

INVESTIGATING LEVELS OF BIGOREXIA NERVOSA AND
OVERTRAINING SYNDROME AMONG COLLEGIATE ATHLETESFatima Waheed¹, Ghazal Hussain^{*2}, Nisha Awan³, Aiman⁴^{*1,3,4}Department of Physical Therapy and Rehabilitation, School of Health Sciences, University of Management and Technology (UMT), Lahore, Pakistan²Lecturer, Department of Physical Therapy and Rehabilitation, School of Health Sciences, University of Management and Technology (UMT), Lahore, Pakistan¹fatimawaheed1207@gmail.com, ²drghazalpt@gmail.com, ³nishaawan840@gmail.com,
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bigorexia nervosa, overtraining syndrome, POMS, DMS, collegiate athletes.

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Abstract

Background: Bigorexia nervosa is a body dysmorphic disorder characterized by individual desire to have less fat mass and obsession with increasing muscle mass. It includes environmental factors such as media influence, insecurity, peer influence, and dietary attitudes addition to personality traits such as perfectionism. As a result, these people tend to engage in excessive muscle – oriented physical activity. A sports specific decline in performance accompanied by fatigue, mood changes and diminished performance is how OTS is defined. A period of recovery lasting weeks or months is still not enough to overcome under-performance.

Objective: The objective of the study was to find out the investigating levels of bigorexia nervosa and overtraining syndrome among collegiate athletes.

Method: The study was a cross sectional design conducted at University of Management and Technology, Lahore. A convenience sampling method was used. The sample size of the study was 162 male and female collegiate athletes. The tools used for the study was Drive for Muscularity Scale and Profile of Mood States.

Result: The current study shows that out of 162 participants 39.5% participants have moderate to high bigorexia nervosa and 95.1% participants fell into mild category of POMS (over-training syndrome). 78 males and 76 females have mild overtraining syndrome. 52 female participants have low to moderate drive for muscularity (bigorexia nervosa). **Conclusion:** These findings concluded 154 participants have mild overtraining syndrome. While there is significant association observed between bigorexia nervosa and overtraining syndrome with p-value of 0.00, 62 participants have moderate to high bigorexia nervosa. No association was observed between gender and overtraining syndrome. A significant association was also observed between gender and bigorexia nervosa.

INTRODUCTION

Muscle dysmorphia another name for bigorexia nervosa, is an illness marked by an obsession with gaining muscular mass and losing body fat. In order to attain their ideal appearance, people with bigorexia frequently take up bad eating habits, and excessive physical activity. Young individuals are more prone to negative body perception and anxiety connected to appearance, which can have serious negative effects on their physical and mental health [1]. Furthermore, bigorexia may occur as a result of unhealthy eating patterns that lead to eating disorders. An unhealthy connection with food, peer pressure, media impact, and personality qualities like perfectionism are additional risk factors for bigorexia nervosa. Because social media shapes the standards of what is deemed attractive and desirable, an unrealistic and challenging to achieve ideal body image is created. A person's self-evaluation of their body is frequently dependant on peer's comparisons [2]. Peers comparisons typically influence self-esteem with a tendency to attract towards more idealise individual. In the modern world, nevertheless, these comparisons are increasing including the idealised body images that are displayed in social media. Regardless of the audience interest, the perfect figure was formerly promoted by mass media like magazines and television [3]. Users of social media are now free to select the content they want to view. Social media has a big influence on how people behave and view the world. They can be beneficial in encouraging a healthy lifestyle without undue limitations; they can also raise the chance of developing different eating disorders. One particularly risky element is the prosperity to use drastic dietary techniques and depends on eating a balanced diet and getting frequent exercise. But when it comes to eating disorders, diet and exercise become obsessions [4]. The desire to have less body fat and a fixation with gaining muscle mass are hallmarks of bigorexia nervosa, a body dysmorphic condition, referred to as the Adonis complex, muscular dysmorphia , or reverse anorexia. In addition to personality qualities like perfectionism, it encompasses environmental influences like media impact, peer

pressure, insecurity and dietary views[5, 6]. University students are increasingly experiencing appearance anxiety and negative body image, which puts them at risk for body dysmorphic disorders like bigorexia. Furthermore, it is well established that poor eating habits brought on by social incapacity, low income, and a lack of nutritional understanding in this population are directly linked to a higher chance of developing poor eating attitudes and nutrition-related non-communicable diseases in the future [7].

