NUTRITION INTAKE AND KNOWLEDGE, BODY IMAGE PERCEPTION, EATING DISORDER RISK AND INTENTION OF BEHAVIOR CHANGE OF FEMALE BRAZILIAN ATHLETES

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ABSTRACT

This cross-sectional study aimed to evaluate the nutritional intake, body image, risk of eating disorders and intention of behavior change of female Brazilian athletes. Sixty-nine athletes from different sports (TEAM: volleyball, handball, indoor soccer and basketball n=46; COM: judo, karate n=9; RG: rhythm gymnast n=14) had their anthropometric and body composition evaluated, answered questions on nutritional knowledge and beliefs, body image, eating disorders, and intention of changing eating behavior, and reported their 24h food intake. Athletes presented significant difference in age (TEAM: 17.3y±1.46; COM: 20.6y±5.66; GR: 16.0y±4.64; p=0.03). Mean Body Mass Index (BMI 19.91kg/m2±2.88) and fat percentage (%F 18.8±3.82) of RG were lower than TEAM (23.26±2.65kg/m2, p=0.01; %F=23.98±5.31, p=0.03) and COM (22.96±2.75kg/m2, p=0.021; %G=25.03±3.88, p=0.015). RG had de lowest mean energy intake (1533kcal±533). No differences in macronutrient intake were observed between groups. Mean carbohydrate intake was low (<5g/kg/day) for all groups. Protein intake was high for 44.5% and 35.7% of COM and RG, respectively. Most athletes presented beliefs related to protein overvaluation. Mean knowledge score was of 57% correct answers, with no difference between groups (p=0.775). Knowledge did not correlate with the stage of intention of behavior change, for which athletes were evenly classified in "preparation" (21.7%), "action" (18.8%) and "contemplation" (17.4%) stages. Body image dissatisfaction and distortion were observed in 82.6% and 33.3%, respectively. Of the 23 athletes with body distortion, 5 (21) % presented risk for eating disorder. The differences observed between groups allow us to design nutrition education strategies according to specific characteristics of sports.

Keywords: nutrition, body image, team sport, combat sport, rhythm gymnastic

INTRODUCTION

The adoption of nutrition strategies based on the state-of-art of sports nutrition knowledge can lead to better training and performance outcomes[1]. Different sports and disciplines demand specific strategies based on the athletes' physiological characteristics, type of training/periodization, as well as physical and health conditions. Furthermore, particular nutrition strategies should be adopted during training, pre and during competition, and recovery. Goals for each phase and the competition calendar have to be well known[1,2].

However, in the quest of gaining a competitive edge, athletes are vulnerable to adopt trend diets and other dietary behaviors that may be deleterious[2]. Female athletes deserve special attention. The adoption of very restricted diets as a reflex of distorted body image is common, especially in sports in which there is an aesthetic component or weight category[4,5]. Therefore, we aimed to evaluate the nutritional intake, body image, risk of eating disorders and intention of behavior change of female Brazilian athletes from Santos city.

METHODS

The study was approved by the Research Ethics Committee of the Federal University of São Paulo under #2087/2012.

In a cross-sectional design, 69 female athletes from different sports (TEAM: volleyball, handball, indoor soccer and basketball n=46; COMBAT: judo, karate n=9; RG: rhythm gymnast n=14) were evaluated as follows: Body Mass Index (BMI) and body fat percentage (%BF), using age-appropriate cutoff points[6,7] and equations[8,9]; b) Demographic characteristics: schooling, socioeconomic status[10], and level of competition; c) Habitual energy and macronutrient intake through a 24h-recall; d) Nutritional knowledge on concepts of food composition and food groups (multiple choice questions), plus 18 statements about sports nutrition, based on beliefs found in the literature (5-point Liekert scale). Every correct answer corresponded to one point. The possible knowledge score ranged from 0 to 53; e) Body satisfaction was evaluated using a silhouettes scale figures[11], representing from thinness to obesity. Athletes selected the silhouette that best represented their "actual silhouette" (AS) and their "desired silhouette" (DS). The difference between AS and DS represented the level of dissatisfaction (zero meaning satisfaction with body image, values less than zero representing the desire to have a larger body and values greater than zero representing the desire to have a thinner body); f) Risk of eating disorders was screened using self-administered translated and validated questionnaires[12] (Eating Attitudes Test - EAT26, Bulimic Investigatory Test of Edinburgh - BITE and the Body Shape Questionnaire – BSQ). The transtheoretical model was applied to identify the stage of behavior in relation to the adoption of a healthy diet[13]. ANOVA was used to compare groups and Tukey's test for multiple comparisons. Significance was considered when $p<0.05$. The Pearson coefficient of linear correlation and confidence intervals were also applied.

