



Original/*Deporte y ejercicio*

Eating disorders and diet management in contact sports; EAT-26 questionnaire does not seem appropriate to evaluate eating disorders in sports

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Abstract

Introduction: there is a growing concern in the appearance of eating disorders in athletes, especially those that practice sports grouped into weight categories. This affects the way athletes eat, using frequently unhealthy strategies to control weight, especially during the pre-competition period.

Aim: this study analyses the prevalence of contact sports athletes in developing eating disorders, and how a controlled diet plan can reduce this risk. At the same time, it evaluates the use of the EAT-26 questionnaire to detect such disorders.

Methods: a randomized frequency study was performed on 244 athletes (158 men, 86 women), who were separated into two groups: those that followed a diet plan given by a nutritionist, and a control group on a free diet. The athletes completed an EAT-26 questionnaire while participating in the University-level National Championships.

Results: the free diet group scored significantly higher on the questionnaire. Also, the female athletes controlled diet group scored significantly higher than their male counterparts.

Discussion: the results of the questionnaire indicate that an adequate nutritional program circumvents the use of unhealthy habits to control body weight and therefore avoids developing particular eating disorders. EAT-26 questionnaire does not seem the most appropriate tool to detect these disorders.

(Nutr Hosp. 2015;32:1708-1714)

DOI:10.3305/nh.2015.32.4.9214

Key words: *Body weight. Contact sports. Combat sports. Healthy habits. Sport nutrition.*

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Recibido: 7-V-2015.
Aceptado: 26-VI-2015.

DESÓRDENES ALIMENTARIOS Y SUPERVISIÓN DIETÉTICA EN DEPORTES DE CONTACTO; EL CUESTIONARIO EAT-26 NO PARECE APROPIADO PARA EVALUAR DESÓRDENES ALIMENTARIOS EN DEPORTISTAS

Resumen

Introducción: existe una preocupación creciente por los desórdenes alimentarios en deportistas, especialmente en aquellos que practican deportes agrupados en categorías de peso. Esto afecta a la manera de comer de los deportistas, usando con frecuencia estrategias no saludables para control del peso, en especial en periodo precompetitivo.

Objetivo: este estudio analiza la prevalencia de desórdenes alimentarios en deportistas de deportes de contacto, y cómo una planificación dietética controlada puede reducir el riesgo. También valora el uso del cuestionario EAT-26 para detectar dichos desórdenes.

Métodos: ha sido realizado un estudio aleatorizado de frecuencias en 244 deportistas (158 varones, 86 mujeres), que fueron separados en dos grupos: los que seguían un plan dietético proporcionado por un nutricionista y un grupo control con una dieta libre. Los participantes rellenaron el cuestionario EAT-26 mientras participaban en los Campeonatos Universitarios Nacionales.

Resultados: el grupo con dieta libre puntuó con valores más altos en el cuestionario. Al mismo tiempo, los deportistas que seguían una dieta controlada puntuaron de forma significativa en el cuestionario respecto a los varones del mismo grupo.

Discusión: los resultados del cuestionario indican que una adecuada planificación nutricional evita el uso de hábitos poco saludables para controlar el peso corporal, evitando desarrollar desórdenes alimentarios particulares. El cuestionario EAT-26 no parece la herramienta más apropiada para detectar estos desórdenes.

(Nutr Hosp. 2015;32:1708-1714)

DOI:10.3305/nh.2015.32.4.9214

Palabras clave: *Peso corporal. Deportes de contacto. Deportes de lucha. Hábitos no saludables. Nutrición deportiva.*

Abbreviations

AMDQ: Athletic Milieu Direct Questionnaire.
BEDA-Q: Brief Eating Disorders in Athletes Questionnaire.
BULIT-R: Bulimia Test-Revised.
C: Control group following free diet.
CHRIS-73: College Health-Related Information Survey.
D: Group following a diet plan.
EAT-26: Eating Attitudes Test-26.
EDE-Q: Eating Disorder Examination Questionnaire.
EDI: Eating Disorder Inventory.
FAST: Female Athlete Screening Tool.
J: Judo competitors.
K: Karate competitors.
K-S test: Kolmogorov-Smirnov test.
M: Men.
PST: Physiologic Screening Test.
SEDA: Survey of Eating Disorders among Athletes.
T: Taekwondo competitors.
W: Women.