It has been demonstrated that eating disorders behaviour varies by gender in both the general population and sports societies. Women are believed to be more likely than men to have body dysmorphia, worse self-image and body concept, as well as the social pressure to be thin. In the context of athletics, female athletes are frequently thought to be more susceptible to eating disorders than their male counterparts [8].

Overtraining syndrome is a state linked with a prolonged imbalance between training and recovery. This condition is marked by declines in performance, feelings of fatigue and disturbances in mood [9]. It is estimated to impact between 20% and 60% of athletes throughout their careers. In comparison to functional and non-functional overreaching, overtraining syndrome represents the most severe form and indicates a chronic build-up of both training and non-training stressors, which may require months to years for complete recovery. Nevertheless, the underlying mechanisms of this condition remain inadequately understood, as various psychological, biochemical, immune, neural and neuroendocrine factors are typically evaluated with minimal success [10].

Numerous factors including systemic inflammation and its subsequent effects on the central nervous system, such as neuro-hormonal changes, depression, and weariness can contribute to OTS. Other causes of OTS include tissue damage, glycogen depletion, elevated cytokine levels, and glutamine depletion in the muscles, which can result in muscle pain, weight loss, mood swings, and recurrent illness, that can coincide with a decline in performance [9].

Athletes are particularly concerned about overtraining syndrome (OTS) and related bone stress injuries, which can have a serious effect on their performance and general health. OTS is a condition marked by persistent exhaustion and diminished performance brought on by a decrease in recovery time, diet, and training load [11]. It has been determined that an athlete's age is an intrinsic factor that may affect their likelihood of acquiring OTS. Because of their shorter recovery times and higher training intensities, younger athletes are frequently more vulnerable. The association between age and OTS risk is still debatable. An athlete's chance of developing OTS is significantly influenced by extrinsic factors, including training volume and intensity, recuperation times, and diet [12]. Another significant intrinsic element that seems to affect the occurrence of OTS in athletes is gender. Women may be more vulnerable as a result of hormonal changes that occur during the menstrual cycle. Oestrogen levels during specific menstrual cycle phases, for instance, have been linked to greater fatigue and poorer exercise performance. During times of high training load, female athletes displayed distinct hormonal response patterns from male athletes [13]. Excessive training loads combined with poor recovery and sleep quality can cause overtraining syndrome, a condition that impairs performance and causes weariness. Overtraining causes the body to adapt, which can lead to mood swings and disruptions in a number of physiological systems, including the immunological, endocrine, and neurological systems. After prolonged restriction, chronic exposure to these elements can produce a tissue milieu that leads to abnormal neurological, metabolic, hormonal, and inflammatory responses, which in turn can result in inflammation and infectious illness [14].

METHODOLOGY

The sample size of the study was 162 male and female collegiate athletes. The setting of data collection was Aleem Dar Cricket academy, UMT sports club and Punjab cricket academy. The tools used for the study were Drive for muscularity and profile mood of states questionnaires. A

convenience sampling method was used. This technique was selected based on the feasibility and effectiveness in engaging participants. Conventional sampling was suitable for this study due to limited funds and time provided to acquire data from willing participants without much difficulty. The inclusion criteria for this research consisted of male and female collegiate athletes between the age of 15 and 25 years. All participants were required to be engaged in regular training for a minimum of six months and to have at least one year of competitive experience in their respective sports. Athletes who were playing indoor games, those using performance-enhancing drugs, and those undergoing a structured rehabilitation program were excluded from this study. Additionally, athletes with a history of ankle sprain or fractures, as well as female athletes who were in their menstruating period during the time of data collection were also excluded from the study.

