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Factors Associated with Eating Disorders in Male Athletes

Erkek Sporcularda Beslenme Bozukluğu ile İlişkili Faktörler

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ABSTRACT

Objectives: Pertaining literature is inconclusive and fails to explain sport-related factors for disordered eating in male athletes. The aim of this sudy was to identify some risk factors that may contribute to disordered eating attitudes and behaviors in male athletes according to type and level of participation to sports activity.

Material and Methods: A cross-sectional Eating Disorder Examination Questionnaire (EDE-Q) survey was conducted to determine the prevalence of disordered eating among male athletes and non-athletes. The total sample of participants consisted of 186 males, 18-26 years old. The male athletes were divided into groups according to sport type ("lean" sports and "non-lean" sports) and athletic participation (recreational athletes, low- and high-competitive level).

Results: The mean values of all subscales of EDE-Q revealed no significant difference for non-athletes and athletes, as well as between the groups according to sports type and competitive level. About 50% of the non-athletes reported binge eating episodes, etc., vs. 42.0% of athletes differences being insignificant. The percentages of excessive exercising for the same groups were 12.5% and 23.1%, respectively. The prevalence of excessive exercising in "lean" sport athletes (38.2%) was significantly higher than in "non-lean" athletes (13.8%). Self-induced vomiting and use of laxatives were with low prevalence in all surveyed groups. We did not identify any differences between groups according to level of athletic participation, with the exception of a higher percentage in male athletes with high competitive level with scores ≥4 for the dietary restraint subscale.

Conclusion: This study identified the presence of disordered eating patterns and pathogenic weight control behaviors in both male athletes and non-athletes, the difference between them was statistically insignificant. Among the pathological weight-controlling behaviors, only the compulsive exercising was with higher incidence rate in athletes of "lean" sports when compared with "non-lean" sports. There were significant differences in prevelance of dietary restraints in highly competitive athletes in terms of level of athletic participation. Considering the levels of participation, only those who were at a higher competitive level have performed more dietary restrictions. It is not possible to say that type of sport and level of participation pose a greater risk for eating disorders in male athletes. There is need for further research examining other factors that may relate to eating disorder attitudes and behaviors in male athletes.

Keywords: Eating disorders, male athletes, EDE-Q, type of sport, level of athletic participation

ÖZ

Amaç: Erkek sporcularda görülen beslenme bozuklukları için literatür bilgisi yetersizdir ve sporla ilgili faktörleri açıklayamamaktadır. Bu çalışmanın amacı erkeklerde spor aktivitesine, türüne ve katılım düzeyine göre düzensiz yeme tutum ve davranışlarını etkileyebilecek bazı risk faktörlerini belirlemektir.

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Gereç ve Yöntemler: Erkek sporcular ve sporcu olmayanlar arasında düzensiz yeme sıklığını belirlemek için kesitsel bir Yeme Bozukluğu Belirleme (EDE-Q) anketi uygulandı. Tüm grup 18-26 yaşları arasındaki 186 erkekten oluşuyordu. Erkek sporcular, spor türüne (kas geliştirme etkisi az ve çok olan) ve spora katılıma (eğlence amaçlı spor, düşük ve yüksek yarışma düzeyi) göre gruplara ayrıldı.

Bulgular: EDE-Q alt ölçeklerinin ortalama değerleri, sporcu olmayanlar ve sporcular için olduğu kadar, spor türü ve yarışma düzeyine göre karşılaştırıldığında anlamlı bir farklılık ortaya koymadı. Sporcu olmayanların %50'si, sporcuların ise %42.0'si tıkanırcasına yeme atağı vb. Bildirdi, ancak aralarındaki fark istatistiksel olarak anlamlı değildi. Aynı gruplar için aşırı egzersiz oranları sırasıyla %12.5 ve %23.1 idi. Kas gelişimi ağırlıklı sporcularda aşırı egzersiz sıklığı (%38.2) daha az kas geliştiren spor türlerine göre (%13.8) anlamlı derecede yüksekti. Kusmayı uyarma ve laksatiflerin kullanımı prevalansı tüm anket gruplarında düşüktü. Diyet kısıtlaması alt ölçeği için ≥4 puan alan yüksek yarışma düzeyine sahip erkek sporculardaki yüksek oranlar hariç, grupların spora katılım düzeyine göre herhangi bir anlamlı farklılık bulunmadı.