Introduction

Eating disorders generally appear when a person's body image is distorted, mainly due to social and cultural factors¹. Eating disorders are subdivided into anorexia nervosa, bulimia nervosa, and atypical eating disorders. Anorexia nervosa is characterized by severe food restrictions supported by purgative behaviours¹. Bulimia nervosa combines food restrictions with episodes of compulsive binge-eating followed by induced vomiting. Finally, atypical eating disorders might take account of those profiles that do not match the previous two cases, such as eating disorders associated to weight control in sports².

There is a growing concern in the appearance of eating disorders in athletes, especially those that practice sports where they are divided into weight categories. This method of categorization affects the way athletes train and eat, who aspire to possess very low fat content and high muscle mass. Recent studies have indicated that many athletes use unhealthy strategies to control their weight, especially when a competition is near³. The strategies include vomiting, severe water and food restrictions, and induced sweating⁴. Therefore, it is of vital importance to identify and prevent the appearance of these eating disorders. This is especially true in female athletes, due to the higher prevalence of eating disorders in women⁵. However, there is very little information regarding unhealthy weight control habits in male athletes⁶. Unlike other populations where eating disorders appear due to negative social and cultural influences, athletes adopt these unhealthy strategies in order to compete in a desired weight category⁷. In many cases, these strategies are not seen as potentially harmful by the athlete, and are

even recommended by their trainers. Therefore, it is crucial to educate the athlete and their trainers as to what are adequate methods of weight control, including adopting proper eating habits.

Objectives

The objective of this study is to verify if an adequate diet plan can decrease behaviours related with eating disorders in contact sports athletes. To this end, a group of male and female athletes following a controlled diet plan were analyzed using the EAT-26 questionnaire and compared with a control group on a free diet.

Method

Participants

This study was performed with 244 volunteers participating in the University-level National Championships of judo, karate-kumite, and taekwondo. To facilitate comprehension, the study groups were referred combining the abbreviations: J for judo competitors, K for karate competitors, T for taekwondo competitors, M for men, W for women, C for the control group following free diet, and D for the group following a diet plan. Weight and age of each group are indicated in figure 1. Competitors participating in the categories with no upper weight limit (heavy weights) were not considered for this study.

Procedure and measurements

A modified version of the EAT-26 questionnaire (Eating Attitudes Test-26) was used in the study⁸. The questionnaire indicates the risk or presence of eating disorders. It is comprised of 23 items divided into 3 scales: dieting scale, bulimia and food preoccupation scale, and the oral control scale. The dieting scale evaluates food restriction and obsession for losing weight. The bulimia and food preoccupation scale evaluates the use of binge-eating/induced vomiting conducts and thoughts about food. Finally, the oral control scale evaluates food intake self-control and the pressure of the environment to lose weight. Items 1, 6, 7, 10, 11, 12, 14, 16, 17, 22, 23, 24, and 25 pertain to the diet scale, while the values obtained in items 3, 4, 9, 18, 21, and 26 account for the bulimia scale. The remaining items correspond to the oral control scale (2, 5, 8, 13, 15, 19, and 20). The answers and value for each item (except for items 1 and 25) include: never (0 points), rarely (0 points), sometimes (0 points), often (1 point), usually (2 points), and always (3 points). The answers and score for items 1 and 25 were inverted. A score of 20 or more (out of a total of 78)