RESULTS

The majority of the sample (87%) comprised teenagers (10 to 19 years of age). Tables 1 and 2 show the general characteristics of the sample.

Table 1 Anthropometric and body composition characteristics

	n	Age (years)	Body mass (kg)	Height (m)	BMI (kg/m²)	%BF
RG	14	16.00[a]	46.8[c,d]	1.54[c,d]	19.9[c,d]	18.8[e,d]
		(4.64)	(10.7)	(0.08)	(2.9)	(3.8)
TEAM	46	17.30[b]	65.3[c]	1.67[c]	23.3[c]	24.0[e]
		(1.46)	(8.9)	(0.07)	(2.3)	(5.3)
COM	9	20.56[a,b]	61.9[d]	1.64[d]	23.0[d]	25.0[d]
		(5.32)	(10.9)	0,06	2.8	3.9

Mean (standard-deviation). [a]p=0,002; [b]p=0,046; [c] p≤0,001; [d] p≤0,05; [e]p=0,003

Table 2 Demographic characteristics

		RG n= 14 %	TEAM n = 46 %	COM n = 9 %
Schooling	Middle school	79	56	33
	High school	0	22	11
	College	21	22	56
Socioeconomic status	Class A	7	15	33
	Class B	50	56	33
	Class C	43	29	34
Level of competition	Regional	29	0	0
	Estadual	21	76	0
	Nacional	50	24	56
	Internacional	0	0	44

Energy intake was below minimum recommended values for 38% of the athlete's (<30 kcal/kg). No differences in macronutrient intake were observed between groups. Mean carbohydrate intake was low (<5g/kg/day) for all groups. Protein intake was high for 44.5% and 35.7% of COM and RG, respectively. Lipid intake was adequate for 57%, 76%, and 78% of the RG, TEAM and COM athletes, respectively (Table 3).

The most common beliefs are shown in Table 4. Knowledge scores were of 57.3±7.8%, 55.3±6.1%, and 57.9±6.1% correct answers for RG, TEAM, and COM, respectively, with no difference between groups (p=0.775). Knowledge was associated with higher level of schooling (p=0.001), but did not correlate with age, socioeconomic status, and the stage of intention of behavior change, for which athletes were classified in "preparation" (21.7%), "action" (20,3%) and "contemplation" (17.4%) stages (Figure 1).

Table 3 Energy and macronutrient intakes

Groups	n	Energy (kcal/d)	Energy (kcal/kg)	Protein (g/kg/d)	Carbohydrate (g/kg/d)	Lipids (%E)
RG	14	1533[a] (533)	34.2 (12.9)	1,5 (0.6)	4.6 (1.7)	28.4 (7.8)
TEAM	46	2296[a] (1283)	35.7 (19.4)	2,2 (3.5)	4,5 (2.5)	29.3 (6.1)
COM	9	2114 (1199)	35.1 (16.0)	1.6 (1.2)	4.6 (1.6)	30.3 (6.4)

Mean (standard-deviation) [a]p= 0.021

Table 4 Distribution of athletes according to beliefs

Beliefs	RG n=10 %	TEAM n=46 %	COM n=9 %
Athletes need 5 times more proteins than non-athletes	80	67	89
Plain water is the best hydration strategy to improve performance in long duration exercise	60	87	89
Egg whites and chicken breast (w/o skin) provide proteins that guarantee muscle gain	60	67	44
Bananas are fundamental to avoid cramps during exercise	50	74	44
Athletes should restrain fat intake as much as possible	70	48	56

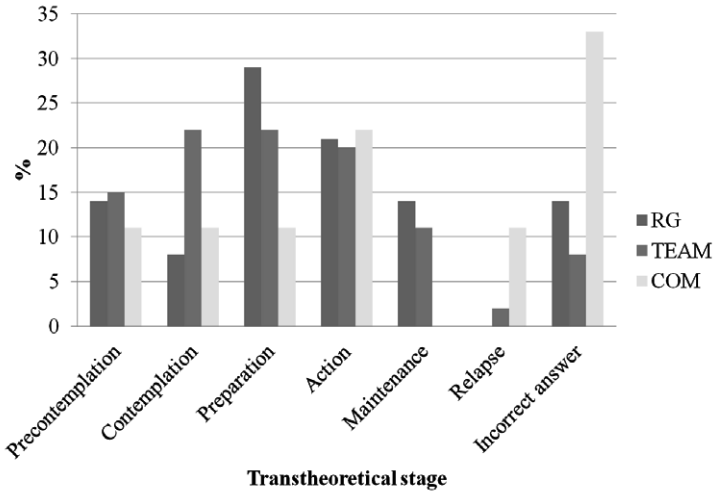

Figure 1
Distribution of the athletes according to transtheoretical stage

Body image dissatisfaction and distortion were observed in 82.6% and 33.3%, respectively. Out of the 23 athletes with body distortion, only 5 (21%) presented risk for eating disorder (EAT n=4; BITE n=1). Dissatisfaction varied from wishing five silhouettes thinner, up to three larger.