Sonuç: Bu çalışma, hem erkek sporcularda, hem de sporcu olmayanlarda yeme bozukluğu ve patojenik kilo kontrolü davranışlarının varlığını tanımladı, ancak aralarındaki farkı istatistiksel olarak anlamlı olmadı. Patolojik kilo kontrol edici davranışlar göz önüne alındığında, kas geliştirici spor yapanların diğerlerine göre daha fazla zorlayıcı egzersiz yaptıkları gözlendi. Spora katılım düzeyleri göz önüne alındığında, yalnızca yüksek yarışmacı düzeyde spor yapanların daha fazla diyet kısıtlaması yaptıkları belirlendi. Spor türü ve katılım düzeyinin erkek sporcularda yeme bozuklukları için daha büyük bir risk oluşturduğunu söylemek mümkün değildir. Erkek sporcularda yeme bozukluğu ve davranışları ile ilgili olabilecek diğer faktörleri inceleyen daha fazla araştırmaya ihtiyaç vardır.

Anahtar Sözcükler: Yeme bozuklukları, erkek sporcular, EDE-Q, spor türü, spora katılım düzeyi

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INTRODUCTION

Eating disorders are severe disturbances to a person's eating behavior that adversely impact physical and psychological health. Recent research confirms that athletes experience a greater prevalence of eating disorders than the general population (1,2).

The emergency of pathological eating behavior was initially linked to women. Eating disorder results in low energy availability, and is the triggering component of the female athlete triad that includes also menstrual irregularities and osteopenia. Each of these conditions is a distinct medical concern, but together they interconnect and aggravate one another and may have critical health consequences for athletes (3).

Clinical eating disorders, such as anorexia nervosa and bulimia nervosa may be life threatening conditions. Actually, most of the athletes do not meet the criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) (4) for eating disorders, and have pathogenic eating behaviors that present with insufficient frequency or severity. These subclinical forms are considered as "disordered eating" (DE) and include a range of pathological eating behaviors (binge eating), unhealthy weight control behaviors (self-induced vomiting; laxatives, diuretics and diet pill misuse, restrictive dieting, over-exercising), and body image distortions. Disordered eating behaviors practiced on a regular basis are considered risk factors for developing a clinical eating disorder, but having disturbed eating patterns does not necessarily mean that a clinical eating disorder will develop (5).

Two decades ago, it was thought that the ratio between women and men with eating disorders is more than 10:1. This is the reason why most studies on the prevalence of eating psycho-pathology in the athletic population have been conducted with women. However, in recent years the eating behavior of men is also in the focus of attention of researchers (6). A number of studies have revealed a higher incidence of eating disorders in male athletes than in their non-athlete peers in the general population. For example, Sundgot-Borgen and Torstveit found that 8% of elite male athletes met criteria for an eating disorder as compared with 0.5% of the controls (1).

The results of DiPasquale and Petrie also showed lower eating disorder prevalence rates and use

of pathogenic weight control behaviors among non-athletes than athletes (7). The same is the result reported by Martinsen and Sundgot-Borgen (8). However, two studies based on self-report questionnaires reported higher prevalence of disordered eating among non-athletes compared with the athletes (2,9).

The risk groups for disordered eating in male athletes identified in the literature are almost the same as in female athletes. The main body of research has identified a higher prevalence of pathological eating behaviors in sports with weight classes (boxing, weightlifting, judo, taekwondo, wrestling), aesthetic sports (such as gymnastics or figure skating), and in sports where having low body weight is advantageous (endurance sports) (1,6,10-13). Controversially, the meta analysis of Chapman and Woodman revealed no significant difference between male athletes of aesthetic sports and controls as well as no risk associated with practicing endurance sport (14). Some authors even found similar prevalence of eating disorders in both sexes (15).

