Food in the occupational environment and its benefits in worker's health

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Abstract

Introduction: The food universe is very broad and has a lot to do with the culture of each region. However, the macronutrients' constitution: proteins, carbohydrates, and lipids can be adjusted in any diet, thus allowing food to be a way to promote health and quality of life and to lower the risk of work accidents by improving sleep quality. Objective: To amplify and update a non-labor diet application, aiming to indicate, among the existing diets, the one that allows greater work capacity, better performance and more health through the metabolic control. Methodology: The PRISMA methodology was applied in the bibliographic review. Scientific articles, indexed in international journals were searched in the following databases: Medline (searched via PMC – PUBMED Central) and Scopus and through JISSN. Using the keywords diets, "position stand", timing, nutrients, work performance, sleep, consensus and protein, combined three by three, as well as their respective variations. Results and discussion: 247 articles were found. After applying the eligibility criteria, only articles published in the last 5 years in journals, cross-sectional studies (in humans) with consent, and published in English were accepted. Duplicate articles were removed. Articles which were not related to the theme were excluded after reading the title and abstract, excluding 206 papers. In this study were included 41 papers. Out of the 41, 13 articles were added by cross-reference. In the MEDLINE search, the [SECT] filters - referring to the research section and [TW] were inserted for words present in the articles when searching composite words. Initially, the compositions of the several diets were addressed: Hypocaloric - LED and VLED, Low Fat - LFD, Low Carbohydrate - LCD, Ketogenic – KD, and Hypercaloric – HPD. Their main strengths and their main characteristics were fully addressed. Conclusion: It was concluded that the HPD, from all the diets, was the one that had the greatest practical relevance in work environment, once its results in the maintenance of a lean body mass, through its high ingestion frequency. The improvement of the health markers and the nocturnal vigil period reduction, reveal the effectiveness in improving working performance.

Keywords: Diet, Stand position, Work performance, Nutrient, Sleep, Protein.

INTRODUCTION

The nutritional universe is very broad and, for this reason, it allows carrying out its analysis through different perspectives. The discussion about diets and their respective compositions is relevant to health science insofar it revises concepts addressed in different areas, thus contributing to a multidisciplinary discussion. Regarding the sports field, nutrition has daily updates and, therefore, is discussed thoroughly (Jäger et al. 2017). However, concerning the occupational environment that is not the case. Therefore, this demonstrates the relevance of nutrition studies focused on the occupational environment, since adequate nutrition is able to improve the worker's quality of life, generating positive effects with changes throughout the system (Anderson, Gallagher, and Ramirez Ritchie 2018). Many relationships between diet and sleep are currently being addressed, generating new adjustment needs by companies interested in improving their productivity indexes (Schmitt, Belschak, and Den Hartog 2017; Lindseth, Lindseth, and Thompson 2013). Thus, companies with greater nutritional awareness are able not only to provide a better quality of life to the worker but also to achieve higher productivity and decreasing absenteeism due to musculoskeletal disorders. The present work focuses on the assessment of the nutritional compositions of the existing diets presented in the "position stands" of the Journal of the International Society of Sports Nutrition (JISSN) and tries to correlate them to the occupational environment, allowing better diet choices. The paper objective is to amplify and update the applicability of diet in the occupational environment, in order to indicate, among the existing diets, the one that presents in its constitution the best

relation between the maintenance of the worker's body composition, the improvement of its performance and the promotion of health through metabolic control.

METHODOLOGY

The paper methodology is based on the scoping review (Grant and Booth 2009; Peters et al. 2015), through the analysis of scientific articles indexed in international journals published by Medline (via PUBMED CENTRAL) and Scopus and JISSN using, for that, the PRISMA Statement guidelines (Shamseer et al. 2015; Moher et al. 2009; Tricco et al. 2018; Liberati et al. 2009). The used keywords were “diets”, “position stand”, “timing”, “nutrients”, “work performance”, “sleep”, consensus and protein, combined three by three, as well as their respective variations.

