

Risk factors of eating disorders in young female athletes

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Abstract

Eating disorders in young female athletes is a serious psychological and health disease which could become an early problem on Female Athlete Triad. Eating disorders are influenced by internal and external factors. This study aimed to determine the risk factors for eating disorders in young female athletes. An observational study with a cross-sectional design on eighty-six young female athletes was conducted with consecutive sampling method. Subjects in this study were athletes in athletics, weightlifting, volleyball, beach volleyball, swimming, rowing, fencing, Pencak Silat, karate, taekwondo, judo, sepak takraw, table tennis, and boxing. The inclusion criteria of the subject athletes were young female athletes aged 11-21 years registered at the study site, did not consume alcohol, and voluntary. The nutritional status of the subjects was measured by their Body Mass Index for age score. Eating disorder was measured using the Eating Attitude Test-26 questionnaire and Eating Disorder Diagnostic Scale for the type of eating disorders, Rosenberg Self Esteem for Self Confidence, Depression Anxiety Stress Scale-42 for stress level, and Body Shape Questionnaire for body image perception. This study used univariate analysis, bivariate analysis with chi-square and multivariate analysis with logistic regression test. The prevalence of eating disorders risk among the young female athletes in this study was approximately 37.2%, where 9.3% of subjects were bulimia, 5.8% were on the binge of eating disorder, and 22.1% subjects experienced eating disorder not otherwise specified (EDNOS). The multivariate analysis showed that the risk factor of eating disorders in young female athletes was the negative body image perception ($p = <0.001$; RP:10.5) and stress ($p = 0.023$; RP:3.5). Nutritional status, self-confidence, and type of exercise were not proven as the risk factors of eating disorder among young female athletes. Based on this study, it can be concluded that the negative body image perception and stress are the risk factors of eating disorders among young female athletes.

1. Introduction

The number of women's participating in sports has increased significantly throughout the past years (Kelly and Hecht, 2016) Meanwhile, female athletes who participate in sport are mostly adolescents who are prone to nutritional problems (Tønnessen *et al.*, 2015). Adolescence is defined as the period of life between 11 and 21 years of age (Brown and Stang, 2011.) It is a time of profound biological, emotional, social, and cognitive changes during which a child develops into an adult (Brown and Stang, 2011). Physical, emotional, and cognitive maturity is accomplished during adolescence (Brown and Stang, 2011). The dramatic physical growth and development experienced by adolescents significantly increase their needs for energy, protein,

vitamins, and minerals (Larson *et al.*, 2017). Young female athletes have the characteristics of high physical activity and exercise, great social pressure from the sports environment such as the influence of coaches, friends or the demands of performance and high achievement from the sports they are involved in (Wells *et al.*, 2015). This condition triggers young female athletes to have a high risk of eating disorders (Fink and Mikesky, 2015).

Eating disorders are serious mental illnesses and make a significant negative impact on the individual's quality of life (Bratland-Sanda and Sundgot-Borgen, 2012). These disorders are characterized by a preoccupation with food, body weight, and shape that leads to behavior such as starvation, fasting, binge

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eating, and purging and excessive exercise (Coelho *et al.*, 2014). According to the Diagnostic and Statistical Manual of Mental Disorders: Fifth Edition (DSM-5), common eating disorders include anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorders (BED), and *eating disorders not otherwise specified* (EDNOS) (Pope *et al.*, 2015). The higher prevalence of eating disorders seen among female athletes compared to male athletes (Bratland-sanda and Sundgot-borgen, 2012). Research in Norway showed that prevalence of eating disorders in female athlete was 20% and in the male athletes is only 8% and the population of non-athletes were 9% (Ismailova and Gazdowska, 2016). Other studies reported that the prevalence of eating behavior disorders varied from 0-19% in male athletes and 6-54% in female athletes (Bratland-sanda and Sundgot-borgen, 2012).

