

## Risk factors for eating disorders in gymnasts: pilot study

**Introduction:** Numerous studies in recent years suggest that in athletes from the aesthetic sports there is a high risk of developing eating disorders. Because of the seriousness of the consequences of these disorders, early detection is essential in order to prevent progression. The aim of this study is to determine whether there are risks of eating disorders development in active and former gymnasts, and compare them to the control group of non-athletes.

**Material and Methods:** The study involved 19 gymnasts (mean age  $17.6 \pm 2.5$  years, BMI  $20.5 \pm 2.7$ ), 32 former gymnasts (mean age  $28.5 \pm 7.6$  years, BMI  $22.7 \pm 3.5$ ) and 32 females (mean age  $31.7 \pm 6.6$  years, BMI  $24.1 \pm 3.5$ ). All respondents completed the Eating Attitudes Test (EAT-26).

**Results:** The results of ANOVA analysis showed that there were no statistically significant differences between groups ( $p > 0.005$ ) in total results in the EAT-26. However, the maximal value in each group exceeded 20 points, and for the questions about the behavior that indicates disorders, 5 to 10% of respondents gave answers that indicate problem in behavior related to nutrition and necessary consultations with a specialist. There were statistically significant differences between groups in Oral control subscale ( $p = 0.024$ ). The active gymnasts had higher prevalence of behavior that can cause higher risk of developing eating patterns.

**Conclusions:** Based on the results of this transversal study and previous researches in this area, we will start monitoring programs and strategies for maintaining or losing weight in active and former gymnasts, and provide them necessary information about proper nutrition, as well as other preventive treatments.

**Keywords:** Eating behaviour, Nutrition, EAT-26

## INTRODUCTION

A large number of studies in recent years, indicate a problem that athletes who train and compete in aesthetic sports such as gymnastics, figure skating and dance, show a higher risk of developing the disorder compared to the general population (Blacket et al., 2003; Coelho et al., 2010; Krentz and Warschburger 2013; Sundgot-borgen et al., 2013; Morgado and Coelho, 2014) since they have higher pressure to be thin (Nordin et al., 2003). Although some research have not established presence of the difference between athletes in aesthetic sports and other athletes (Benson et al., 1990; Beals and Hill, 2006), prevention is necessary. Athletes often deny that they have problems and refuse help and referral to treatment (Bonci et al., 2008). The most common eating disorders are anorexia nervosa, bulimia nervosa, binge eating disorder, and eating disorder not otherwise specified (Treasure et al., 2010). Non-specific disorders are those that by their characteristics do not fall into these groups, as in the example of people who are very thin and are occasionally on a diet but are still in the normal range of weight and have their period, people tend to sometimes or often overeat and night overeat with no expulsion of food, and who are addicted to exercise. Because of the seriousness of the consequences that can be caused, it is important to recognize the problem early and prevent progres-

sion and clinical treatment (Morgado and Coelho, 2014). A large percentage of risk in young athletes is caused by the lack of information on healthy eating habits, controlled intake of calories and control of body weight. With top athletes health checks are required, but the problem may occur in the youngest age categories where it is not reacted on time. Early identification and treatment of these disorders should become a priority (Morgado and Coelho, 2014). The authors agree that the problem of previous research is that they are of transversal type and that longitudinal studies and programs would ensure effective monitoring and prevention of disorders in athletes in specific sports (Okano et al., 2005). Eating disorders are often long-standing and have significant negative impacts on the individual's quality of life (Wade et al., 2012; Morgado and Coelho, 2014), and can be related to various risk factors: social pressure, self-esteem, body image, body mass index, competition anxiety (Berry and Howe, 2000), poor dietary habits, inadequate nutrient intake (Boros, 2009), perfectionism (Nordin et al., 2003).