RESULTS AND DISCUSSION

In the initial research, 247 papers were found. After applying the eligibility criteria papers articles published between 2013 and 2018, review papers, articles published in journals, cross-sectional studies (in humans) with consent, and published in English were accepted. Articles which did not comply with the theme were excluded after reading the title and abstract, excluding 206 papers. In this study were included 41 papers, after using the snowballing technique (Wohlin and Claes 2014). In MEDLINE, the filters [SECT] (referring to the research section) and [TW] (regarding paper keywords) were used. In general, the human body, performing its daily activities (that is, without practicing any additional physical activity), needs between 2.0 and 2.5 Kcal per day (Evers et al. 1995). On the other hand, individuals who practice physical activity daily and, therefore, end up increasing the muscle mass will present an increase of the metabolic rate, demanding a greater daily caloric intake (Periasamy, Herrera, and Reis 2017). When assessing the context of food intake frequency in the occupational environment, the meals provided to the workers must be adjusted in order to promote health, control weight gain, improve metabolic blood markers results, especially LDL cholesterol, total cholesterol and insulin and to promote the maintenance of muscle mass in the body composition (Kerksick et al. 2017). It is of utmost importance to analyze the task regarding its intensity, to provide the worker with meals with the right amount of calories (Jäger et al. 2017). The current protocols published in JISSN by La Bounty et al (2011) describe that the frequency of the meals must be, at least, more than 3 times a day, which is considered standard in the industrialized world, and, if associated with the practice of daily physical activity, can provide very favorable responses to worker health (Fontana et al. 2004). Firstly, it is important to understand that the increase in daily food frequency does not alter the body composition of sedentary people (Garaulet et al. 2013; Jakubowicz et al., 2012, 2013). In contrast, when the population is physically active, good results are observed in all health markers (Garaulet et al. 2013; Gudzune et al. 2013; Parry and Straker 2013; Wooding et al. 2017; Buckner, Loenneke, and Loprinzi 2018). Studies from 2008 onwards confirm that the glycemia and insulin indexes decrease with increasing food frequency since the calorie supply at each meal is lower. Thus, avoiding the hypercaloric intake per meal improves the metabolic controls related to the circadian cycle (Smeets and Westerterp-Plantenga 2008; Jakubowicz et al. 2012; Garaulet et al. 2013). In addition to that, the increase of the frequency of the meals acts in the stomach distension and in the regulation of the gastric hormones promoting satiety and control of the hunger (Speechly and Buffenstein 1999; Smeets and Westerterp-Plantenga 2008; Leidy and Campbell 2011; Lin et al. 2015; Versteeg et al. 2018). The nutritional composition, acting as a crucial point of the dietary approach, is of supreme importance for the success of the objectives of improving quality of life, health and well-being. Hence, according to the nutrients and their concentrations, it is important to distinguish

different dietary directions, that is, diets, so that, after identifying their strengths and limitations, it is possible to choose the one that best suits the context of the occupational environment.

- Very Low Energy Diet (VLED) and Low Energy Diet (LED) are attributed, in general, to low-calorie diets, with LED diets with 800-1200 Kcal per day and VLED diets with 400-800Kcal per day. VLED, in the nutritional context, are made to compensate for two meals a day and are supported by 70-100g per day of protein, 15g per day of fats, and 30-80g per day of carbohydrates. Despite being a diet reported in the literature, it presents many side effects to the individuals who do it, such as cold intolerance, fatigue, dizziness, headache, and intestinal constipation and has no long-term effectiveness (Aragon et al. 2017). Therefore, it does not fit the purpose of diets in occupational settings.
- Low Fat Diet (LFD) contains about 20-35% fat in the total calories eaten per day (Aragon et al. 2017). A variation of this diet is called Very Low Fat Diet (VLFD) with 10-15% fat in total nutrient composition, although its nomenclature is based on the Acceptable Macronutrient Distribution Ranges (AMDR) for adults, established by the Food and Nutrition Board for the Institute of Medicine (Manore 2005). This diet should be called a diet with hypercarbohydrates because it is presented by AMDR with 10-15% of protein, 45-65% of carbohydrates and 20-35% of fat.
- Low Carbohydrate Diet (LCD) can be considered the most widespread diet in society. In 2016, Hashimoto et al. described that any diet with a ≤ 40% carbohydrate value should be considered as an LCD (Hashimoto et al. 2016), being this value used as a reference in the protocol approached by JISSN. Although this diet has the strongest availability of food on the market, as there are not many restrictions regarding foods high in fat and low in carbohydrates, it is not possible to say, in the long run, that LCD diets are effective in the maintenance of body composition, with loss of mass relatively equal to others. A study comparing LCD with LFD showed no relevant difference in the individuals' body composition, is believed that the difference presented occurred due to the higher protein content in the LCD than in the LFD, therefore, the LCD diets did not prove to be beneficial over time (Gardner et al. 2007; Hu et al. 2012).
- Ketogenic Diet (KD) has less than 10% carbohydrate in its composition (Westman et al. 2007). Depending on the diet protein concentration, the KD comprises the ingestion of 60-80% of fat. The concept of weight loss because of KD does not only occur due to the low carbohydrate intake. In fact, it is believed that the metabolic stress generated by fat oxidation through lipolysis is the main mechanism responsible for weight loss (Aragon et al. 2017). On the other hand, Soenen et al.(2012) described that the effect of weight loss occurs due to the concentrations of proteins absorbed in the diet rather than the low carbohydrate ratio (Soenen et al. 2012), confirmed by the study of Weigle et al. (Weigle et al. 2005). However, a common negative point pointed out by KD studies is the difficulty of the body's metabolic adaptation to ketogenic feeding (Burke 2015). Another disadvantage is the fact that there is a lack of superior effects on body composition compared to other diets that maintain the same amount of protein and calories involved (Burke et al. 2017).