Continuing eating disorders could become an early problem on Female Athlete Triad (FAT) (Hay and Touy, 2018). FAT was originally characterized by disordered eating, amenorrhea, and osteoporosis (Brown *et al.*, 2017). Young female athletes with eating disorders are at greater risk for experiencing Female Athlete Triad (FAT) because athletes in this condition have low energy availability and their energy needs are not met to perform bodily functions (Fink and Mikesky, 2015). These effects cause a decreased in macronutrient and micronutrient intake in the body causing several psychological effects and health problems such as increased anxiety, decreased body performance, free fat mass, dehydration, glycogen depletion, menstrual disorders, changes in Basal Metabolism Rate (BMR), and low nutritional status (Brien *et al.*, 2017).

Nutritional status, stress level, self-confidence, perception of body image and type of exercise are factors associated with eating disorders (Kantanista *et al.*, 2018). Some internal factors of eating disorders are age, sex, nutritional status, personality type, body image perception, stress level, and self-confidence (Brajendra and Rajesh, 2018). While external factors include the type of exercise, the level of competition, high training intensity, social pressure such as the demands of the athlete profession, the influence of the coach, family, friends, media, social economy and lack of knowledge (Mclester *et al.*, 2014; Wells *et al.*, 2015). The level of stress is related to the social pressure faced by athletes from coaches, friends, family, high training intensity, and great demands to win in the competition (Brajendra and Rajesh, 2018). Perceptions of body image and self-confidence are interrelated, female athletes often do not want to gain weight because in addition to feeling fat also with reasons to increase sports performance and increase self-confidence (Kantanista *et al.*, 2018). In

addition, the influence of sports type factors on eating behavior disorders mentioned in previous studies that athletes in sports that prioritize aesthetics, weight categories, and endurance such as gymnastics, cheerleading, swimming, jumping, rowing, slides, and martial arts greater chance of experiencing eating behavior disorders (Ismailova and Gazdowska, 2016; Roy *et al.*, 2019)

Young female athletes need more support to decrease potential health problems in the next life period (Tønnessen *et al.*, 2015; Aprilia *et al.*, 2018). Unfortunately, research about nutrition and the health of athletes in Indonesia is still lacking (Latni *et al.*, 2014). Study at Pusdiklat Ragunan Jakarta reported that 15 (23.1%) female athletes experienced bulimia eating disorder which was experienced by 6 (40%) volleyball athletes, 2 (13.3%) basketball athletes, 1 (16.7%) swimming athletes, and 5 (33.3%) martial athletes (Saputri and Dieny, 2017). This showed that eating disorders in female athletes have occurred in Indonesia, although the prevalence is not known certainly because not much research has been done. Hence, this study aimed to determine the risk factors for eating disorders in young female athletes.

2. Materials and methods

2.1 Design, location and time

This study was an observational study with a cross-sectional design and conducted from May to July 2019 at the Balai Pusat Pendidikan dan Latihan Olahraga Pelajar (BPLOP) Central Java, Salatiga sports club, and Semarang University sports clubs. This study was licensed by the Health Research Ethics Commission of the Faculty of Medicine of Universitas Diponegoro No.290/EC/KEPK/FK UNDIP/VII/2019.

2.2 Samplings

Based on the calculation of the large sample of one population observational study sample and a 10% drop out the correction, the total sample size of 86 subjects was obtained (Sopiyudin Dahlan, 2010). The consecutive sampling method is used for sampling in this study. Based on the inclusion criteria, including young female athletes aged 11-21 years registered at the study site, did not consume alcohol, was willing to become a respondent and fill in the Informed Consent, out of 104 subjects subjected to screening, 91 subjects were obtained. In the research process, there were 5 subjects experiencing dropouts due to incomplete data. Subjects in this study consisted of athletics, weightlifting, volleyball, beach volleyball, swimming, rowing, fencing, Pencak Silat, karate, taekwondo, judo, sepak takraw, table tennis, and boxing.