Data collection tool:

Drive for muscularity scale:

The Drive for Muscularity is a 15 items scale. This scale has demonstrated both validity and reliability in previous research involving similar populations. The participants' drive for muscularity test was assessed by summing their responses to items on a 5-point Likert scale, which ranges from 1 (strongly disagree) to 5 (strongly agree) for students such as "I wish that I were more muscular". Then adding all the questions' scores and categorizing them according to the ranges into very low drive for muscularity, low to moderate and so on [15].

Profile of Mood States:

The profile of mood state is an inventory that involves answering directly by the subject that tells us the mood state an athlete is currently in to understand his/her ability. It has been used in number of researches. Many studies hypothesized that successful athletes it can be interpreted easily because successful athletes usually score low on negative score like tension, depression, anger, fatigue, and confusion while higher on positive attitudes like vigor more than unsuccessful

athletes. Some misunderstanding can occur because sometimes mood disturbances are not

by participants before taking data. All other ethical considerations were fulfilled. SPSS version 25 was

Female	81	50.0
Gender	Frequency	Percent %
Male	81	50.0
Female	81	50.0
Total	162	100.0
Training hours of athlete	Frequency	Percent %
1-3	89	54.9
4-6	73	45.1
Total	162	100.0
Number of Competitions per Year	Frequency	Percent %
1-3	104	64.2
4-6	46	28.4
7-9	7	4.3
10-15	5	3.1
Total	162	100.0
Age of Athlete	Frequency	Percent %
15-20	94	58.0
21-25	68	42.0
Total	162	100.0

related to ability of an athlete [16].

Ethical considerations and Data analysis:

All ethical considerations pertaining to the conducted study were duly acknowledged. We ensured that participants provided their consent to take part in the study. Consent form was signed

used to analyze data. Chi square test was applied to find the association between bigorexia nervosa and overtraining syndrome. Participants were thoroughly informed regarding the objectives, procedures, risks and advantages of the study. Participants were completely voluntary, free from any constraint.

RESULTS

Demographics Table 1

Table 1 displays the demographic profile of each variable including age, gender, training hours, types of sports and number of competitions per year. The study included 162 participants including male and female amateur athletes equally (81 each), primarily aged 15-20 years (58%) and (42%) aged between 21-25 years. Most participants were from cricket (45.1). Hockey 17.3%, football 15.4%, badminton 10.5%, boxing

4.3%, athletics 3.1%, wrestling 2.5%, rugby 1.2%, sprinters 0.6% were included in the study. Majority of the participants (64.2%) were participating in 1-3 competitions per year. 28.4% participants in 4-6, 4.3% in 7-9, 3.1% in 10-15 competitions per year. Out of 162 participants 54.9% were doing training for 1-3 hours while 45.1% were doing training for 4-6 hours.

Table: 2

Frequency of POMS:

TOTAL SCORE OF POMS		
	Frequency	Percent
Mild	154	95.1
Moderate	7	4.3
Severe	1	.6
Total	162	100.0

Table 2 displays the distribution of POMS (Profile of Mood States). The data shows that the vast majority of scores are in the mild category with 154 participants (95.1%). A small number of

participants have moderate score. Only a 1 participant has severe score representing 0.6% of the total.

Table: 3: Frequency of Total Score of Drive for Muscularity Scale

TOTAL SCORE OF DRIVE MUSCULARITY SCALE		
	Frequency	Percent
very low drive	6	3.7
low to moderate	89	54.9
moderate to high	64	39.5
very high drive	3	1.9
Total	162	100.0

Table 3 displays the distribution for the Drive for muscularity scale. 89 participants have low to moderate DMS and 64 participants have moderate

to high drive for muscularity scale. Only 3 participants show a very high drive.

