Review Article

Prevalence of Different Types of Eating Disorder in Different Endurance Sports and its Impact on Performance: A Narrative Review

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Endurance sports have shown prominent effects in aerobic capacity, cardio-protection, prevention or treatment of diabetic mellitus, athletic body composition and bone density. Despite these positive effects, these sports may lead to risk factors for eating disorders. It has been found in several studies that athletes are more prone to eating disorders (ED) than the non-athletic population. Thus, this review aims to critically analyze the literature to evaluate different types of eating disorders among athletes and their impact on their performance among endurance athletes. The significance of this review is to provide information about further exploration in eating disorder athletes so that it may hopefully help clinicians and physiotherapists in planning individualized exercise programs that would be beneficial in improving outcomes in these sports persons. Results suggested that anti-gravitational sports are at higher risk of ED when compared with endurance sports, whereas endurance sports athletes are at more risk when compared with ball sports or triathletes. It has also been found that initially, ED may result in performance, but later it will lead to low performance because athletes with EDs will have physiological and psychological disorders.

Access this article online

Website: www.cijmr.com

DOI: 10.58999/cijmr.v3i01.124

Keywords: Eating disorder, Anorexia, Bulimia, Endurance sports, Athlete, Performance.

Introduction

There are several types of sports and endurance sports are considered to be more favorable for metabolic and cardiovascular effects. Endurance sports are characterized by isotonic contractions of large muscle groups[1]. Endurance games have shown prominent effects in aerobic capacity, cardio-protection, prevention or treatment of diabetic mellitus, athletic body composition and bone density.[1] Despite of these positive effects, these sports may leads to risk factor of eating disorder. It has been found in several studies that athletes are more prone to eating disorder (ED) than the non athletic population.[1]

Eating disorders are affecting persons eating nature that affect the person both physiologically and psychologically.[2] Previous studies claim that female athletes are more affected by ED than male athletes with ratio of female: men are 10:1 but recent researches have shown those males are equally affected as female athletes[2]. EDs may impact human beings of all ages; puberty age represents a threshold period of increased vulnerability for the onset of EDs.[3]

Anorexia Nervosa (AN) is characterised by the fear of becoming overweight, body image distortion and denial of low weight, refuse to maintain normal BMI and amenorrhoea.[4] Bulimia Nervosa (BN) is the commonest and the features of this condition are regular and frequent food binges, typically followed by a compensatory purge.[4,5]

Performance sports which emphasis on aesthetic body of an athlete and appearance enhancement, sports which focuses on weight categories and those in which an optimally lower body weight may raise performance, especially endurance sports are commonly linked with the risk factors.[5-7] Sports costume can peak the athletes' awareness of their build and a feel of body shame which eventually leads to ED.[8,9] Athletes may also experience pressure from their coaches and fellow teammates to achieve a body weight or shape or size that will enhance performance.[10] Coaches are strongest person

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Submitted: 26/06/2023 Revision: 17/11/2023
Accepted: 18/04/2024 Published: 20/04/2024

How to cite this article: Sheikh MS, Zutshi K, Aman I. Prevalence of Different Types of Eating Disorder in Different Endurance Sports and its Impact on Performance: A Narrative Review. Central India Journal of Medical Research. 2024;3(1):12-15.

Table 1: Result

Study	*Year*	*Population*	*Outcome measures*	*Result*
Alayne Yates[12]	2003	99 runners, 36 cyclist and 56 paddlers were enrolled in the study.	Exercise Orientation questionnaire (EOQ) score.	The paddler group had a significant relief in symptoms of anxiety/panic when compared with runners or cyclists (P<.01) and higher SLSS scores than cyclists [P<.01]. The mean score of ED patients are as follow: 12% runners, 14% cyclists, and 18% paddlers
Claude Ferrand[13]	2004	42 young male amateur cyclists	MPS EAT-26 BMI	Global EAT scores ($p < .01$), in dieting scores ($p < .01$), in Bulimia scores ($p < .01$). 24 participants score of above 20 on the EAT-26 scale. These cyclists had shown significantly higher scores on Other-oriented perfectionism (M = 62.7, SD = 7.1) than the group scoring below or equal to 20 (M =55.4, SD=7.5, $p<.05$).
Jorunn Sundgot-Borgen[14]	2004	Elite athletes of both gender (n = 1620) and controls group of both gender (n = 1696)	Self reported questionnaire	Majority of the athletes had eating disorder (p<0.001). The prevalence of EDs is on higher side in male athletes who are involved in anti gravitational sports (22%) than in ball sports (5%) and endurance sports (9%) $P<0.05$). The prevalence of EDs among female athletes is significantly on higher side in athletes who are competing in aesthetic sports (42%) when compared with the endurance (24%), technical (17%) and ball game sports (16%).
Shaun K. Riebl[15]	2007	Both male cyclist (n=61) and non cyclist (n=63)	EAT-26	Male cyclists reported significantly are scoring higher EAT-26 scored compared to the male control group (P_0.001).
Jessica Mongrain[7]	2018	162 non-elite endurance athletes participated in multisport.	Eating Attitudes Test-26 (EAT-26) questionnaire	The mean EAT-26 score was 6.5 ± 0.5 and only 9 athletes' equivalent to 5.6% who scored +20 units in scale. -elite multisport endurance athletes reported significantly lower self reported symptoms of ED.
Jasmina Parlov[16]	2020	36 artistic female swimmers and 34 female water polo players	Eat-26 item self-report scale and Dieting subscale	The median value for EAT-26 score Was reported to be higher in the artistic swimmers group when compared with water polo players' group. Results suggest that artistic swimmers, show higher risk of developing eating disorders than female water polo players and that they are also prone to dieting for weight-control.
Jose J Muros[17]	2020	4037 male and female cyclists and triathletes	SCOFF questionnaire and Mediterranean diet adherence screener	Males cyclist were significantly less prone to have ED than females ($p < 0.001$), and triathletes ($p < 0.01$). It is also reported that cyclists are less prone to have ED also. Possibility of having any eating disorder increased with increasing BMI ($p < 0.001$) and decreasing age ($p < 0.001$).