2.3 Data collected

The dependent variable of this study was eating disorder, obtained using the Eating Attitude Test (EAT-26) questionnaire with an assessment of eating disorder (score ≥ 20) and no eating behavior disorder (score < 20) (Dallas *et al.*, 2015). Furthermore, to determine the type of eating disorder used eating disorder diagnostic scale questionnaire (EDDS), categorized as anorexia, bulimia, binge eating disorder (BED), and eating disorder not otherwise specified (EDNOS) (Seyyed and Moosavi, 2018). The categorization of types of eating disorders is based on the values in the questionnaire which include answering 4 or more questions in number 2, answer 4 or more in questions number 3 and 4, have a BMI < 17.5 kg/m², answer 3 or more in question number 21. Bulimia includes answering yes to questions number 5 and 6 or answering 2 or more question number 8, answer 4 or more questions number 3 and 4, answer 1 or more to one of questions 15-18. The BED category includes answering yes in questions number 5 and 6 or answering more than 2 questions in number 7, answering yes in 3 or more questions in numbers 9-13, answering yes in question number 14, not doing compensation behavior answering 0 in questions number 15-18, if the respondent meets the BED criteria but experiences compensation behavior, then it is classified into bulimia. EDNOS category, if it has one of the criteria above but is not included in anorexia, bulimia, and binge eating disorders (Seyyed and Moosavi, 2018).

The independent variables include nutritional status, stress level, level of confidence, perception of body image, and type of exercise. The nutritional status variables in this study were categorized based on BMI for age score indicators for subjects aged < 18 years and BMI for subjects aged > 18 years. BMI for age score is one indicator of determining the nutritional status of adolescents whose values are in the form of z-scores and categorized into 5 categories: very thin (< -3 SD), thin (-3 SD to < -2 SD), normal (-2 SD up to 1 SD), fat (> 1 SD to 2 SD), and obesity (> 2 SD) (Wyon *et al.*, 2014). Body Mass Index (BMI), which is an assessment of a person's nutritional status, obtained from the distribution of weight measurements (BB) in kg and height (TB) in m² consisting of 5 categories, including underweight (BMI = < 18.5), normal (BMI = 18.5-22.9), risk of obesity (BMI = 23-24.9), obesity I (BMI = 25-29.9), obesity II (BMI = > 30) (Lim *et al.*, 2017).

Stress level is the result of assessing the severity of stress experienced by a person, measured through an interview questionnaire Depression Anxiety Stress Questionnaire (DASS-42) that can measure the level of depression, anxiety, and stress. In this study, the

questions were only used in the stress section with normal categorization (score 0-14) and stress (score > 14) (Basha and Kaya, 2016). Confidence describes a person's confidence about himself in general, assessed using the Rosenberg Self Esteem (RSES) questionnaire which consists of ten questions and is categorized as insecure (score < 15) and self-confidence (score ≥ 15) (Chaudhari *et al.*, 2017). Body image perception is a person's opinion about their ideal body shape, assessed using Body Shape Questionnaire (BSQ) consisting of 14 questions with the category of positive body image perception (score < 38) and negative body image perception (score ≥ 38) (Blair *et al.*, 2017). Types of exercise are categorized by sports groups that tend to experience eating behavior disorders that prioritize endurance and strength (Roy *et al.*, 2019). Data on subject characteristics (name, age, date of birth), sports, history of illness, history of injury were obtained through interviews with a research questionnaire. Weight and height data were obtained through direct measurements using a digital stamp scale GEA brand with an accuracy of 0.1 kg and microtoise with an accuracy of 0.1 cm. BMI data was measured using a Tanita (Bioelectrical Impedance Analyzer) brand and the z-score was obtained with WHO antroplus software.

2.4 Data analysis

Data on the subject's characteristics, nutritional status, stress level, self-confidence, perception of body image, type of exercise, eating disorder and type of eating disorder are presented in the form of a percentage with a frequency distribution table. Chi-square and fisher's exact tests were used to analyze the relationship between categorical data variables. The magnitude of the risk of the independent variable on the dependent variable in this study was done by determining the value of RP (Ratio Prevalence). Furthermore, the analysis of the most influential factors (nutritional status, stress level, self-confidence, perception of body image, type of exercise) on the occurrence of eating behavior disorders was carried out by logistic regression analysis.