Another factor that may contribute to the prevalence of disordered eating in male athletes is the level of athletic participation. However, the data about competitive level as a risk factor for DE are also controversial. According to Sundgot-Borgen, increased training volume of elite athletes might lead to a greater likelihood of disordered eating behaviors (10). However, Darcy et al. found that recreational athletes score higher than elite athletes (16).

Literature available concerning male athletes is inconclusive and fails to explain sport-related factors for DE. A better knowledge about risk factors for disordered eating will contribute to an understanding of how sport-specific pressures influence the incidence of eating disorders in male athletes and will direct sports professionals who work with male athletes in the identification of at-risk athletes and the implementation of preventing programs. The present study aimed to identify some risk factors that may contribute to disordered eating attitudes and behaviors in males: namely, engagement in sporting activity, type of sport and level of athletic participation.

MATERIALS and METHODS

A cross-sectional questionnaire survey was conducted to determine the prevalence of disordered eating among male athletes and non-athletes. The study was approved by the Ethical Board of National Sports Academy, Sofia, and was performed in accordance with the Helsinki Declaration, revised 2013.

Subjects

The total sample of participants in this study consisted of 186 males between 18 to 26 years of age. All participants were university students at the National Sports Academy, Sofia,. The sample included 138 randomly selected volunteer male athletes from different sport fields, and a control group of 48 male subjects non practicing sports. All participants were informed about the objective of the study before answering the questionnaire and gave their informed consent for participation. The exclusion criteria for participation in the study was the presence of a previously diagnosed or treated clinical eating disorder.

The male athletes were divided into two groups according to sport type: “lean” sports (n=55) and “non-lean” sports (n=83). As “lean” were classified sports where low body weight/lean body or aesthetic appearance gives competitive or biomechanical advantage (aesthetic sports, endurance sports, weight-dependent sports, antigravitation sports). All sports not considered to be “lean”, would be considered to be “non-lean” (ball games, tennis, shooting sports, orienteering, motor racing) (17).

In order to understand how the level of athletic participation affects the incidents of DE, male athletes were divided into three groups: *Recreational athletes/exercisers*, ie. athletes engaged in regular sports activities at least twice weekly without participation in competitions (n=32); *low competitive level,* ie. athletes engaged in regular sports and competing on regional and national level (n=77); *high competitive level,* ie. elite athletes engaged in regular sports and participating in international competitions (n=29).

Screening for disordered eating

The 28-item anonymous paper-based Eating Disorder Examination Questionnaire (EDE-Q 6.0) (18) was used for determining the prevalence of disordered eating attitudes. EDE-Q is composed of four subscales: Dietary Restraint (DR), Eating Concerns (EC), Shape Concern (SC), Weight Concern (WC), as well as Global Score (GS). GS was calculated as an arithmetic mean of the four subscale scores.

In addition to subscales, the questionnaire includes questions about the presence of some pathogenic behaviors related to nutrition and maintenance of low weight, such as binge eating, self-induced vomiting, use of laxatives, or intentional intensive physical exercise aimed to control the weight (18). The participants also provided information about their age, sporting experience, participation in competitions and competitive level. Self-reported weight and height were used to calculate body mass index (BMI).

EDE-Q scores were evaluated as continuous and dichotomous variables, and a mean cutoff of ≥4.0 for the subscales WC, SC, DR or GS was used to classify the athletes as having clinical significant disordered eating (18). Pathogenic behavior was considered as of clinical severity if binge eating, self-induced vomiting or use of laxatives was reported on ≥2 days in the preceding 28 days (18); or if excessive exercise for controlling the weight was practiced ≥5 days in a week in the preceding 28 days (19).

