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CORRELATION BETWEEN BODY IMAGE AND THE RISK OF FEMALE ATHLETE TRIAD (FAT) IN SMAN OLAHRAGA SIDOARJO

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Abstract

Background: Many female athletes that desire the perfect body fall into negative body image and eating disorders. Suppose the condition occurs over a long period, it increases the risk of female athlete triad (FAT) syndrome, which consists of three components: low energy availability, menstrual dysfunction, and low bone mineral density. Although many studies have indicated the high prevalence of FAT syndrome among female athletes, there is still a lack of research on this syndrome in Indonesia.

Objective: This research examines the correlation between body image and the risk of FAT syndrome in young female athletes of SMANOR Sidoarjo.

Methods: The cross-sectional study was conducted using questionnaires, BSQ-34 items to assess body image and LEAF-Q to assess the risk of the FAT syndrome. Seventy-six young female athletes (16.88±1.01 years old) at SMANOR Sidoarjo were divided into three different

sports categories: power, endurance, and games. The non-parametric correlation test spearman rho was used to determine the relationship between both variables.

Result: Half of the subjects (n=38) felt dissatisfied with their body image, and 38.2% (n=29) have a risk of FAT syndrome with no significant difference (p>0.05) between the three sports categories. There is a one-way relationship between body image and the risk of the FAT syndrome (p<0.05, r=0.294).

Conclusion: This study revealed a one-way relationship between body image and the risk of the FAT syndrome. Thus, a multi-disciplinary approach is needed to promote mental health and nutrition-related problems that could lead to FAT syndrome.

Keywords: body image, energy availability, female athlete triad (FAT).

INTRODUCTION

The number of women participating in sport has increased significantly over the past few years (Weiss Kelly & Hecht, 2016). In the world of sports, many athletes strive to get an ideal body to improve their performance (Petisco-Rodríguez et al., 2020). Voelker et al., (2015) stated that female athletes still tend to consider themselves overweight and feel dissatisfied with their body appearance even though their body weight is ideal or even underweight. The desire to have a perfect body shape can make athletes make several dangerous efforts and lead to conditions of eating behavior disorders (Rosewall et al., 2019). The knowledge level of athletes related to nutrition is also one of the causes of unhealthy diet trends and poor eating behavior (Merawati et al., 2019).

Body image perception is a person's subjective view of the shape and size of their own body which is influenced by their expectations regarding the desired shape and size. Body image can also be influenced by the views and reactions of others regarding the shape and size of an individual's body (Adguna & Budisetyani, 2019). Negative body image perceptions can be an early risk for eating behavior disorders (Suryawati et al., 2020). This risk becomes higher due to the stigma in the environment related to weight and body shape in achieving maximum performance, the demands of coaches on athletes to get a certain body shape, or athletes' dissatisfaction with the shape and appearance of their own body (Kong & Harris, 2015). Social pressure from the environment; coaches; and teammates, performance demands, the desire for higher achievement, and several other internal factors are some of the things that can increase the risk of this disorder (Suryawati, 2020). Teammates are also an important factor that can influence athletes' eating attitudes and

behaviors (Petisco Rodriguez, 2020).

Suryawati, et al. (2020) stated that eating behavior disorders in female athletes have occurred in Indonesia even though the precise number is currently unknown because not many studies have been conducted. The results of a study at the Jakarta Ragunan Training Center showed that there were 15 (23.1%) female athletes who experienced eating behavior disorders in the form of bulimia. This eating behavior disorder is actually quite common even among international female athletes, especially in endurance athletes, aesthetic sports, and weight sports that demand a lean body shape and specific body weight (Petisco-Rodriguez, 2020). Long-term persistence of eating behavior disorders can be the beginning of the Female Athlete Triad syndrome (Hay & Touy, 2018). This is because eating behavior disorders can result in decreased macronutrient and micronutrient intake, causing problems such as psychological effects, anxiety, decreased performance, dehydration, nutrient deficiencies, glycogen depletion, menses disorders, and low nutritional status (O'Brien et al., 2017). Adolescent female athletes who have poor nutritional status, if left unchecked in the long term, will remain malnourished as adults even during pregnancy and cause low birth weight in their children (Alexander et al., 2015). This poor eating behavior is a serious condition because it can have adverse effects on physical health, mental health, performance, quality of life, and increase the risk of morbidity and mortality (Petisco-Rodriguez, 2020).

The Female Athlete Triad is a situation where there are three interrelated conditions that often occur in female athletes, including energy availability, menstrual cycle, and bone density (Tenforde et al., 2020). This triad includes three components—low energy intake and availability, menstrual disorders, and low bone density (Gross & Joy, 2020). This syndrome has three symptoms, which are eating disorders; amenorrhea; and osteoporosis. Low energy intake, whether or not accompanied by eating behavior disorders, can result in cardiac, endocrine, reproductive and skeletal system complications. It can also cause Gonadotropin releasing hormone (GnRH) to be disrupted and impact Luteinzing Hormone (LH), estrogen production, and the origin of irregular menstrual cycles. Estrogen also plays an important role in bone density and formation. Thus, disrupted estrogen production will also disrupt musculoskeletal health and lead to another Triad condition, namely decreased bone density (Brown et al., 2017).