3. Results

3.1 Subject characteristics

The subjects in this study were 86 young female athletes ranging in age from 11 years to 21 years old. The age of the subjects was mostly middle adolescents with 42 people (48.8%). Based on Table 1, the nutritional status of most subjects had a good nutritional status of 69 people (80.2%). Subjects who experienced stress were 31 people (36%) and subjects who were not stressed were 55 people (64%). Confidence most of the subjects felt confident as many as 85 people (98.8%).

Negative body image perception was experienced by 38 people (44.2%) of research subjects and 48 people (55.8%) others had positive body image perception. The subjects mostly came from sports that prioritized endurance about 50 people (58.1%) and body strength as many as 36 people (41.9%). The types of sports that prioritize endurance consist of swimming, rowing, table tennis, women's volleyball, beach volleyball, sepak takraw, medium distance running, marathon, and brisk walking. The types of sports that prioritize strength consist of weightlifting, pencak silat, boxing, judo, fencing, karate, taekwondo, hurdles, sprints, javelin, discus, and shot put. Eating disorders in this study were experienced by 32 people (37.2%). The types of eating disorders in this study were eating disorder not otherwise specified (EDNOS) of 19 people (22.1%), bulimia nervosa 8 people (9.3%), and binge eating disorder 5 people (5.8 %).

3.2 Factors for eating disorder

Nutritional status, stress levels, self-confidence, perception of body image, and type of exercise are factors related to eating behavior disorders. The results of the study can be seen in Table 2. Subjects with eating disorders with overweight were 6 people (35.3%), while those with good nutritional status were 26 people (37.7%). Subjects who experienced eating disorders and experienced stress as many as 18 people (58.1%) while subjects with eating disorders and no stress 14 people (25.5%). There were no subjects found eating behavior disorder that was not confident, but there were 32 people (37.6%) subjects with eating behavior disorder who felt confident. Eating disorders with negative body image perception were experienced by 25 people (65.8%) and subjects with positive body image perception were 7 people (24.6%). Subjects who experienced eating behavior disorders and came from the type of exercise that prioritizes body resistance amounted to 19 people

(38%) and body strength 13 people (36.1%). Table 2 shows the results that there is no relationship between nutritional status, self confidence, and type of exercise with eating disorder in young female athletes. Analysis using the chi-square test found that there was a significant relationship between stress levels ($p = 0.006$)

Table 1. Overview of age, nutritional status, stress level, self-confidence, type of exercise, and eating disorders in young female athlete

Variable	n	%
Age (years)		
Early adolescence (11-14)	28	32.6
Middle adolescence (15-17)	42	48.8
Late adolescence (18-21)	16	18.6
Nutritional status		
Overweight	17	19.8
Normal	69	80.2
Stress level		
Stress	31	36
Normal	55	64
Self-confidence		
Insecure	1	1.2
Self-confidence	85	98.8
Body image perception		
Negative	38	44.2
Positive	48	55.8
Type of exercise		
Endurance	50	58.1
Strength	36	41.9
Eating Disorders		
Yes	32	37.2
No	54	62.8
Type of Eating Disorders		
<i>Bulimia Nervosa</i>	8	9.3
<i>Binge Eating Disorder (BED)</i>	5	5.8
EDNOS	19	22.1
No	54	62.8

Table 2. Correlation between nutritional status, stress level, self-confidence, body image perceptions, type of exercise with eating disorders

Category	Eating Disorders		P	Ratio prevalence (RP)	
	Yes n (%)	No n (%)			
Nutritional status	Overweight	6 (35.3)	11 (64.7)	1.000 ^a	0.902
	Normal	26 (37.7)	43 (62.3)		
Stress level	Yes	18 (58.1)	13 (41.9)	0.006 ^{a*}	4.055
	No	14 (25.5)	41 (74.5)		
Self-confidence	Yes	0 (0.00)	1 (100)	1.000 ^b	-
	No	32 (37.6)	53 (62.4)		
Body image perception	Negative	25 (65.8)	13 (34.2)	<0.001 ^{a*}	11.264
	Positive	7 (14.6)	41 (85.4)		
Type of exercise	Endurance	19 (38.0)	31 (62.0)	0.858 ^a	1.084
	Strength	13 (36.1)	23 (63.9)		

and body image perception ($p = <0.001$) with an eating disorder in young female athletes.

