

Özgün Araştırma

Erkek Güç ve Kuvvet Sporcularında Kas Dismorfisinin Egzersiz Bağımlılığı, Beden İmgesi ve Protein Tüketimi ile İlişkisi

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Öz

Amaç: Kas dismorfisi psikolojik bir sorundur ve birçok faktörün etkisiyle görülme sıklığının arttığı bildirilmektedir. Bu çalışma yetişkin erkek güç ve kuvvet sporcularında kas dismorfisinin varlığını belirlemeyi, kas dismorfisi puanına göre sporcularda protein tüketimi, egzersiz bağımlılığı, beden imgesinin değerlendirilmesi amacıyla planlanmıştır.

Gereç ve Yöntem: Araştırma yetişkin 69 erkek güç ve kuvvet sporcusu ile yürütülmüştür. Katılımcıların genel bilgileri, besin tüketim sıklığı formu, kas algısı bozukluk envanteri, egzersiz bağımlılığı ölçeği, beden imgesi başa çıkma stratejileri ölçeği kullanılmıştır ve hava değişimi pletismografisi ile antropometrik ölçümleri alınmıştır.

Bulgular: Bigoreksiya olan sporcuların oranı %10,1 olarak belirlenmiştir. Sporcuların kas dismorfisi ölçeğinden aldıkları puan arttıkça egzersiz bağımlılığının ve beden imgesi baş etme stratejileri ölçek puanının arttığı saptanmıştır. Kas algısı bozukluğu puanının protein tüketimi arasında pozitif korelasyon olduğu belirlenmiştir. Protein tüketimindeki 1 g değişimin, kas dismorfisi ölçeğinde 0,038 puanlık pozitif değişime; kas algısı bozukluğu ölçeğinde toplam puanındaki 1 birimlik değişimin, egzersiz bağımlılığında 0,497 birimlik, beden imgesinde 0,909 birimlik pozitif değişimlere katkı sağladığı belirlenmiştir.

Sonuç: Bu çalışmanın sonuçlarına göre sporcularda kas dismorfisi riski yükseldikçe egzersiz bağımlılığının, beden algı bozukluklarının ve tüketilen protein miktarının doğru orantılı olarak arttığı sonucuna varılabilir. Bu sonuçlar kas algısı bozukluğu riski olabilecek sporcularda beden algı bozukluklarının, egzersiz bağımlılıklarının ve beslenmelerinde yapılan hataların bir göstergesi olabilir. Güç ve kuvvet sporcularında kas dismorfisi riski ve ilişkili faktörler (beden imgesi, benlik saygısı, egzersiz bağımlılığı gibi) yönünden değerlendirilmesi gerektiği sonucuna varılmıştır.

Anahtar kelimeler: kas dismorfisi, sporcu, protein tüketimi, egzersiz bağımlılığı, beden imgesi

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Original Research

The Relationship of Muscle Dysmorphia with Exercise Addiction, Body Image and Protein Consumption in Male Power and Strength Athletes

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Abstract

Objectives: Muscle dysmorphia is a psychological problem, and its incidence is reported to increase with the effect of many factors. This study was planned to determine the presence of muscle dysmorphia in adult male power and strength athletes; and to evaluate protein consumption, exercise addiction, and body image in athletes according to the risk of muscle dysmorphia.

Materials and Methods: The research was conducted with 69 adult male power and strength athletes. General information of the participants, food consumption frequency form, muscle dysmorphia disorder inventory, exercise addiction scale, body image coping strategies scale were used, and air displacement plethysmography and anthropometric measurements were taken.

Results: The rate of athletes with bigorexia was determined as 10.1%. It was determined that as the scores of athletes on the muscle perception disorder scale increased their exercise addiction and body image coping strategies scale scores increased. It was determined that there was a positive correlation between muscle perception disorder score and protein consumption. A 1 g change in protein consumption resulted in a positive change of 0.038 points on the muscle dysmorphia disorder scale; It was determined that a 1-unit change in the total score on the muscle dysmorphia disorder scale contributed to 0.497 units of positive changes in exercise addiction and 0.909 units of positive changes in body image.