Statistical Analysis

Statistical analyses were performed using SPSS v23.0. Descriptive statistics (mean ± SD) were computed for physical variables (age, height, weight, BMI, sport experience) and for EDE-Q subscales. Normality of all parametric variables was tested using Shapiro-Wilk normality test. An independent samples t-test and one-way ANOVA statistics were used for evaluation of differencesin the characteristics of the groups of non-athletes and athletes, as well between groups according to sport type and competitive level. Differences in EDE-Q scores of the studied groups were examined by non-parametric tests, respectively, by Mann-Whitney U-test and Kruskal-Wallis test. Chi-square analyses were conducted to compare differences in percentage of athletes with DE in the studied groups. An alpha level of $p<0.05$ was used to establish significance for all procedures.

RESULTS

Table 1 presents the physical characteristics of the studied male subjects grouped according to whether they were practicing sport or not, type of sport, and level of athletic participation. Male athletes and non-athletes, as well as the athletes from both sport-type groups did not differ in mean age, height, weight and BMI. No difference was found in the corresponding physical variables of athletes from non-lean sports and lean sports. ANOVA statistics revealed also insignificant difference in physical characteristics, age and sporting experience between the groups according to competitive level.

The results from the descriptive statistic (means and standard deviations) of EDE-Q subscales and Global Score are given in Table 2. As can be seen, the mean values of all subscales of EDE-Q were very close and without significant difference for non-athletes and athletes, as well as between the groups according to the type of sport and competitive level. EDE-subscale scores can vary between 0 and 6, but those that are ≥4 indicates that a subject places greater concern on dietary restraint, body shape and weight, and is at a higher risk for practicing restrictive eating behaviors.

Table 1. Subject's physical characteristics

Groups / Variables	Age (yr)	Height (cm)	Weight (kg)	BMI ($kg.m^{-2}$)	Sports experience (yr)
Groups according to athletic participation					
Non-athletes (n=48)	23.4 ± 3.6	179.4 ± 7.0	79.0 ± 13.4	24.5 ± 3.5	0
Athletes (n=138)	22.5 ± 2.9	180.4 ± 7.3	78.1 ± 10.3	23.9 ± 2.6	8.31 ± 4.3
Groups according to type of sports					
"Non-lean" sports (n=83)	22.2 ± 2.0	178.7 ± 19.0	77.6 ± 10.7	23.7 ± 2.4	7.98 ± 4.9
"Lean" sports (n=55)	22.8 ± 3.8	180.0 ± 7.2	78.9 ± 10.8	24.3 ± 2.9	8.53 ± 3.8
Groups according to competitive level					
Recreational athletes (n=62)	22.9 ± 2.6	181.8 ± 8.0	81.6 ± 11.0	24.8 ± 3.0	6.83 ± 4.9
Low competitive level (n=83)	22.5 ± 2.9	180.0 ± 7.1	77.0 ± 10.8	23.7 ± 2.5	8.40 ± 4.2
High competitive level (n=57)	21.8 ± 2.9	180.9 ± 7.3	77.2 ± 10.9	23.6 ± 2.6	9.55 ± 4.2

Figures as mean ± standard deviation; T-test for independent samples: comparisons between athletes and non-athletes; non-lean sports and lean sports; one-way ANOVA: comparisons between groups according to competitive level

Table 2. Eating disorder examination questionnaire subscale scores

Groups / EDE-Q subscales	Dietary Restraint	Eating Concern	Shape Concern	Weight Concern	Global Score
Groups according to sports participation					
Non-athletes (n=48)	1.06 ± 1.01	0.63 ± 0.75	1.33 ± 1.03	1.01 ± 0.93	1.01 ± 0.72
Athletes (n=138)	1.27 ± 0.84	0.64 ± 0.84	1.30 ± 1.06	0.97 ± 1.07	1.04 ± 0.91
Groups according to type of sports					
Non-lean sports (n=83)	1.17 ± 1.35	0.68 ± 0.89	1.25 ± 1.06	0.90 ± 0.99	1.00 ± 0.91
Lean sports (n=55)	1.43 ± 1.42	0.57 ± 0.77	1.37 ± 1.06	1.08 ± 1.18	1.11 ± 0.91
Groups according to competitive level					
Recreational athletes (n=62)	1.09 ± 1.05	0.63 ± 0.91	1.27 ± 1.07	1.18 ± 1.32	1.04 ± 0.95
Low competitive level (n=83)	1.22 ± 1.43	0.62 ± 0.79	1.33 ± 1.14	0.94 ± 1.03	1.03 ± 0.95
High competitive level (n=57)	1.62 ± 1.40	0.70 ± 1.06	1.25 ± 1.06	0.82 ± 1.08	1.10 ± 0.92