3.3 Negative body image perception and stress as risk factors for eating disorder

The results of multivariate analysis prove the hypothesis that the risk factors for eating disorders in young female athletes in this study are stress levels and body image perception. The results of the study can be seen in Table 3. Based on the calculation of the chance of using the equation $f(y) = 1/1+\exp-(\text{constant}+a_1x_1+a_2x_2)$, the probability of the subject experiencing an eating disorder if the subject is stressed and has a negative body image is 80%. Body image perception is the most influential risk factor for eating disorders. The results of multivariate analysis with logistic regression obtained p -value <0.001 (RP:10.465; IK95%:3.538-30.953) which means that subjects with negative body image perceptions have a 10 times greater chance of experiencing eating behavior disorders compared to subjects with body image perception positive.

Table 3. Risk factor for eating disorders in young female athlete

Variable	Coefficient	p	Ratio prevalence (RP)
Stress level	1.268	0.023	3.553 (1.194-10.567)
Body image perception	2.348	<0.001	10.465 (3.538-30.953)
Constant	-2.228		

4. Discussion

Subjects in this study were aged 11-21 years with characteristics mostly in the early adolescent (32.6%) and middle age groups (48.8%). Eating disorders are vulnerable at that age because during adolescence individuals experience many biological changes in body shape and size that encourage adolescents to have negative body image perceptions (Senín-Calderón *et al.*, 2017). Besides, emotional and social development is characterized by a high desire to adjust to the environment and their peers are included in the selection and consumption of food so that the risk of health problems increases (Brown and Stang, 2011). Eating disorders in young female athletes in this study were 32 (37.2%), with the type of eating disorder bulimia nervosa 8 people (9.3%), binge eating disorder 5 people (5.8%), and eating disorder not specific (EDNOS) as many as 19 people (22.1%). Bulimia eating disorder experienced by 2 table tennis athletes, 1 martial arts athlete, 1 boxing athlete, 2 sepak takraw athletes, 1 karate athlete, 1 swimming athlete, binge eating disorder experienced by 1 boxing athlete, 2 volleyball athletes, 2 athletic athletes, EDNOS is experienced by 1 martial arts athlete, 1

rowing athlete, 2 volleyball athletes, 1 takraw athlete, 1 judo athlete, 2 karate athletes, 3 taekwondo athletes, 3 swimming athletes, 1 beach volleyball athlete, and 4 athletic athletes. Study at Pusdiklat Ragunan Jakarta, 15 (23.1%) athletes experienced bulimic eating disorders experienced by 6 volleyball athletes, 2 basketball athletes, 1 swimming athlete, 1 gymnastics athlete, 3 taekwondo athletes, and 2 martial arts athletes (Saputri and Dieny, 2017). Of the 32 subjects who experienced an eating disorder, the most common type of eating disorder experienced by the subject was Eating Disorder Not Specified (EDNOS), an atypical eating disorder with irregular eating behavior, including one of the categories of anorexia nervosa, namely the fear of gaining weight or being fat, dissatisfaction with body shape, and including one of the criteria for bulimia nervosa, which is the feeling of being unable to control the portion of food, doing exercise to lose weight (Nelms *et al.*, 2014).