Conclusion: According to the results of this study, it can be concluded that as the risk of muscle dysmorphia increases in athletes, exercise dependence, body perception disorders and the amount of protein consumed increase in direct proportion. These results may be an indicator of body perception disorders, exercise addiction and nutritional errors in athletes who may be at risk of muscle dysmorphia disorders. It was concluded that strength and power athletes should be evaluated in terms of muscle dysmorphia risk and related factors (such as body image, self-esteem, exercise addiction).

Keywords: *muscle dysmorphia, athlete, protein consumption, exercise addiction, body image*

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Introduction

Regular training programs in athletes are the main factor in providing ideal body images related to muscularity. In this direction, athletes apply special nutrition programs in order to increase both lean body mass and muscular body structure. After a while, these goals move towards the demand for a more muscular body image, which cannot be achieved under normal conditions (Ricciardelli & McCabe, 2003). This suggests that some men may be at risk for body image disorders and muscle dysmorphia (MD). Muscle dysmorphia is a pathological preoccupation with muscularity and is characterized by the urge to gain muscle mass (Babusa et al, 2015). MD is associated with the individual's feeling of being ashamed of his/her own body and feeling small and weak (Greenway & Price, 2020). It is also stated that as individuals place exercise at the center of their lives, they may evaluate their physical structures as inadequate in terms of body image and muscle mass (Kelecek & Altıntaş, 2021). Although the prevalence of MD is unknown for the general population; the risk is considered high in athletes involved in sports that require high muscle mass, such as bodybuilding, football, and weightlifting (Babusa et al, 2015). MD affects men and young population more than women (John, 2008; González-Martí et al, 2012). Studies on body dissatisfaction in men and its consequences are very limited (Cash, 2004; Cash, 2012; Grogan, 2006; Frederick et al, 2007). In this regard, the aim of the study is to examine muscle perception disorder in male power and strength athletes and to look at the relationship between body images, exercise addictions and daily protein amounts.

The contribution of the study to the literature is the inclusion of the relationship between the risk of muscle dysmorphia and exercise addiction, body satisfaction and protein consumption in sports branches where muscle mass is at the forefront.

- Hypothesis 1: As the risk of muscle dysmorphia increases in athletes, Exercise addiction is an increase.
- Hypothesis 2: As the risk of muscle dysmorphia increases in athletes, Body dissatisfaction is an increase.
- Hypothesis 3: As the risk of muscle dysmorphia increases in athletes, in the amount of protein consumed is an increase.

Materials and Methods

Design

The study had a cross-sectional design.

The research population consists of 69 elite male power and strength athletes

(weightlifting, wrestling, boxing, judo) between the ages of 18-30 who volunteered to participate in the study. GPOWER 3.1 package program was used to determine the adequate sample size in the study. The power of the test was taken as $(1-\beta) = 0.90$. As a result of the calculations, the sample volume that will provide the power of the test $(1-\beta) = 0.90$ was determined as at least 35 people in total. Those who had a chronic disease in the musculoskeletal system and those who did not volunteer to study were excluded from the study. The research was approved by Ankara Medipol University Non-Interventional Clinical Research Ethics Committee with the decision numbered E-81477236-604.01.01-669 on 04.04.2022.

Data Collection Tools

The questionnaire form, which was used as a data collection tool, was applied by the researcher to the participants by face-to-face interview technique. Survey form: it includes general information on demographic characteristics, Muscle Dysmorphia Disorder Inventory (MDD-I), Exercise Addiction Scale, Frequency of Food Consumption and Body Image Coping Strategies Scale. The participants were measured by Air Displacement Plethysmography analysis for body composition measurements.

Air Displacement Plethysmography (BOD POD)

Air displacement plethysmography (BOD POD, Cosmed, Roma, Italy) device was used to measure the body composition of the athletes.

Body volume was calculated by measuring the volume of air displaced by the BOD POD. Then, body density was calculated over weight and volume. For the general population, weight (kg), body fat percentage (%), lean body mass (kg) were determined using the Siri equation (Siri, 1956).

Height Measurement

The heights of the participants were measured on a stadiometer (SECA 213, Hamburg, Germany) without shoes, in an anatomical stance in the Frankfort plane, with the feet side by side.

Muscle Dysmorphia Disorder Inventory (MDD-I)

The Muscle Dysmorphia Disorder Inventory (MDD-I), used to evaluate muscle dysmorphic symptoms, is a 5-point Likert-type scale with items ranging from 1 (never) to 5 (always). The MDD-I measures three main components of the symptomology of muscle dysmorphia: it consists of the study for volume subscale, appearance intolerance, and functional impairment subscale (Bégin et al, 2019; Murray et al, 2012; Devrim et al, 2018).