- High Protein Diet (HPD) is defined as a diet that promotes ingestion ≥ 25% protein (Makris and Foster 2011). Previous studies described that the daily dose absorbed by an individual was 1.2-1.6g per kg body weight (Leidy et al. 2015). A prospective, randomized, parallel and single-blind group study by Longland et al. (2016) with 40 participants, 20 per group who completed 4 weeks of intense training, with a 40% hypoenergetic diet, 33 kcal per day for lean body mass. The two groups were divided: the control group (CON) received 1.2g of protein in the diet per kg of body weight day (1.2g /kg/day), and the other group received 2.4g /kg/day (PRO), in which the two groups performed the same types of training combined with anaerobic and high resistance exercise during that period. Results showed that the PRO group, which consumed 2.4g / kg / day of protein, had an increase in muscle mass of 1.2 kg and a loss of fat mass of 4.8 kg, while the CON group with ingestion of 1.2 g /kg/day presented preservation of muscle mass by 0.1 kg and a loss of fat mass by 3.5 kg (Longland et al. 2016).

Antonio et al. (2014, 2015, 2016) concluded that that the supply of higher doses (than the usual doses of proteins), such as 4.4g per kg and 3.6g per kg is beneficial to muscle mass gain and mass loss. This suggests that the effect of the extra-consumed protein would act as a higher thermal effect of the feed, thus increasing the thermogenesis of non-exercise activity, the thermal effect of exercise, and also the excretion of faecal energy and reduced intake of the other macronutrients, via increased satiety and suppression of hepatic lipogenesis. The conclusions provided by Antonio et al. (2014, 2015, 2016) suggest that the known effects of temperature, satiety and muscle mass related to HPD can be amplified in trained individuals submitted to progressive resistance exercises. However, studies report that protein is an expensive nutrient to be introduced into the diet, a fact that reveals the downside of this diet.

CONCLUSIONS

Considering the dimensional reality of a company, diet is a measure that promotes a benefit to both the employer and the employee. As demonstrated, the adequate choice of the nutritional composition offered daily to the worker provides the maintenance of his muscular mass, reducing the muscular injuries and when, above all, combined with the physical activity. In addition, the adequate frequency of food intake (greater than 5 times a day) by means of meals offered by the employer, especially in those situations in which workers perform 12-hour shifts, promotes the improvement of their health markers. Results such as reduced systemic arterial pressure, lower LDL cholesterol, lower the glycemic indexes, reduced serum insulin release, muscle mass maintenance, and professionals' weight control can be observed. Thus, although all diets have strengths and limitations, it was verified that diets with the highest protein concentration (above 25% in the total composition of a diet), present greater benefits to the human being, especially to the worker. Their performance can be empowered due to the decrease in the nighttime wakefulness, thus justifying the maintenance and adaptation of the diet provided in the companies so that doses between 1.2-2.4g of protein per kg of weight per person daily (1.2-2.4 g /kg/day).

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