Due to the specificity of sport, the gymnasts are required to maintain a low percentage of fat in order to achieve top results (Chen et al., 2009). If the diets are conducted frequently and without supervision, there is a higher risk of development of eating disorders than in athletes in other sports where there is no control of weight. Studies have shown that the gymnasts are shorter and thinner than their peers of the same age, and that the differences are more pronounced in girls because they are more sensitive to the stress caused by training. It is therefore necessary during long-term training process that begins in early childhood, to have an expert help and respect the doctor's advice about the importance of nutrition in great efforts, for which it is necessary to involve parents and coaches in order to ensure proper growth and development of the child in a young person and later in a top gymnast. The authors recommend that it is

152 necessary to research the role of the coach, parent and peers of the same age in the development of eating disorders (Berry and Howe, 2000).

Target -analysis of 34 studies from 1975 to 1999 showed that top athletes are at greater risk of developing an eating disorder than those who are not top athletes and those that are not involved in sports, especially in sports that require thinness, but significant effects have not occurred in gymnasts, however, the authors' conclusion is that the gymnast are less likely to show signs of eating disorders than inactive subjects ( $d = -0.11$ ;  $z = -1.89$ ). The author attributed this result to a relatively small sample, which consisted of 50 gymnasts (Smolak et al., 2000).

Gymnasts in adolescence often compete in the elite categories, in the period when concerns about the appearance become pronounced, with the sociological factors that are present, with the need to maintain the shape of the body and the body weight at an optimal level, in order to achieve their maximum and the best possible results (Morgado and Coelho, 2014). Individual changes in the desire to be leaner to improve sports performance were associated with disordered eating. A cross-lagged partial correlation analysis showed that the desire to be leaner to improve sports performance was predictive of disordered eating and not vice versa (Krentz and Warschburger, 2013). As the sports gymnastics is predominantly anaerobic activity because of highly intensive activities of relatively short duration, the nutrition must be various and must contain various nutritious foods, carbohydrates, proteins, vitamins, and low fat. Unfortunately, it often happens that gymnasts practice nutrition with reduced intake of calories to maintain a lower percentage of body fat, which leads to a lack of carbohydrates, calcium and iron, decreased bone density, women's sports triad, prolonged puberty (Vicente-Rodriguez et al., 2007). Recreational artistic gymnastic participation is associated with delayed pubertal development,

enhanced physical fitness, and muscle mass, and bone density in pre-pubertal girls (Vicente-Rodriguez et al., 2007).

Because of the seriousness of the consequences of these disorders, and the fact that this area is often ignored by the coach, early detection is essential in order to prevent progression. The aim of this study is to determine whether there are risks of eating disorders development in active and former gymnasts, and compare them to the control group of non-athletes.

## **MATERIAL AND METHODS**

### **Participants**

The participants voluntarily completed the questionnaire which was sent in electronic form. Gymnasts have received information about the questionnaire from their coaches. The questionnaire was completed by 124 people, and the questionnaires that were incomplete or if the respondents were male, were not included in the sample. The study involved a total of 19 gymnasts (mean age  $17.6 \pm 2.5$  years, BMI  $20.5 \pm 2.7$ ), 32 former gymnasts (mean age  $28.5 \pm 7.6$  years, BMI  $22.7 \pm 3.5$ ) and 32 females (mean age  $31.7 \pm 6.6$  years, BMI  $24.1 \pm 3.5$ ). All respondents completed the Eating Attitudes Test (EAT-26).

### **Methods**

Questionnaire of eating habits, EAT-26 (Garner and Garfinkel, 1979) is the most commonly used measure of symptoms of eating disorders (Coelho et al., 2010; Pope et al., 2015). This questionnaire studies cognitive and behavioral characteristics that are typical of anorexia and bulimia nervosa. EAT measures behavior related to diet, food preoccupation and concern about being overweight. It consists of three subscales: tendency to diet-

- 154 ing, bulimia and oral control. A shortened version of 26 items arranged on a six-degree scale. Scoring was done in a manner that some items marked with “never”, “rarely” and “sometimes” were scored with 0, and some items marked as “often”, “very often” and “always” were scored with 1, 2 and 3 points. The total score of 20 or higher indicates the indication for eating disorder.