Figures as mean ± standard deviation; Mann-Whitney U-test: comparisons between athletes and non-athletes; non-lean sports and lean sports; Kruskal-Wallis H-test: comparisons between groups according to competitive level

Table 3 presents the comparison of the prevalence of clinically significant disordered eating, determined on the basis of estimates of subscales DR, SC, WC, or GS ≥4 and disordered eating behaviors across sport type. About 5.5% (n=3) of the athletes competing in sports in which leanness is thought to improve performance were found to have scores ≥4 on the Dietary Restraint subscale of EDE-Q, and can be classified as having clinically significant disordered eating. The proportion of athletes with disordered eating in the lean sports group is insignificantly higher than in the nonlean-build athletes (1.2%, n=1) and non-athletes (0%).

EDE-Q assesses not only eating disorder attitudes, but also some abnormal behaviors aimed to lose weight. Fifty percent of the non-athletes reported the occurrence of binge eating episodes on ≥2 d

in the past 28 days, vs. 43.4% of non-lean sports athletes and 40.0% of lean sports athletes. The higher prevalence of binge eating in non-athletes was not significant.

The other two weight-loss methods, ie. self-induced vomiting and use of laxatives were with low prevalence in all studied groups. The percentage of athletes who practice self-induced vomiting was 5.5% (n=3) for lean sports, 3.6% (n=3) for non-lean sports and 2.1% (n=1) for non-athletes, and they differed insignificantly. The use of laxatives has the highest incidence rate in the non-lean sports (7.2%, n=6), followed by the non-athletes (4.2%, n=2) and lean sports (0%).

The desire to be leaner to improve sports performance sometimes results in obsessive exercising for hours at the gym. Excessive training for controlling weight at least five times over the past 28 days was categorized as pathological behavior with clinical significance for disordered eating. The prevalence of this pathological weight-loss behavior in non-athletes was 12.5% (n=6) and it didn't differ statistically with the whole group of athletes, with 23.1% (n=32). The comparison between sport-type groups revealed a significantly higher (p=0.007) percentage of cases with excessive exercising for lean-build athletes (38.2%, n=21) as compared to nonlean-build athletes (13.3%, n=11).

The analysis did not reveal significant difference in the overall prevalence of DE (percentage of subjects meeting the criteria of at least one indicator for DE (score ≥4.0 for the corresponding EDE-Q subscales or pathogenic eating behavior) between non-athletes (47.9%) and athletes (52.9%). The difference of 14.8% in the overall prevalence of DE between lean sports (61.8%) and non-lean sports (47.0%) was also insignificant.

Table 3. Prevalence of disordered eating in non-athletes and athletes, according to type of sport

Disordered eating	**Non-athletes** (n=48)	**Athletes** (n=138)	**Non-lean sports**[a] (n=83)	**Lean sports**[b] (n=55)
EDE-Q Subscale score ≥4.0				
Dietary Restraint	0% (n=0)	2.9% (n=4)	1.2% (n=1)	5.5% (n=3)
Shape Concern	0% (n=0)	0.7% (n=1)	1.2% (n=1)	0% (n=0)
Weight Concern	2.1% (n=1)	0.7% (n=1)	1.2% (n=1))	0% (n=0)
Global Score	0% (n=0)	0% (n=0)	0% (n=0)	0% (n=0)
Pathogenic weight control behaviors[c]				
Binge eating	50.0% (n=24)	42.0% (n=58)	43.4% (n=36)	40.0% (n=22)
Self-induced vomiting	2.1% (n=1)	4.3% (n=6)	3.6% (n=3)	5.5% (n=3)
Use of laxatives	4.2% (n=2)	4.3% (n=6)	7.2% (n=6)	0% (n=0)
Excessive exercise	12.5% (n=6)	23.1% (n=32)	13.3% (n=11)	38.2% (n=21)*
Overall [d]	47.9% (n=23)	52.9% (n=73)	47.0% (n=39)	61.8% (n=34)