Table:4

Crosstabulation of POMS with DMS

TOTAL SCORE OF POMS * TOTAL SCORE OF DRIVE MUSCULARITY SCALE Crosstabulation						
		very low drive	low to moderate	moderate to high	very high drive	Total
TOTAL SCORE OF POMS	mild	5	84	62	3	154
	moderate	0	5	2	0	7
	severe	1	0	0	0	1
Total		6	89	64	3	162

Table 4 shows the cross tabulation of bigorexia nervosa and overtraining syndrome. Out of 162 participants only 64 participants have moderate to

high drive for muscularity, while 154 participants have mild score of POMS.

Table: 5 Chi-square test for overtraining syndrome and bigorexia nervosa.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	27.068 ^a	6	.000
Likelihood Ratio	8.045	6	.235
Linear-by-Linear Association	3.418	1	.064
N of Valid Cases	162		

Table 5 shows that POMS and DMS have strong association between them as they have a p-value of 0.00 which is less than standard p-value of 0.005.

Based on the Chi-Square Test table 7 shows p-value is 0.557 and the likelihood ratio test shows p-value is 0.459, both indicates that there is no statistically association between the variables.

Table 6 Cross-tabulation of gender and bigorexia nervosa

Crosstab				
Count				
		gender of athlete		Total
		male	Female	
TOTAL SCORE OF DRIVE MUSCULARITY SCALE	very low drive	4	2	6
	low to moderate	37	52	89
	moderate to high	37	27	64
	very high drive	3	0	3
Total		81	81	162

Table 7 Chi Square Test for gender and bigorexia nervosa

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.757 ^a	3	.041
Likelihood Ratio	8.948	3	.030
Linear-by-Linear Association	3.434	1	.064
N of Valid Cases	162		

Table 6,7 shows the association between the variables is on the borderline of statistical significance. The Pearson Chi-Square test indicates the association is statistically significant, with a p-value of 0.41 which is less than the standard value of 0.051.

DISCUSSION

The aim of a comparative cross-sectional study was to assess the investigating levels of bigorexia

nervosa and overtraining syndrome among collegiate athletes. The setting from which we collected our data was UMT sports club; Aleem Dar sports academy and Punjab stadium. We calculated the sample size from WHO which was 162. SPSS version was used to analyze data. The inclusion criteria for this research consisted of male and female collegiate athletes between the age of 15 and 25 years. All participants were required to be engaged in regular training for a

minimum of six months and to have at least one year of competitive experience in their respective sports. The exclusion criteria were Indoor athletes, athletes with recent musculoskeletal like fractures, joint effusion sprains, strains, muscle tear, ligamentous sprain, dislocations and neurological conditions like seizures, epilepsy balance issues etc. The data collection tools used in this study was POMS profile of mood states questionnaire for over training syndrome and DMS for bigorexia nervosa. Notably, a positive association was found between gender and bigorexia nervosa. While a negative association was found between gender and overtraining syndrome.

A study was shown to determine disordered eating and compulsive exercise in collegiate athletes. Out of 128 participants about 20% of male and 45% of female collegiate athletes' exhibit clinical or subclinical signs of eating disorders, including bulimia nervosa, and anorexia nervosa. Furthermore, eating disorder signs, restricted diet, or the use weight reduction supplement were reported by up to 84% of female collegiate athletes and 72% of male athletes [17].

Our study was also comparative cross sectional, which was conducted on 162 male and female collegiate athletes to determine the investigating levels of bigorexia nervosa and overtraining syndrome in collegiate athletes. Positive association was found between bigorexia nervosa and overtraining syndrome with a p-value of 0.00. Out of 162 participants about 64 participants have moderate to high drive for muscularity. Only 1 participant has severe drive for muscularity.

In another cross-sectional study two profiles- an average physical self -concept profile (n=94) and an average high physical self -concept profile (n=114) was found to be the most appropriate choice out of a sample of 208 cross fitters. Females were more likely to adhere to the average self-concept profile, according to chi-square test, which also showed significant differences in profile pertinence [18].