In the original validation study in male weightlifters, the subscales and total score

showed good internal consistency (Bégin et al, 2019). Scoring in the MDD-I evaluation ranges from 0 to 65 points. The cut-off point of the scale is accepted as 39. Individuals with a score of ≥ 39 were reported to have bigorexia (Devrim et al, 2018).

The Cronbach general-total internal consistency coefficient of MDD-I was found to be 0.81 (Subaşı et al, 2018).

Exercise Addiction Scale (EAS)

During the development process of the Exercise Addiction Scale (EAS), the validity and reliability study of which was conducted by Demir et al. (Demir et al, 2018), the addiction diagnostic criteria in the "Diagnosis and Statistical Manual of Mental Disorders IV" were taken as a basis and studies in the literature were also used (APA, 2001; Szabo and Griffiths, 2007; Vardar, 2012; Berczik et al, 2012).

The Cronbach alpha reliability coefficient for the overall EAS was found to be 0.88 and was determined to be reliable. According to the score ranges, "1-17 is considered as normal, 18-34 as low risk, 35-51 as risky, 52-69 as dependent and 70-85 as highly dependent group". The scale, which consists of a total of 17 items, has three sub-dimensions; excessive focus and emotional change dimension, tolerance development and passion dimension, postponement of individual-social needs and conflict dimension (Demir et al, 2018).

Food Consumption Frequency

The foods and portions consumed by the athletes in the last month were questioned and recorded in the questionnaire. How often participants consume each food were asked how much they consumed this food at one time, and it was calculated how much they consumed from this food in a day. Ergogenic support usage situations, frequencies, and brands of the products used were asked and included in daily calculations. After determining their weight from the portion sizes, the average daily energy/nutrient and food consumption amounts were calculated using the Nutrition Information Systems Package Program (BEBIS, Germany 8.1.).

Body Image Coping Strategies Scale (BICSS)

The Body Image Coping Strategies Scale (BICSS), developed by Cash et al. (Cash et al, 2005) in 2005, is a 29-item self-report scale. This scale, which was validated and reliable in Turkish by Doğan et al., (2011), consists of three subscales: correction of appearance, positive logical acceptance, and avoidance. It has been shown that the BICSS Turkish version is sufficiently valid and reliable (Doğan et al, 2011).

Statistical Analysis of Data

The collected data were saved to the IBM SPSS Statistics 22 program for analysis.

Continuous variables obtained from the questionnaires were expressed as mean (\bar{x}), standard deviation (SD), and categorical variables as number (n) and percentage (%).

In the statistics part, appropriate analysis methods were selected according to the data that are suitable for normal distribution and not suitable.

Statistical significance level in the tests was evaluated as $p < 0.05$.

Results

The distribution of some sports information and ergogenic support usage status of the athletes participating in the research is given in Table 1. According to this table, the average age of the athletes was 19.3 ± 2.5 years. Most of the athletes (72.4%) stated that they had high school or higher education. According to the information in Table 1, the proportion of athletes interested in boxing, wrestling, weightlifting, and judo, respectively; 18.8%, 30.4%, 33.4% and 17.4%. It has been determined that 52.2% of the athletes have been athletes for 5-9 years. 37.7% of the athletes stated that they used ergogenic support. 50.0% of the individuals using supplements stated that they used BCAA, 46.2% protein powder, 34.6% creatine and its derivatives (Table 1).

Table 1. Distribution of Athletes Sports Characteristics and Ergogenic Support Usage Status

		n	%
Sports branch	Boxing	13	18.8
	Wrestle	21	30.4
	Weightlifting	23	33.4
	Judo	12	17.4
Sports age (years)	<5	15	21.7
	5-9	36	52.2
	≥ 10	18	26.1
Ergogenic support use status	Uses	26	37.7
	Not using	43	62.3
Ergogenic support*	Protein powder	12	46.2
	Glutamine	2	7.7
	L-Carnitine	2	7.7
	BCAA	13	50.0
	Creatine and its derivatives	9	34.6
	Multivitamin	3	11.5
	Omega-3	4	15.4
	Caffeine	5	19.2
	Glucosamine	1	3.8
Calcium, magnesium, zinc	6	23.1	

*Multiple options marked

Table 2. Anthropometric Measurements of Athletes

	Total (n=69)
	$\bar{x} \pm SS$
Age (years)	19.3±2.5
Height (cm)	173.9±8.27
Weight (kg)	76.9±15.38
Body fat (%)	11.5±6.17
Body fat mass (kg)	9.5±6.69
Lean body mass (kg)	67.6±10.67
FFMI (kg/m²)	31.4±2.25

FFMI: Fat free mass index.