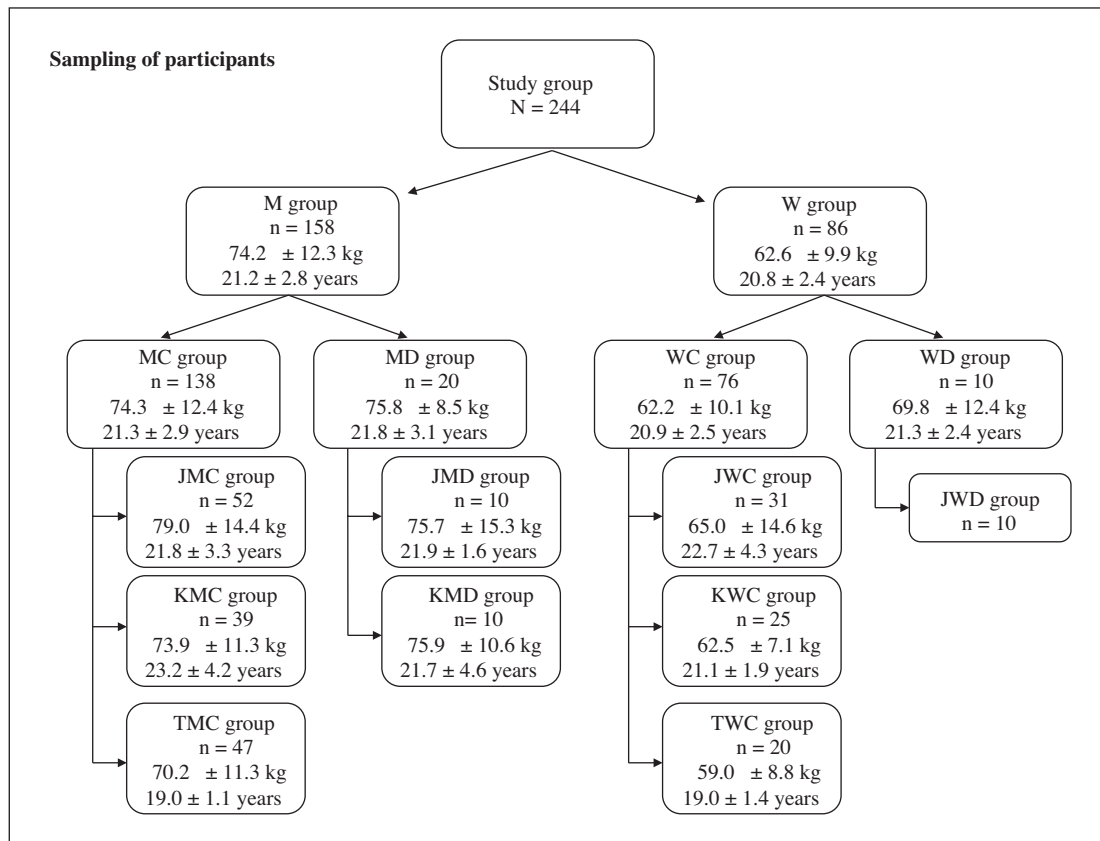


Fig. 1.—

indicates a risk of developing or presenting an eating disorder⁸. The analysis of internal validity and consistency of the questionnaire (Cronbach's alpha) for the 3 factors was: dieting ($=0.78$), bulimia ($=0.82$), and oral control ($=0.84$)⁹.

This study was conducted according to the guidelines written in the Declaration of Helsinki and APA Ethics Code. All procedures were approved by the Ethical Committee of the University. A written informed consent was obtained from all participants. Anonymity was preserved for all participants.

Research Design

The study consisted in comparing the EAT-26 scores of the athletes following a diet plan (JMD, KMD, and JWD) with the values obtained in the control group. The last group was randomly recruited during the University-level National Championships of judo, karate-kumite, and taekwondo where the groups on a controlled diet plan also participated.

JMD, KMD, and JWD groups initiated the diet plan 2-7 months before the tournament. The athletes that required more weight loss commenced the diet plan earlier than the rest of the athletes. Caloric expenditure was estimated and divided into 3 components: resting metabolic rate, thermal effect of feeding and physical activity expenditure. Resting metabolism was

calculated according to the Harris-Benedict equation taking in account in each case gender, the weight in kg, height in cm, and the age in years. Corrected body weight was taken into account for the calculations, considering as ideal weight the upper limit of each weight category in the corresponding disciplines. The thermal effect of food was estimated as the 8.50% of the sum of the resting metabolic rate plus physical activity expenditure¹⁰. Physical activity expenditure was estimated from previously published tables¹¹.