METHODS

The cross-sectional study was conducted using questionnaires, BSQ-34 items to assess body image and LEAF-Q to assess the risk of the FAT syndrome. Seventy-six young female athletes (16.88±1.01 years old) at SMANOR Sidoarjo were divided into three different sports categories: power (n=49), endurance (n=8), and games (n=19). The sample size of this study was determined by the total sampling method, where all parts of the population that meet the inclusion and exclusion criteria will become research respondents. The inclusion criteria in this study were subjects who were willing to fulfill informed consent and fill out all the questionnaires provided. The research team explained how to fill out the questionnaire and then provided a link to the questionnaire to be filled out online by the subject.

Univariate analysis was used to describe the frequency distribution of each variable, which is the frequency distribution of the characteristics of the research subjects based on age, weight, height, and body mass index according to age (BMI-for-age). Bivariate analysis, The non-parametric correlation test spearman rho was used to determine the relationship between both variables. The purpose of this analysis was to determine the relationship between body image and the level of risk of Female Athlete Triad syndrome.

RESULTS AND DISCUSSION

Young athletes are prone to feeling dissatisfied with their body image. Cross-sectional study has been conducted on 122 students aged 12-17 years by Vidiana & Sudarmiati (2021), there are 31 students (26.4%) who still feel dissatisfaction with their body image, from mild to severe categories. This is in line with research by Alivia N. Y. & Adriyanto (2018) on adolescent girls aged 15-18 years, which shows that subjects who have a negative body image tend to have poor eating behavior as well. As many as 22.5% of the total female adolescent respondents who have poor eating behavior also have poor nutritional status. The determination to achieve the desired body shape may create false perceptions and trigger intake restriction behavior. Based on a study conducted among female athletes (n=86) of various sports categories (11-21 years old), shows that there is a significant relationship (p<0.001) between body image perceptions and eating behavior disorders in a population of adolescent female athletes (Suryawati, et al. 2020).

Table 1. Frequency Distribution of Body Image Perception by Type of Sport (N=76)

Body Image Classification	Frequency (n)	Percentage (%)
No concern	38	50.0%[a]
- Power (n=49)	22	44.9%[b]
- Endurance (n=8)	4	50.0%[b]
- Games (n=19)	12	63.2%[b]
Mild concer	15	19.7%[a]
- Power (n=49)	11	22.5%[b]
- Endurance (n=8)	1	12.5%[b]
- Games (n=19)	3	15.8%[b]
Moderate concern	13	17.1%[a]
- Power (n=49)	8	16.3%[b]
- Endurance (n=8)	1	12.5%[b]
- Games (n=19)	4	21.1%[b]
Marked concern	10	13.2%[a]
- Power (n=49)	8	16.3%[b]
- Endurance (n=8)	2	25.0%[b]
- Games (n=19)	0	0.0%[b]

[a]Percentage compared to total subjects, N=76
[b]Percentages compared to total subjects per sport type, (Power (n=49), Endurance (n=8), Games (n=19)).

This study showed that half of the research subjects n=38 (50%) were already satisfied with their body image and the other half n=38 (50%) still felt dissatisfied with their body image with details of n=15 (19.7%) had mild concern, n=13 (17.1%) had a moderate concern, and n=10 (13.2%) had a marked concern of their body image (Table 1). There was no significant difference (p=0.310) in body image scores between each type of sports category (Table 2).

Table 2. Differences in Body Image Perception by Type o Sport

Sport Categories	BSQ-34 Items Score				
	n	Min	Max	Average±SD	p
Power	49	34	171	93.90±38.39	
Endurance	8	37	173	91.75±54.37	0.310[a]
Games	19	39	136	76.84±29.18	

[a]Kruskall-Wallis significance test results (p>0.05)

The analysis of multivariate statistical tests conducted by Suryawati, et al (2020) shows that body image perception is a variable that greatly influences the eating behavior of the subject. Based on the results of research conducted by Yusintha N. A., & Adriyanto (2018), there is a significant relationship between eating behavior and nutritional status in the adolescent female population (p<0.05, r=0.256). The subjects in this study (N=76) have shown that most of them had normal nutritional status (BMI-for-age). However, the power sports category has the lowest percentage (n=40 (81.63%)) of normal nutritional status when compared to other categories. The power category in this study also showed the highest percentage of dissatisfaction with their body image (n=27 (59.1%)). The bivariate

analysis was used in this study and shows that there is a significant relationship (p<0.05, r=0.471) between body image perception and nutritional status (BMI-for-age). Athletes who feel dissatisfied with their bodies have the potential to engage in unhealthy behaviors, such as food intake restriction or negative emotions. This condition can trigger eating behavior disorders that eventually lead to low energy availability and other health problems (Kantanista et al., 2018).