According to the table in Table 2, the average weight of the athletes was 76.9±15.4 kg, and the average fat percentage was determined as 11.5±6.2%. The mean fat free mass index (FFMI) was determined as 31.4±2.3 kg/m².

Table 3. Distribution of the Athletes' Total Scores of MDD-I, EAS and BICSS and their Score Classification

		n	%
MDD-I Classification	No MD (<39 points)	62	89.9
	There is MD (≥39 points)	7	10.1
	Total score ($\bar{X} \pm SD$)	27.5±9.09	
EAS Classification	Low risk addiction (18-34 points)	1	1.4
	Risky addiction (35-51 points)	15	21.7
	Dependent group (52-69 points)	36	52.3
	Highly dependent (70-85 points)	17	24.6
	Total score ($\bar{X} \pm SD$)	59.8±12.27	
BICSS Classification	Correction of appearance ($\bar{X} \pm SD$)	23.4 ± 7.97	
	Positive logical acceptance ($\bar{X} \pm SD$)	27.9 ± 7.66	
	Avoidance ($\bar{X} \pm SD$)	14.3 ± 5.80	
	Total score ($\bar{X} \pm SD$)	65.6±17.53	

MDD-I: Muscle Dysmorphia Disorder Inventory, EAS: Exercise Addiction Scale, BICSS: Body Image Coping Strategies Scale

According to Table 3, the ratio of athletes with bigorexia was determined as 10.1%. The mean score of the athletes in MDD-I was determined as 27.5±9.1. According to this table,

52.3% of the athletes were found to be dependent and 24.6% to be highly dependent. The rate of athletes with risky addiction level was determined as 21.7%. According to Table 3, the total mean score of BICSS of the athletes was calculated as 65.6 ± 17.5 .

According to the information in Table 4, as the probability of athletes to have bigorexia increases, exercise addiction and body image coping strategy scores increase ($p < 0.05$). Table 4, the correlation of the MDD-I total score of the athletes participating in the research with the consumed energy nutrients is given. According to the information in this table, a positive significant relationship was found between MDD-I score and protein and vegetable protein consumption. As protein and vegetable protein consumption increases, the score of being bigorexia increases ($p < 0.05$).

Table 4. Correlation of Athletes' Total Score of MDD-I with Different Parameters

	MDD-I Total Score	
	r	p*
Scales		
EAS	0.368	0.002
BICSS	0.471	0,000
Energy and nutrients		
Energy (kcal)	0.235	0.052
Protein (%)	0.180	0.139
Protein (g)	0.313	0.009
Vegetable protein (g)	0.252	0.037
Fat (%)	0.036	0.766
Fat (g)	0.184	0.129
Cholesterol (mg)	0.052	0.673
Carbs (%)	-0.109	0.373
Carbs (g)	0.048	0.694
Fiber (g)	0.117	0.339

*Bivariate correlation, $p < 0.05$

According to the information in Table 5, it was stated that the change in 1 gram protein consumption contributed to a positive change of 0.038 points in the MDD-I scale.

Table 5. Regression Analysis of Athletes' Muscle Dysmorphia and Other Variables

	MDD-I Total Score	
	β	<i>p</i> *
EAS	0.497	0.002
BICSS	0.909	0,000
Protein Consumption (g)	0.038	0.009

*Simple regression, $p < 0.05$, EAS: Exercise Addiction Scale, BICSS: Body Image Coping Strategies Scale

According to the information in Table 5, it was determined that a 1-unit change in the MDD-I total score contributed to a 0.497-unit positive change in exercise dependence ($p < 0.02$). It was determined that a 1-unit change in the MDD-I total score contributed to a 0.909-unit positive change in body image ($p < 0.01$).