The perception of negative body image is a risk factor for eating disorders. Young female athletes have a higher tendency to experience negative body image perceptions because they naturally pay more attention to appearance. Many young female athletes feel fat and are not satisfied with their bodies so they try to achieve an ideal body by limiting food intake (Dogan *et al.*, 2018). The results of the study showed a significant relationship between body image perception and eating behavior disorders in young female athletes ($p = <0.001$). Young female athletes who experience eating behavior disorders and have negative body image perception experienced by 2 table tennis athletes, 2 sepak takraw athletes, 5 swimming athletes, 2 martial arts athletes, 2 boxing athletes, 3 female volleyball athletes, 1 beach volleyball athlete, 1 judo athletes, 2 karate athletes, 2 taekwondo athletes, and 3 athletic athletes. The results of the study are in accordance with early research which states that individuals naturally have personalities and psychological characteristics such as self-concept, satisfaction with the body and appearance that affect the occurrence of eating disorders (Roy *et al.*, 2019). In addition, the perception of negative body image in athletes can arise due to several factors interrelations such as sports environment stigma related to body weight and thin body shape are better in performance, the trainer's demands to achieve body weight or shape to meet competition criteria, dissatisfaction with body shape and appearance so that athletes have a negative perception of body image (Kong and Harris, 2015).

Stress factors also have a significant correlation with an eating disorder in this study ($p = 0.023$). Based on the calculation of opportunities, stress contributes 27% to the occurrence of eating behavior disorders. As is well known, high physical activity and the condition of a

sports environment full of demands and pressures from both coaches, athletes, athletes, or demands to win in competitions make athletes too often experience competitive stressors and anxieties that bring them in a state of being negative emotions (Murray *et al.*, 2011; Roy *et al.*, 2019). Stress conditions in individuals not only trigger psychological illness but are also associated with poor health status. Someone who is experiencing stress can express their situation by changing their diet and intake and amount through food selection or eating frequency. Athletes often go on dangerous diets to either limit or consume excessive food to achieve their goals which leads to the occurrence of eating behavior disorders (Roy *et al.*, 2019). Previous studies showed that stressed individuals have a higher tendency to consume foods or snacks with high calories and high fat which can cause weight gain and obesity (Escalante, 2016). Young female athletes with eating disorders and experiencing stress in this study were experienced by 4 swimming athletes, 2 martial arts athletes, 2 boxing athletes, 1 karate athlete, 1 taekwondo athlete, 2 table tennis athletes, 1 women's volleyball athlete, 2 sepak takraw athletes, and 3 athletic athletes. Stress on athletes can be triggered by the pressures of the sports environment such as the demands of sports to lose and gain weight in quick time, the demands of coaches to improve performance, intense competition in competition, the ideal body concept that is not appropriate so as to cause negative body image, and demands before the match so that athletes experience stress. Stress on a person can occur due to a mismatch between demands and the ability of resources so that individuals are unable to cope with social pressure or a sports environment (Mischoulon *et al.*, 2012). This research was conducted during the preparation period of athletes' matches, so stress may arise due to more intensive training and greater demands than coaches and sports involved in preparation for the competition.

The results of this study showed that the nutritional status of most subjects based on BMI for age scores found 69 (80.2%) subjects with good nutritional status and 17 (19.8%) subjects with over nutritional status. There is no relationship between nutritional status with an eating disorder. The nutritional status of subjects who experience an eating disorder in the normal category and some are overweight. The nutritional status of the subjects in this study is due to the demands of the sport that athletes are involved in. Previous research data showed several factors causing overweight in athletes, namely as follows, dense frequency of matches in a year 87.73%, consumption of sweet foods and drinks 84.6%, consumption of fatty and coconut milk foods 83.3%, the interests of the coach determine the class body weight for athletes 81.76%, low discipline of athletes in

maintaining body weight 72.54%, lack of nutrition and exercise knowledge 29.75%, and lack of trainer attention in controlling body weight 23.25% (Faizal and Hadi, 2019). Nutritional status in athletes reflects the ideal body shape (Setiowati, 2014). Most of the subjects in this study had a normal nutritional status. Previous studies have suggested that athletes with good nutritional status have higher levels of physical fitness and self-confidence as a form of psychological well-being. Self-confidence is supported by two aspects, namely individual aspects and social environment support. Optimal nutritional status is included in the aspect of individuals who can support the confidence and performance of athletes so that it can be a protective factor for eating disorders (McVey *et al.*, 2002).