## Statistics

In the present study, descriptive statistics and preliminary analyses were conducted in order that the participants' eating attitudes and behavior could be estimated. ANOVA was used to determine differences among three groups of participants. All analyses were performed using SPSS 15.0.

## RESULTS

The results have shown (Table 1) that there is no statistically significant difference in the total result of the questionnaire of eating habits, and the statistically significant difference is present on the sub-scale Oral control, which relates to the control of food intake – (*“I avoid eating when I am hungry”*) and social pressure because of thinness (*“I feel like others are forcing me to eat”*). The gymnasts had significantly higher results on this sub-scale ( $p = 0.024$ ) compared to former gymnasts and control group of participants the statistically significant difference is present in the results of BMI ( $<0.005$ ).

Table 1. Descriptives and ANOVA of EAT-26

Variables	Participants	N	Mean	SD	Min.	Max.	F	Sig.
BMI	Gymnasts	19	20.12	2.63	13.84	24.61	8.508	0.000
	Former gymnasts	32	22.69	3.47	17.97	37.38		

	Non-athletes	32	24.09	3.53	20.40	34.45		
	Total	83	22.64	3.62	13.84	37.38		
Dieting	Gymnasts	19	4.32	4.53	0.00	15.00	0.715	0.492
	Former gymnasts	32	5.59	5.77	0.00	25.00		
	Non-athletes	32	6.16	5.31	0.00	22.00		
	Total	83	5.52	5.32	0.00	25.00		
Bulimia	Gymnasts	19	0.63	1.16	0.00	4.00	0.194	0.824
	Former gymnasts	32	0.81	1.38	0.00	5.00		
	Non-athletes	32	0.88	1.45	0.00	6.00		
	Total	83	0.79	1.35	0.00	6.00		
Oralcontrol	Gymnasts	19	3.95	4.17	0.00	13.00	3.925	0.024
	Former gymnasts	32	1.97	1.96	0.00	7.00		
	Non-athletes	32	2.16	1.83	0.00	6.00		
	Total	83	2.49	2.68	0.00	13.00		
EAT-26	Gymnasts	19	8.89	6.46	1.00	23.00	0.129	0.879
	Former gymnasts	32	8.38	7.00	1.00	33.00		
	Non-athletes	32	9.19	5.88	1.00	26.00		
	Total	83	8.81	6.39	1.00	33.00		

Table 2. Multiple Comparisons (Bonferroni)

Dependent Variable	(I) VAR00027	(J) VAR00027	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
BMI	Gymnasts	2.00	-2.57219(*)	0.96276	0.027	-4.9265	-0.2179
		3.00	-3.97018(*)	0.96276	0.000	-6.3245	-1.6159
	Former gymnasts	1.00	2.57219(*)	0.96276	0.027	0.2179	4.9265

		3.00	-1.39800	0.83105	0.289	-3.4302	0.6342
	Non-athletes	1.00	3.97018(*)	0.96276	0.000	1.6159	6.3245
		2.00	1.39800	0.83105	0.289	-0.6342	3.4302
Oral-control	Gymnasts	2.00	1.97862(*)	0.74977	0.030	0.1452	3.8121
		3.00	1.79112	0.74977	0.058	-0.0423	3.6246
	Former gymnasts	1.00	-1.97862(*)	0.74977	0.030	-3.8121	-0.1452
		3.00	-0.18750	0.64719	1.000	-1.7701	1.3951
	Non-athletes	1.00	-1.79112	0.74977	0.058	-3.6246	0.0423
		2.00	0.18750	0.64719	1.000	-1.3951	1.7701

\*The mean difference is significant at the .05 level.

In order to determine the differences between all groups, post-hoc test was applied (Bonferroni). There is a statistically significant difference between the gymnasts and former gymnasts in BMI, and between the gymnasts and the control group ( $p < 0.005$ ). In the sub-scale Oral control, there is also differences between gymnasts and other two groups of participants, while between former gymnasts and control group there are no statistically significant differences (Table 2).