Daily food intakes were adapted according to activity and frequency taking into account training and resting days. For weight reduction, a 10-15% calorie restriction was applied in meals far from the training sessions. The diets were adjusted to 1.60-2.00 g of protein/day/kg of body weight, 1 g of fat/day/kg of body weight, and 5-6 g of carbohydrates/day/kg of body weight. The software used to design the diet plan was DietSource[®] 3.0 (Novartis, Barcelona, Spain).

Data Analysis

Software SPSS[®] version 20.0 was used for data analysis. Different descriptive analyses were performed: ANOVA, post-hoc tests, one-sample K-S test (Kolmogorov-Smirnov test), and T-test for independent samples to compare means between different groups. The results in table I were expressed as mean

and standard error of the mean. Statistical significance was set at $p < 0.05$.

Results

The scores obtained from the EAT-26 questionnaire are indicated in table I. In the case of the male athletes, the control group (MC) scored higher in all the scales than those following a diet plan (MD) (Table II: line 1). Similar results were obtained in the female groups, except for the Dieting scale where differences with WC group were not significant (Table II: line 2).

In the control group, the female athletes presented significantly higher scores than males (Table II: line 3). This difference was not observed in the group following a diet plan, although the scores in the female group were slightly higher (Table II: line 4).

In the case of the male judo athletes, significant differences were only observed in the Dieting scale and total score (Table II: line 5). As for the female judo athletes, higher scores were observed in the Bulimia

and Oral control scales as well as total score in the JWC group (Table II: line 6). Finally, KWC group presented higher scores in all scales except for the Bulimia scale (Table II: line 7).

Several interesting differences were observed when comparing the sports disciplines (Table II: lines 8-12). In the case of male athletes, KMC scored lower in the Bulimia scale than JMC and TMC (Table II: line 8). No differences were observed between JMD, KMD, and TMD. Regarding the female athletes, the Dieting scale scores were significantly different in the KWC group compared to both JWC and TWC (Table II: lines 11 and 12). On the other hand, the JWC group presented significantly higher scores compared to both KWC and TWC in the Oral control scale (Table II: lines 11 and 12). Finally, and taking into account the total score of the EAT-26 test, the KWC and JWC groups presented significantly higher scores than the TWC group.

In conclusion and considering the answers in the EAT-26 test and the final score reached, three judo competitors (one man and two women) and three tae-

Table I
Scores obtained from study participants after answering the EAT-26 questionnaire

Group (n)	Dieting	Bulimia	Oral control	Eating disorders
M (158)				
MC (138)	4.46±4.24*	1.59±1.55*	2.00±2.25*	8.04±6.04*
MD (20)	3.25±1.52*	0.95±0.83*	1.40±0.88*	5.60±2.01*
JM (62)				
JMC (52)	4.81±3.90*	1.69±1.65*	2.36±2.33	8.87±5.37*
JMD (10)	3.20±1.55*	1.10±0.88	1.60±0.97	5.90±2.28*
KM (49)				
KMC (39)	5.16±3.33*	1.13±1.06*	2.21±1.70*	8.49±3.67*
KMD (10)	3.30±1.57*	0.80±0.79	1.20±0.79*	5.30±1.77*
TM (47)				
TMC (47)	3.49±5.09	1.85±1.71*	1.43±2.48	6.77±7.94
W (86)				
WC (76)	4.64±4.04	2.37±2.13*	2.89±2.18*	9.91±4.88*
WD (10)	3.80±1.48	1.20±0.92*	1.90±1.10*	6.90±1.59*
JW (41)				
JWC (31)	4.29±4.28*	2.77±2.39*	3.87±2.25*	10.94±4.88*
JWD (10)	3.80±1.48	1.20±0.92*	1.90±1.10*	6.90±1.59*
KW (25)				
KWC (25)	6.96±3.82*	1.84±2.12	2.28±1.81*	11.08±4.95*
TW (20)				
TWC (20)	2.30±2.00*	2.40±1.64	2.15±1.98*	6.85±3.49*

Results expressed as mean±standard error of the mean. Dieting, Bulimia and Oral control correspond to subscales of the EAT-26. Eating disorders correspond to the total score of EAT-26. See Method section for abbreviation combinations. *Results significantly different (see Table II).

kwondo competitors (two men and one woman), presented risks of developing eating disorders (EAT-26 score >20).