The confidence of the subjects of this study showed that the majority of subjects felt as much self-confidence as 85 (98.8%). There is no relationship between self-confidence and eating disorders. This insignificant relationship is not only because almost all young female athletes in the study already have good self-confidence, but possibly also because coaching and motivating by coaches and coaches have been carried out continuously in evaluation sessions every day. The athlete in this study also lives in a nearby hostel so that social interaction is more supportive of building self-confidence and self-ability to acquire the required skills both physically and mentally. Self-confidence is formed from habits, and good interaction with the social environment, become aspects of personality and basic capital for someone to do something, achieve success, and be responsible for what is determined by themselves (Setyawati, 2014; Apriansyah and Mukarromah, 2017). There is no significant relationship between self-confidence and eating disorder. That is because in this study the measured confidence is generally confidence and athletes who lack confidence are not caused by aspects of body weight, body shape, or matters related to physical appearance. Confidence in this study is more influenced by aspects of personality and individual satisfaction with the ability or self-performance, while self-confidence that can cause eating disorder is confidence associated with physical appearance (Laila, 2013).

In this study, it was found that the subjects with the most eating disorder were derived from the type of exercise that prioritizes endurance as many as 19 people (38%) and strength 13 people (36.1%). Previous studies have found that athletes in endurance, play, aesthetics and strength sports have a higher tendency to develop eating behavior disorders (Roy *et al.*, 2019). This is due to the fact that the sports group has sport demands and competition characteristics that emphasize ideal body shape and body weight (Krebs *et al.*, 2019). Types of

sports in the body strength group consist of sports that give priority to weight, athletes will not be allowed to compete if their weight is above limits on categories or classes that have been determined, while in sports that prioritizes endurance there is an assumption that the success of athletes in competitions can be achieved if they have low body weight. This can cause great pressure for athletes to achieve weight loss and often in a very short time (Melin *et al.*, 2014). In this study, the type of exercise was not significantly related to eating disorder because in this study consisted of various sports that have different demands and specific characteristics in each sport. Previous research states that the prevalence study in heterogeneous sports groups of mixed athletes is quite difficult to interpret if there is no control group in the study, it is necessary to use a questionnaire assessment of the characteristics of the sport through interviews to find out more detailed clinical conditions and evaluations (Currie, 2010).

The results of multivariate analysis of variables that have a significant relationship with eating behavior disorders, it is known that the perception of body image is the most influential risk factor for eating disorders. Based on the calculation of opportunities, negative body image perception affects the occurrence of eating behavior disorders by 47%. If accompanied by stress the chance of eating disorder will be greater, which is 80%. Body image perception is a person's assumption about one's body condition in the form of positive or negative body image perception. Concerns about negative body image often occur in adolescence, especially in young women (Senín-Calderón *et al.*, 2017). Female athletes often consider themselves overweight and feel dissatisfied with their bodies, even though their actual weight is normal or thin (Voelker *et al.*, 2015). The desire to have shape perfect body and competition in the world of athletes with sports that are concerned with evaluating body shape or prioritizing weight classes makes these athletes make various efforts to make their weight or body shape as desired, one of them by doing a dangerous diet. This will affect a person to reduce food consumption that leads to eating disorders (Rosewall *et al.*, 2019).

Eating disorders experienced by young female athletes in addition to having an impact on declining sports performance can also have an impact on the nutritional status and health of young female athletes in this period and subsequent life periods (Brien *et al.*, 2017). Young female athletes who have poor nutritional status tend to remain, undernourished adults, so that during pregnancy it is more likely to give a baby with low birth weight (Alexander *et al.*, 2015). Whereas a baby with a low birth weight has a greater risk of

experiencing various chronic diseases as an adult. These harmful effects not only can reduce the quality of life of women as individuals but also have an impact on the quality of the next generation so that eating disorders are important to be prevented (Drew *et al.*, 2017).

5. Conclusion

Risk factors for eating disorders in young women athletes were negative body image perception ($p = <0.001$) and stress ($p = 0.023$). Athletes who have negative body image perception are 10 times greater risk and athletes who experience stress are 3 times greater risks for suffer eating disorders.

Conflict of interest

The authors declare no conflict of interest.

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