Figure 2 show the actual BMI of athletes and the silhouette (AS) chosen by them to represent their actual body. There was a moderate (RG: r=0.55; IC: 0.02-0.84) to strong (TEAM: r=0.72; IC:0.55-0.84; COM: r=0.72; IC:0.03-0.95) correlation between the BMI values and values of the corresponding AS. Although no difference was found between the groups (p=0.724), it can be observed that some athletes with the same BMI evaluated themselves differently regarding body image. For instance, athletes who chose the corresponding silhouette with a BMI equal to 30 show different actual BMI values ranging from approximately 22.5 to 30 kg/m2. The desire for another silhouette ranged from 5 silhouettes thinner to 3 silhouettes larger.

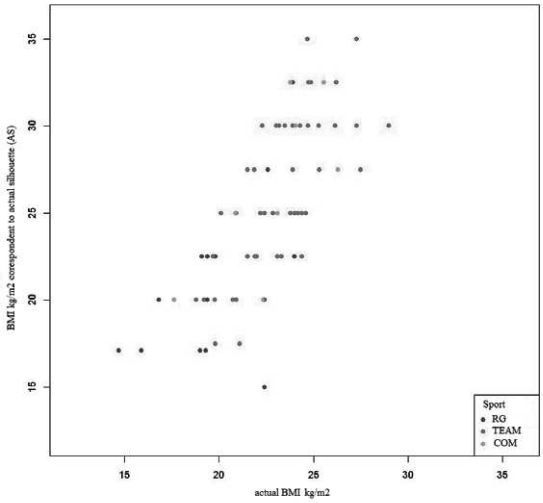

Figure 2
Correlation between athletes' BMI and the corresponding BMI of silhouette chosen as actual (AS)

DISCUSSION

The RG group was younger, lighter, shorter, and had lower body fat values than TEAM and COM athletes, reflecting the characteristics needed for success in this sport and described in other studies[14,15].

Mean energy intake of TEAM was similar to values found by Croll et al[16], who also evaluated a group of different power-team sports, and mean COM intake was higher than values found by Chagas e Ribeiro[17]. Although RG athletes' daily energy intake was lower than TEAM's and COM's, when adjusted to the weight (kcal/kg) there was no difference between groups, and was higher than found in another study of GR athletes[18]. Low energy intake observed in 38% of the sample is not uncommon among athletes[2,19]. Considering the age of the sample, such intake can lead to inhibited production of growth factors[20] and, in association with increased energy expenditure, can lead to development of the female athlete triad, characterized by the presence of disordered eating, amenorrhea and osteoporosis[2].

As well as in this study, low carbohydrate diets have been observed in other studies[2,17,19]. The high protein intake by some of the athletes, can be influenced by the overvaluation of proteins found in this study and in others[21,22,23], including specific sources[24]. Although very low-fat diets were believed to be the most adequate option by a high percentage of the athletes, mean lipid intake was adequate for most of them. The correlation between a higher education background observed in this study was also found by some other researchers[22,25], but not all[21], what may be related to the differences in type and curricula attended.

To understand the intention of behavior change is important because it allows the selection of the best strategies to stimulate progression to further stages, which are related to the adoption of new behaviors. Most athletes (42%) were identified as being in the preparation (intention of taking action towards a new behavior within a month) and action (specific modification in behavior already in progress within the last 6 months)[13]; however, no correlation between knowledge and intention of change was found, corroborating that other factors are involved in this progression process.

The high prevalence of body image dissatisfaction observed is worrisome as it is the main factor involved in the etiogenesis of eating disorders[5]. However, a low prevalence of eating disorder was identified in this sample. The correlation found between actual BMI and BMI correspondent to the actual silhouette (AS) shows that these athletes had a good perception of their body and confirms the low prevalence of body distortion, identified by the BSQ questionnaire. Female athletes are particularly susceptible to pressures in order to maintain a determined body image[5] and the dissatisfaction and quest for an excessively thinner body can influence food practices[22]. Although studies show that there are differences in body image perception according to sport[26], and that engagement in sports in which esthetics and weight-control play a major role (i.e. RG, combat sports) seem to lead to a greater prevalence of body image dissatisfaction[2], in this study no difference was found between groups.

CONCLUSION

The evaluation conducted in this study identified that female athletes present inadequate energy and macronutrient intakes, gaps in nutrition knowledge, especially regarding beliefs, and body dissatisfaction. This information associated with the knowledge of their stage of intention of behavior change brings important subsidies for the development of customized Food and Nutrition Programs, as well as individual counseling.

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