*****: p<0.05 chi-square analyses;
[a]: non-lean sports: ball games, shooting sports, orienteering, moto racing;
[b]: lean-sports - aesthetic sports, endurance sports, weight dependent sports, antigravitation sports;
[c] : pathogenic weight control behaviors: binge eating, self-induced vomiting or use of laxatives ≥2 days or excessive exercise for controlling the weight ≥5 days in a week in the preceding 28 days;
[d]: percentage of subjects meeting the criteria of at least one indicator for disorder eating (score ≥4.0 for the corresponding EDE-Q subscales or pathogenic eating behavior)

Table 4 represents data for the prevalence of athletes who meet the criteria for disordered eating according to their athletic participation. The results of chi-square test for comparing the athletes from the tree groups showed that 10.3% (n=3) of athletes competing at the highest level have had scores greater than 4.0 in the Dietary Restraint subscale and their percentage was significantly higher than the other groups. With respect to the SC, WC and GS subscales, differences between the groups were not documented.

The results indicated a lack of statistically significant differences in the incidence rate of the individual pathogenic weight-loss behaviors between groups according to athletic participation. The overall prevalence of DE in recreational athletes was 46.9% (n=15), in low competitive level athletes it was 54.5% (n=42), and in high competitive level athletes it was 58.6% (n=17). Although there was a marked increase in the percentage of athletes with DE with an increase in the level of athletic participation, there was no statistical difference between the groups.

Table 4. Prevalence of disordered eating in male athletes according to the level of athletic participation

Disordered eating	**Recreational athletes** (n=32)	**Low competitive Athletes** (n=77)	**High competitive Athletes** (n=29)
EDE-Q Subscale score ≥4.0			
Dietary Restraint	0% (n=0)	1.3% (n=1)	10.3% (n=3)*
Shape Concern	0% (n=0)	1.3% (n=1)	0% (n=0)
Weight Concern	3.1% (n=1)	1.3% (n=1)	0% (n=0)
Global Score	0% (n=0)	0% (n=0)	0% (n=0)
Pathogenic weight control behaviors[a]			
Binge eating	34.4% (n=11)	41.6% (n=32)	44.8% (n=13)
Self-induced vomiting	3.1% (n=1)	3.9% (n=3)	1.9% (n=1.9)
Use of laxatives	0% (n=0)	3.9% (n=3)	10.3% (n=3)
Excessive exercise	18.8% (n=6)	22.1% (n=17)	31.0% (n=9)
Overall[b]	46.9% (n=15)	54.5% (n=42)	58.6% (n=17)

***:** $p<0.05$ Chi-square analyses
[a]: Pathogenic weight control behavior: binge eating, self-induced vomiting or use of laxatives ≥2 days or excessive exercise for controlling the weight ≥ 5 days in the preceding 28 days
[b] Percentage of subjects meeting the criteria of at least one indicator for disorder eating (score ≥4.0 for the corresponding EDE-Q subscales or pathogenic eating behavior)

DISCUSSION

This study aimed to determine the prevalence of disordered eating psychopathology in male athletes. Existing literature does not provide convincing evidence that males who engage in sporting activity are more susceptible to eating disorders than their female counterparts in the general population. As it was already mentioned, part of the studies found a higher prevalence of eating disorders in male athletes than in non-

athletes (1,7,8), but the other part of studies did not detect any differences (2,9,20).

The EDE-Q used in the present study has been widely used in athletes. Its criterion validity has been reported by numerous authors (21-23). The comparisons failed to find any difference in EDE-Q subscales scores between male athletes and non-athletic controls. The mean values of individual EDE-Q subscales of all groups were in the normal ranges (18).