When energy availability is insufficient for a long period of time, the body will try to adapt by reducing energy use for cellular maintenance; thermoregulation; growth; and reproduction (Setyawati et al., 2020). This condition will trigger FAT (Female Athlete Triad) syndrome, which includes three components, including low energy availability; menstrual disorders; and low bone density (Gross & Joy, 2020).

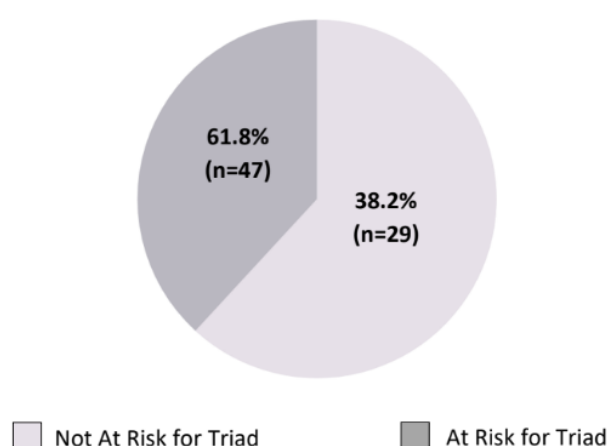Figure 1. Risk Prevalence of Female Athlete Triad Syndrome (N=76)

Table 3. Differences in Risk Level of FAT Syndrome by Type of Sports (N=76).

Sport Categories	LEAF-Q Scoring				
	n	Min	Max	Average±SD	p
Power	49	0	14	6.88±3.43	
Endurance	8	2	13	6.88±3.36	0.705*
Games	19	2	14	7.63±3.34	

*One-Way ANOVA significance test results (p>0.05)

Out of 76 female athletes from various sports who participated in this study, 29 athletes (38.2%) were at risk for FAT syndrome (Figure 1). The highest prevalence came from the game category (42.11%), with an average LEAF-Q score of 7.63±3.34 (Table 3). However, there was no significant difference (p=0.705) in the risk levels of the three sports. This is because FAT syndrome is likely to occur in any physically active woman at any level (Gross &

Joy, 2020).

Table 4. Frequency Distribution of Risk Level of FAT Syndrome by Body Image Satisfaction Level (N=76)

		LEAF-Q				TOTAL		r	p
		Not At Risk (Score < 8)		At Risk (Score ≥ 8)					
		n	%	n	%	n	%		
BSQ-34	No Concern (Score <80)	29	38.2	9	11.8	38	50.0	0.294	0.010
	Mild Concern (Score 80 – 110)	4	5.3	11	14.5	15	19.7		
	Moderate Concern (Score 111-140)	8	10.5	5	6.6	13	17.1		
	Marked Concern (Score > 140)	6	7.9	4	5.3	10	13.2		
TOTAL		47	61.8	29	38.2	76	100		

(Table 4) shows that subjects who have satisfaction with their body image tend to have no risk of experiencing FAT syndrome (n=29, 38.2%). Whereas subjects who tend to have negative body image perceptions have a fairly high percentage to experience the risk of FAT syndrome. Of the 15 subjects who felt slightly dissatisfied with their body image, there were n=11 (14.5%) at risk of FAT syndrome; of the 13 subjects who felt dissatisfied, there were n=5 (6.6%) at risk of FAT; and of the 10 subjects who felt very dissatisfied with their body image, almost half n=4 (5.3%) were at risk of FAT syndrome. there is a significant relationship between body image and the risk of the FAT syndrome in the adolescent female athlete (p<0.05, r=0.294). Although many studies have indicated the high prevalence of FAT syndrome among female athletes, there is still a lack of research in Indonesia that looks at the relationship between perceived body image and the level of risk of Female Athlete Triad syndrome in the athlete population. Whereas body image that leads to negative perceptions can cause to extreme food intake restriction behavior to eating behavior disorders that trigger many health problems, one of which is this FAT syndrome (de Oliveira et al., 2017).

CONCLUSION

This study revealed a one-way relationship between body image and the risk of the

FAT syndrome. Thus, a multi-disciplinary approach is needed to promote mental health and nutrition-related problems that could lead to FAT syndrome.

RECOMMENDATION

This study can still be developed by identifying Female Athlete Triad syndrome through measurements for each indicator more specifically thus the level of accuracy can be higher. Some forms of assessment and measurement that can be done include quantitative intake data, measurement of bone density by looking at the t-score value using the bone densitometry instrument, and assessment of the respondent's menstrual function. In addition, there are still quite a number of female athletes at SMAN Olahraga Sidoarjo who have body image dissatisfaction and are at risk of experiencing FAT syndrome. In-depth assessment and interdisciplinary assistance involving all sports personnel in dealing with this situation are needed.

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