## DISCUSSION

This pilot study is the first step in the research of the risk of eating disorders in nutrition in young gymnasts, but also with the gymnasts that are no longer active. The results showed that in there is not an increased risk of development of the disorder in participants, but that in the sub-scale Oral control the increased values indicate some behaviors that are classified as risky. The mean values of total results on EAT-26 ( $8,89 \pm 6,46$ ) with gym-



nasts are slightly higher than in the general population of high school students, but the maximum result is significantly lower than in previous researches (Szczegielniak et al., 2012). The mean value of result is also lower than in 76 gymnasts from various Portuguese clubs, aged 7 to 25 years, with mean value being  $20.24 \pm 11.94$ , so the authors' conclusion is that gymnasts are predisposed to develop eating disorders (Silva and Saavedra, 2009), unlike our participants.

The total result is lower than the gymnasts of the same age ( $17 \pm 1,5$  years) in the previous research, but the sample included 16 competitors of rhythmic and 14 of sports gymnastics (Theodorakou and Donti, 2013). Unlike our study, the results showed that 30% of gymnasts show behavior related to eating disorders ( $EAT-26 > 20$ ), and the values of all three sub-scales are higher (Theodorakou and Donti, 2013). The results that gymnasts included in our research had in the questionnaire EAT-26 can be a consequence of heterogeneity of the sample. These gymnasts practice in different levels of competition, which also influences their attitudes about nutrition (Pope et al., 2015).

On a sample of 50 gymnasts from various gymnastic disciplines (17 from sports gymnastics, 17 from rhythmic gymnastics and 16 from sports acrobatics) aged 10–15 years, differences in eating disorders were researched among the stated groups. The results have shown that the rhythmic gymnasts had significantly higher results on Drive for thinness sub-scale than other two groups, and the higher total score which is attributed to the specific requirements of rhythmic gymnastics, which requires a slim figure. With gymnasts who compete in sports gymnastics there was no result which could place them in a group of increased risk for development of eating disorder, which is similar to the results of our research. However, the authors believe that the cause of that is a younger sample, because there was no relationship found between age and eating disorders, but it is important to note that

**158** gymnasts are at increased risk were between 13–15 years, i.e. in the upper age limit of the sample. Total of 7 (14%) gymnasts were under increased risk of development of eating disorders.

As we have already mentioned, gymnasts are at high risk of developing an eating disorder, because apart from the society that promotes healthy living, thin look and exercise to achieve the imposed “idea”, they are under pressure of sport that often emphasizes the link between superior performance and weight. Also, the high expectations of coaches, parents and club colleagues are the main factors for development of eating disorders (Bonci et al., 2008). With former gymnasts the results show that eating disorder symptoms subside after gymnastics career and that the concern about achieving the perfect body may be a more important determinant of body dissatisfaction than the percentage of body fat (Ogletree-Cusaac and Torres-Mcgehee, 2011).

The authors propose different strategies for prevention and treatment of eating disorders (Sundgot-Borgen et al., 2004; Nikolić et al., 2009; Morgado and Coelho, 2014), and it is supported by transparent research with the aim to summarize the results of the published papers and propose directions for future research in this area (Connor et al., 1996; Treasure et al., 2012; Sundgot-Borgen et al. 2013). Prevention of eating disorders should become a mandatory part of educational programs for coaches and athletes in all sports, because it is one of the strategies to increase knowledge about the correlates, risk factors, risk groups and strategies for early detection (Morgado and Coelho, 2014). We are still in need of longitudinal controlled large scale intervention studies examining effective intervention and prevention strategies for female athletes. Intervention programs need to be sport and sex specific. Moreover, education programs or strategies should be evaluated routinely to determine their effectiveness with respect to changing knowledge, attitudes, and behaviors (Morgado and Coelho, 2014).

## CONCLUSIONS

This pilot study is only the first step in the prevention of various eating disorders of gymnasts and other athletes in aesthetic sports in our country. The program will include education for trainers and athletes, monitoring programs and strategies for maintaining or losing weight in active and former female athletes, with aim to provide them necessary informations about proper nutrition, as well as other preventive treatments.

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