The main extrinsic risk factor considered for disordered eating in athletes is the type of sport. Research has documented that female athletes who participate in lean sports are more at risk for eating disorders and disordered eating behaviors than athletes from sports where body shape, weight and body fats are not prerequisites for success (1,11,24,25). Milligan and Pritchard suggested gender difference as risk of eating disorders that is higher for lean-build male athletes and for female athletes from aesthetic sports (26). The meta-analysis of Chapman and Woodman identified a higher prevalence of eating disorders only in male wrestlers as compared with non-athletes (14). Tiel et al. found a higher risk for subclinical eating disorders in low-weight wrestlers and rowers (27). The data presented by Riedl et al. showed significantly higher scores on EAT-26 in male cyclists as compared to the male control group (28). Our results did not indicate any significant difference in mean EDE-Q scores between athletes from lean sports and non-lean sports.

The participation in a sport or the type of sport did not influence significantly the percentages of males who meet the pre-established criteria for DE. The higher prevalence of excessive exercising in athletes from lean sports compared with non-lean sports is the only indicator in which they differ statistically.

However, it should be noted that incidence rate is higher in some forms of pathological eating behaviors and exercise habits in the studied group of males, regardless of whether they practice sport or not. According to the DSM-5, an episode of binge eating is characterized both by eating an amount of food that would normally be regarded as too large with a sense of lack of control over eating (4). The occurrence of binge eating on a regular basis is the other key behavioral feature with high prevalence in both group of athletes and non-athletes. Between 40% and 50% of males practiced binge eating. The frequency of binge eating in the male athletes in our study is higher than have been previously found by other authors (29-31).

The negative body dissatisfaction that experience males is likely the reason for obsessive exercise. The rate of males who trained compulsively ≥5 d in a week in the past 28 days to control their body shape or weight, specifically targeting body fat, was relatively high among athletes from both sports groups (31.0% in lean sports, 22.1% in non-lean sports) as well in non-athletes (18.8%). This finding is consistent with research of Petrie et al. (29). However, the data are difficult to accurately compare due to the different methodology of the study. The recent review of Lichtenstein et al. defines the potential negative consequences from compulsive exercise in terms of injury, pain, anxiety, depression, and impairment in social life (32). The authors, however, underline that research on the link between excessive exercising and mental disorders has been insufficiently explored (32).

The other potential risk factor for DE in male athletes is the competitive level. Elite athletes often face high pressure, demands and expectations that might lead to a greater likelihood of disordered eating behavior. According to Picard, female athletes on a higher level of competition were at a greater risk for disordered eating behavior than athletes at a lower competition level (33). On the contrary, Darcy et al. found higher scores of EDE-Q among athletes involved in recreational sports than in competitive sports (16). This study identified that high competitive male athletes had significantly higher scores only with respect to the Dietary Restraint subscale of EDE-Q. There was a slight

tendency to increase the prevalence rate of binge eating and laxative misuse in athletes of higher competitive level. The prevalence rate of self-induced vomiting and excessive exercising was insignificantly higher in recreational athletes.

Limitations

Our study has some limitations that could affect the validity of the results. The primary limitation is the use of a self-report questionnaire to establish the prevalence rates of disordered eating and pathogenic weight behaviors as well as the anthropometric variables. The second limitation of this study is related to the sample surveyed. The participants in this study were a relatively homogeneous group of student athletes who have at least a basic, or sometimes an advanced knowledge about nutrition.

CONCLUSIONS

This study identified the presence of disordered eating patterns and pathogenic weight control behaviors in both male athletes and non-athletes, but the difference between them was statistically insignificant. Among the pathological weight-controlling behaviors, only compulsive exercising had a higher incidence rate in athletes of lean sports in comparison to non-lean sports. Comparisons between groups according to the level of athletic participation revealed significant differences only in the prevalence of dietary restraint in high competitive athletes. The results do not provide reason to assume that the type of sport and the level of athletic participation place the male athlete at a greater risk for disordered eating behaviors. Further research should examine the other factors that may relate to eating disorder attitudes and behaviors in male athletes.

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