Discussion and Conclusion

The hypotheses of the study are that as the risk of muscle dysmorphia increases in athletes, increases in exercise addiction, body dissatisfaction and the amount of protein consumed are observed. Discussion was made in line with these hypotheses.

It has been reported that MDD-I scores, that is, muscle dysmorphic symptoms, are significantly higher in bodybuilding compared to other sports branches (Murray et al, 2012; Mangweth et al, 2001). In a study, muscle dysmorphia was found in 15% of 60 adult male participants who did strength exercises, according to MDD-I (Kirveli, 2020). In one study, the mean MDD-I score of 120 adult bodybuilder male participants was found to be 36.32 ± 7.02 in professional bodybuilders and 35.87 ± 7.67 in recreational bodybuilders. It is seen that as muscle dysmorphic behavior develops in individuals, appearance intolerance increases, more efforts are made to gain bulk, and the risk of functional disorders increases (Devrim, 2016). According to this study, the rate of athletes whose muscle dysmorphia score was above the cut-off score was determined as 10.1%. The mean score of all athletes in MDD-I was determined as 27.5 ± 9.09 . Athletes who are aware that muscle mass is important for elite athletes to achieve success in competitions can move towards increasing their muscle mass in order to be successful. A consequence of the high risk of muscle dysmorphia disorder in this study may be that the group of athletes participating in the study was an elite group of athletes preparing for competitions.

In one study, according to the multidimensional body-self-relationship scale of 60 adult male participants who did strength exercises, the mean scores of those with muscle dysmorphia were lower and there was a significant difference between them, and it was observed that their

body images were lower (Kırveli, 2020). In another study, it was stated that individuals with muscle dysmorphia had weak body perceptions and did not like their bodies (Murray et al, 2012). In a study conducted on bodybuilders, it was found that the relationship between bodybuilder image scheme and FFMI was positive, and the functional disorder subscale scores of MDD-I were negatively correlated (Devrim, 2016). In this study, it was determined that as the scores of the individuals on the MDD-I scale increased, the BICSS scale score increased ($p<0.05$). As the probability of athletes to have bigorexia increases, the body image coping strategy score increases.

In which 183 adult volunteer exercise participants who exercised in sports centers in Ankara, it was found that the obsessive passion of the exercise participants was a positive determinant of the muscle-oriented body image attitude sub-dimension; It has been stated that as individuals place exercise at the center of their lives, they may evaluate themselves as physically inadequate in terms of body image and muscle mass (Keleşek & Altıntaş, 2021). In this study, it was determined that the EAS scores increased as the scores of the athletes on the MDD-I scale increased.

It is stated in the literature that individuals with muscle dysmorphia apply high-level protein intake and high-energy nutrition programs in order to increase their lean body mass (Cash, 2012). In a study, when the distribution of nutrients according to the energy they receive in adults with muscle dysmorphia who performs strength exercises is examined, it is seen that 28% of the energy comes from carbohydrates, 34% from proteins and 38% from fats, while the percentages are similar to each other compared to the total participants. It was observed that 77.8% of the participants with muscle dysmorphia consumed more protein than the recommended level (Kırveli, 2020). In this study, the median consumption of vegetable protein and polyunsaturated fatty acid consumed by individuals without bigorexia was found to be lower than those of individuals with bigorexia. It was determined that there is a positive and significant correlation between the protein and vegetable protein consumption of the MDD-I score. It was determined that as protein consumption increased, the score of being bigorexia increased.

There are limited studies on parameters thought to be related to bigorexia. It was determined that 10.1% of adult male power and strength athletes participating in this study had bigorexia. It was observed that as the probability of bigorexia of the athletes increased, exercise addiction and body image coping strategy scores increased. It was observed that as protein consumption increased, the score of having bigorexia increased. It was observed that as the

exercise addiction of the athletes increased, the probability of bigorexia and the strategy score of coping with body image increased.

More research should be given on bigorexia. When identifying individuals with bigorexia, active ingredients (such as body image, self-esteem, exercise addiction, eating attitudes and behaviors) should be analyzed in detail. A multidisciplinary approach should be followed in the treatment of individuals with bigorexia, and dietitians should be encouraged to take a role in the treatment as a member of this team. In addition, there is a need for validity and reliability studies of the muscle perception disorder inventory on women.

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