in athlete's lives and can have a significant influence on the internalization of weight goals. Coach's behavior such as, such as public weigh-ins, negative weight body comments, and high expectations regarding performance, can also indulge disordered eating attitudes.[10,11]

Thus the aim and objective of this review is to analyze the literature to critically evaluate the prevalence of eating disorder among athletes and its impact on their performance among endurance athletes.

Methodology

This narrative review was conducted according to the primary aim of research. Electronic data based searches were performed under PubMed, Pedro and Google Scholar until March 2021. A basic search strategy was used with the help of following keywords: Eating disorder AND anorexia AND bulimia AND Endurance Sports AND athlete AND Performance.

Result

Table 1 depicts results from the several studies according to the year, population, outcome measures.

Prevalence of Eating Disorder

According to a study (Jorunn Sundgot-Borgen,2004) athletic population is more prone towards ED when compared to non athletic population. He concluded that around 13.5% of population is having either subclinical or clinical ED. Prevalence of ED within sports, male athletes have higher percentage of 22 % are in antigravitational sports than in ball games are 9% and endurance sports is 5%. Whereas for female athletes competing in aesthetic sports has higher prevalence with 42% than that of endurance sports that is 24% and technical sports 17% and ball sports was 16%.

Jessica Mongrain (2018) concluded that among different multi endurance sports, elite athletes are at low risk of having or developing EDs.

Jasmina Prlov (2020) suggested that artistic swimmers are at higher risk of ED when compared to water polo swimmers with dieting control behavior. Artistic swimmers also show purgative behaviors such as self induced vomiting. She also suggested leanness sports might contribute to develop ED.

According to a study conducted by José J. Muros (2020) female cyclist are more prone to male cyclist to develop ED whereas if we compare among triathletes and cyclist than cyclist are at more risk of developing ED. But when compared male cyclist with non cyclist population (Shaun K. Riebl,2007) it has been concluded that male cyclist is suffering from ED when compared to non cyclist or no athletic population.

Eating Disorder and Performance

Claud Ferrand (2004) suggested that performance is higher among the participant with higher value of EAT-26B scale. This performance has been classified as perfectionist among whom participants with higher value were having other oriented perfectionism which is due to society pressure.

Manore (2015) suggested that eating disorder may leads to leanness which may initially improve the performance but later during higher competitive level or at certain period it may reduce the performance because it will leads to lots of physiological and psychological problems such as dehydration, irregular menstruation, low bone density, depression or OCD.

Discussion

This narrative review deals with ED and its effects on performance. According the articles which are included suggested that the incidence of any type of eating disorders is higher among elite athletes and gravitational sports when compared with endurance, ball and triathletes' sports. It is also observed that EDs. is higher in female athletes when compared with male athletes and higher among athletes competing in sports which especially focus on leanness and weight compared.

Some researchers found out that ED is more among both male and female endurance athletes due to fact that more weight lowers the performance rate. The chances of develop an ED is dependent on various factors such as social, cultural, demographic breakdown, environmental, biological, and psychological. There is an inter-relationship between eating disordered behavior and psychological status. These factors can affect eating nature, performance and overall health in athletes and non-athletes.[18,19]

One of the highlighted reasons behind ED are the pressures from the coaches and fellow team mates may add on to increasing young athlete's vulnerability to eating disorder symptoms[21]. Alternatively, another explanation could be that among older, non-elite multisport athletes, the reality of managing a significant downplay in performance, which lessen their obsession with controlling body weight.[20,21]

Sport body stereotypes and their beliefs include the idea that being smaller will improve one's performance in sports, pressure from coaches to reduce weight, observation of teammates' and competitors' eating and exercise habits, exposure of uniforms, similarities between symptoms of disordered eating and characteristics of "good athletes," and the assumption of health based on superior performance.[22]

Reasons for the cyclists scoring significantly higher on EAT-26 may be due to their high energy requirements.[23,24] Cyclists can ride from two to seven hour per day,[25] and since it can be challenging to sufficiently replenish nutrients and fluids after strenuous, extended rides, they may find themselves thinking about food.[25]

The EAT-26 Scale is used to identify people who exhibit ED-related symptoms. Higher scores indicate a greater obsession with food and body image, which may result in harmful eating habits. A score of 21 or higher puts a person at risk for eating problems.20. There is no unique diagnostic tool for eating disorders

that can be obtained with the EAT-26 alone. To examine the relationship between perfectionism and eating disorders, further approaches like interviews or other eating disorder assessments are required.[15]

Because of resources such as time, money, and labour, BMI was self-reported rather being measured. Although direct measurement will yield more accuracy, this approach has shown good agreement in populations of healthy individuals. Yet, because BMI cannot distinguish between lean and fat body mass, it may not always be a valid metric for athletes. BMI is a trustworthy tool for identifying health issues related to weight. In addition, BMI is a simple formula, a good indicator of disorders linked to obesity, and the suggested screening method for overweight and obesity in large populations.[26]

Conclusion

It is concluded that various endurance sports are at higher risk of ED. It has be also found out that initially ED may increase performance but later it will leads to low performance.

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