrients and subjective sleep, objective sleep, and napping in women. Sleep Medicine [Internet]. 2010 Feb [cited 2013 Apr 19]; 11(2): 180–184. Available from: http://dx.doi.org/10.1016/j.sleep.2009.07.014.

[27] Canella DS, Bandoni DH, Jaime PC. Densidade energética de refeições oferecidas em empresas inscritas no programa de alimentação do Trabalhador no município de São Paulo. Rev. Nutr. 2011 Oct; 24(5): 715–724.

[28] Veloso IS, Santana VS, Oliveira NF. Programas de alimentação para o trabalhador e seu impacto sobre ganho de peso e sobrepeso. Rev Saúde Pública. 2007 Oct; 41(5): 769–776.

[29] Savio KEO, Costa THM Da, Miazaki É, Schmitz BDAS. Avaliação do almoço servido a participantes do programa de alimentação do trabalhador. Rev Saúde Pública. 2005 Apr; 39(2).

[30] Levy-Costa RB, Sichieri R, Pontes N dos S, Monteiro CA. Disponibilidade domiciliar de alimentos no Brasil: distribuição e evolução (1974-2003). Revista de Saúde Pública [Internet]. 2005 Aug [cited 2012 May 27]; 39(4): 530–540. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-89102005000400003&lng=pt&nrm=iso&tlng=pt.

[31] Colares LGT. Evolução e perspectivas do programa de alimentação do trabalhador no contexto político brasileiro [Internet]. Nutrire. 2005 [cited 2013 Mar 18]. p. 141–158. Available from: http://www.sban.com.br/revistas/NUTRIRE-vol29-junho2005.pdf.

[32] Burlandy L, Anjos LA Dos. Acesso a vale-refeição e estado nutricional de adultos beneficiários do Programa de Alimentação do Trabalhador no Nordeste e Sudeste do Brasil, 1997. Cadernos de Saúde Pública [Internet]. 2001 Dec [cited 2012 Jul 28]; 17(6): 1457–1464. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2001000600029&lng=pt&nrm=iso&tlng=pt.

[33] Sarno F, Bandoni DH, Jaime PC. Excesso de peso e hipertensão arterial em trabalhadores de empresas beneficiadas pelo Programa de Alimentação do Trabalhador (PAT). Rev Bras Epidemiologia. 2008 Oct; 11(3): 453–462.