Discussion

Athletes that compete in contact sports, particularly those that are placed in weight categories, are at risk of developing particular eating disorders. The current study demonstrates that an adequately-controlled diet plan is capable of reducing this risk. Furthermore, the results of this study reveal that female athletes on a free diet scored higher on the questionnaire than men, and therefore are more susceptible to use unhealthy eating strategies. This observation has also been commented in previous studies^{12, 13}. In this context, the highest level of risk was detected in female judo and taekwondo competitors on a free diet (6.5% and 5.0%, respectively). In the case of male athletes, 4.3% of the taekwondo competitors and 1.9% of the judo competitors on a free diet were at risk, according to EAT-26 questionnaire.

Several recent studies have shown that women practicing highly-demanding sports are at a high risk of developing eating disorders, being twice as prevalent as in men¹⁴. This has also been observed in our study (3.5% in women vs 1.8% in men). Interestingly, karate competitors, including those on a free diet, did not present eating disorders. In this respect, karate is the only discipline that is not an Olympic sport. Thus, it is possible to hypothesize that weight control in karate may not be a conditioning factor for the development of inadequate eating habits as in the other sports analyzed.

Athletes that practice contact sports may represent a very particular population in the context of eating disorders. For this reason, several authors have questioned the use of EAT-26 in these types of sports disciplines, despite its frequent use¹⁵⁻¹⁸. These authors argue that the majority of the strategies used by competitors are not reported in the questionnaire, even though they are very harmful for the individual's health. These strategies give rise to dehydration and glycogen depletion, compromising electrolyte balance and energy storage, resulting in a loss of concentration and premature fatigue during the contest. Indeed, contact sports athletes commonly use strategies to lose weight that are not included in the questionnaire, such as water restrictions and induced sweating, as well as exercising or sleeping with anti-perspiration wear. In addition, these strategies are generally practiced only when a competition approaches. This greatly differs from other so-called typical eating disorders (anorexia and bulimia nervosa), which are generally practiced on a regular basis. The strategies used by these athletes, if performed during a prolonged amount of time (such as during the competition season), can eventually result in severe health problems.

The EAT-26 questionnaire, despite not being the most adequate for this type of study as previously indicated, was used in the present study for three reasons. First, the lack of a specific questionnaire for contact sports. Second, the time and circumstances necessary to complete the questionnaire. And third, the target population. Indeed, alternative questionnaires to detect eating disorders or aberrant nutritional habits are available, but are not adequately adapted to contact sports athletes. For example, BULIT-R (Bulimia Test-Revi-

Table II
Subscales of EAT-26 questionnaire displaying or not significant differences when comparing different groups

Line	Dieting	Bulimia	Oral control	Eating disorders
	Comparison / Significance	Comparison / Significance	Comparison / Significance	Comparison / Significance
1	MC>MD / 0.017	MC>MD / 0.008	MC>MD / 0.033	MC>MD / 0.001
2	WC=WD / ns	WC>WD / 0.005	WC>WD / 0.031	WC>WD / 0.000
3	WC=MC / ns	WC>MC / 0.006	WC>MC / 0.005	WC>MC / 0.022
4	WD=MD / ns	WD=MD / ns	WD=MD / ns	WD=MD / ns
5	JMC>JMD / 0.034	JMC=JMD / ns	JMC=JMD / ns	JMC>JMD / 0.007
6	JWC=JWD / ns	JWC>JWD / 0.004	JWC>JWD / 0.001	JWC>JWD / 0.000
7	KMC>KMD / 0.016	KMC=KMD / ns	KMC>KMD / 0.010	KMC>KMD / 0.000
8	JMC=KMC / ns	JMC>KMC / 0.050	JMC=KMC / ns	JMC=KMC / ns
9	JMD=KMD / ns	JMD=KMD / ns	JMD=KMD / ns	JMD=KMD / ns
10	JMC=KMC=TMC / ns	TMC>KMC / 0.045	JMC=KMC=TMC / ns	JMC=KMC=TMC / ns
11	KWC>JWC / 0.044	JWC=KWC=TWC / ns	JWC>KWC / 0.014	KWC>TWC / 0.008
12	KWC>TWC / 0.000		JWC>TWC / 0.012	JWC>TWC / 0.008

Dieting, Bulimia and Oral control correspond to subscales of the EAT-26. Eating disorders correspond to the total score of EAT-26. See Method section for abbreviation combinations; ns=not significant.

sed), EDE-Q (Eating Disorder Examination Questionnaire), EDI (Eating Disorder Inventory), or the revised version of EDI-2 are mainly centered on bulimic habits and related to self body-image interpretation¹⁹⁻²². In athletes, weight loss is not related to body image but to be able to compete in a certain weight category. In this context, EAT-26, although with limitations, is the most adequate tool to study this population. Several of the questions in the EAT-26 questionnaire target strategies that competitors occasionally use to lose weight such as induced vomiting. In our report, these answers have been detected even in cases where the athlete scored below 20²³. This can be possibly due to the social environment, which greatly differs with those affected with anorexia nervosa or bulimia. In this context, it is especially surprising that the use of inadequate weight loss strategies is not hidden by the individuals. In fact, these habits are generally performed publicly and in many cases supported by the coaches, family, and other competitors, a situation which is unthinkable in people affected by other eating disorders.

The second aspect previously commented of the EAT-26 questionnaire is in regard to the time necessary to fill out the survey. In this context, the volunteers of this study completed the survey while competing at the University-level National Championship. The EAT-26 questionnaire has 26 items, which is shorter than other possible surveys (36 in BULIT-R, 64 in EDI, 91 in EDI-2, and 36 in EDE-Q). The FAST (Female Athlete Screening Tool) and AMDQ (Athletic Milieu Direct Questionnaire) questionnaires have 33 and 19 items, respectively, but are specifically for female athletes only^{24, 25}. The PST (Physiologic Screening Test) contains 18 items, but requires 4 physiological examinations²⁶ that are impossible to perform during a competition. The SEDA (Survey of Eating Disorders among Athletes) questionnaire initially would seem a more adequate tool for this survey, but has the drawback of being more limited in identifying risk factors²⁷. The CHRIS-73 (College Health-Related Information Survey) questionnaire has 32 items, but has been used in very few studies and remains to be validated²⁸. Finally the BEDA-Q (Brief Eating Disorders in Athletes Questionnaire) has been developed exclusively for high school elite female athletes²⁹.

Interestingly, a specific questionnaire for judo athletes exists³⁰, addressing the evaluation of key questions such as the use of techniques for rapid weight loss, inadequate diet strategies, induced vomiting, or the use of laxatives. However, subsequent studies from the same group have opted to use the EAT-26 questionnaire³¹, forfeiting their previous questionnaire. Therefore, considering all the possible questionnaires, the EAT-26 seems to be appropriate to perform this study, but with key limitations. Therefore, it is necessary to develop a more specific questionnaire for contact sports athletes that more adequately addresses the environment in which they compete as well as the strategies used for weight control.

In conclusion, a controlled diet plan helps to minimize the risk of using unhealthy strategies to reduce body weight, decreasing the risk of developing eating disorders that may damage the athlete's health. The athletes on a controlled diet scored lower in the questionnaire, independently of gender and sport discipline. The addition of an educational program for the athletes and their trainers would be very useful in further improve the results of the diet plan.

To our knowledge, this is the first interventional study indicating that an adequate nutritional program in contact sport athletes decreases the risk of developing unhealthy habits that could evolve into eating disorders. This finding reinforces the figure of a Nutritionist to advise coaches and competitors on healthy eating habits, as well as to design a diet plan. In addition, this study alerts about the necessity of developing a more specific questionnaire and screening tools to address the particular aspects of contact sports.

Acknowledgements

This work was supported by Generalitat Valenciana under Grant PROMETEO/2012/007 and by Instituto de Salud Carlos III (Spain) under Grant CIBEROBN (CB12/03/30038).

Conflict of interest

Authors declare no conflicts of interest.

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