In our study there was significant association found between gender and bigorexia nervosa with a p-value of 0.04 which was assessed by DMS questionnaire. In contrast there was no association

between gender and overtraining syndrome with a p-value of 0.557. Only 1 female participant suffered from severe overtraining syndrome which was assessed by POMS questionnaire.

38 studies in all were chosen to assess the hormonal aspects of overtraining syndrome. Athletes with OTS /FOR/NFOR had largely normal basal hormone levels as compared to healthy athletes. In contrast, cortisol and plasma catecholamine's showed contradictory results, and other hormones responded appropriately [19].

While our study based on to investigate the levels of bigorexia nervosa and overtraining syndrome in both genders. Our study shows that there is significant relationship between bigorexia nervosa and gender with p-value of 0.041. 64 participants (37 males and 27 females) suffered from moderate to high drive for muscularity (bigorexia nervosa). Only 3 male participants have very severe drive for muscularity. 52 female collegiate athletes suffered from low to moderate drive for muscularity.

This research seeks to explore the occurrence of bigorexia and its correlation with perfectionism and overtraining among Tunisian athletes participating in team sports. A total of 153 team sport players completed several questionnaires, including the exercise addiction scale (the EDS-R by Hausenblas and Downs, 2002), and the perfectionism evaluation created by Burns (1981). These findings show that there was negative correlation between perfectionism, overtraining and most of the addiction variables. In contrast, the correlation between overtraining and the seven dimensions of addiction was positive, with the exception of the tolerance dimension. Athletes who are often suspected of having a dependence on effort can primarily be found in these disciplines: marathon, race walking, and mountain biking (Pastor; 2007) [20].

Our study based on gender differences of bigorexia nervosa and overtraining syndrome in collegiate athletes. A positive correlation was found between bigorexia and overtraining. POMS and DMS questionnaires were used to assess the levels of bigorexia nervosa and overtraining syndrome in collegiate athletes, we did not specify types of

sports, as our method of study was convenience sampling.

The purpose of this research is to examine how cortisol hormone levels correlate with BMI based on bigorexia tendencies among students in the Faculty of Sports Sciences. The research involved 40 university students (20 females and 20 males). There exists a moderately negative correlation between bigorexia and both weight and BMI. Additionally, there is a highly positive correlation between the bigorexia scale score and cortisol levels [15].

In contrast our aim of study was to determine the gender differences in bigorexia nervosa and overtraining. Collegiate athletes (81 females and 81 males) were determined for our study. There was a statistically significant relationship between gender and bigorexia nervosa as well as between overtraining and bigorexia nervosa. A negative correlation was found between genders and overtraining with p-value of 0.557. Only 4 females and 3 males suffered from moderate overtraining syndrome.

CONCLUSION

This study concluded that 95.1% participants fell into the mild category of POMS (overtraining syndrome), while only 1 participant suffered from severe overtraining syndrome. 39.5% participants have moderate to high drive for muscularity. There was positive association between bigorexia nervosa and overtraining syndrome with a p-value

of 0.00. There was no significant association observed between gender and overtraining syndrome. A positive association was also observed between gender and bigorexia nervosa with a p-value of 0.041.

Limitations & Recommendations

- The study was limited to amateur (non-professional) athletes rather than elite athletes which affects the study's generalization.
- Only athletes between the ages of 15-25 are included in this study, which restricts its applicability to younger or older athletes.
- Without sleep metrics, it is challenging to determine whether declines in agility or explosive power were influenced by insufficient or disrupted rest.
- Lean vs non-lean athletes' performance difference should be accessed.
- Comparison of Bigorexia Nervosa between athletic and non-athletic population should also assess in future.
- Comparison between outdoor and indoor athletes should also be determined for further studies.

Conflict of interest: The authors declared no conflict of interest.

Figure 1 Bar chat of overtraining syndrome and bigorexia nervosa

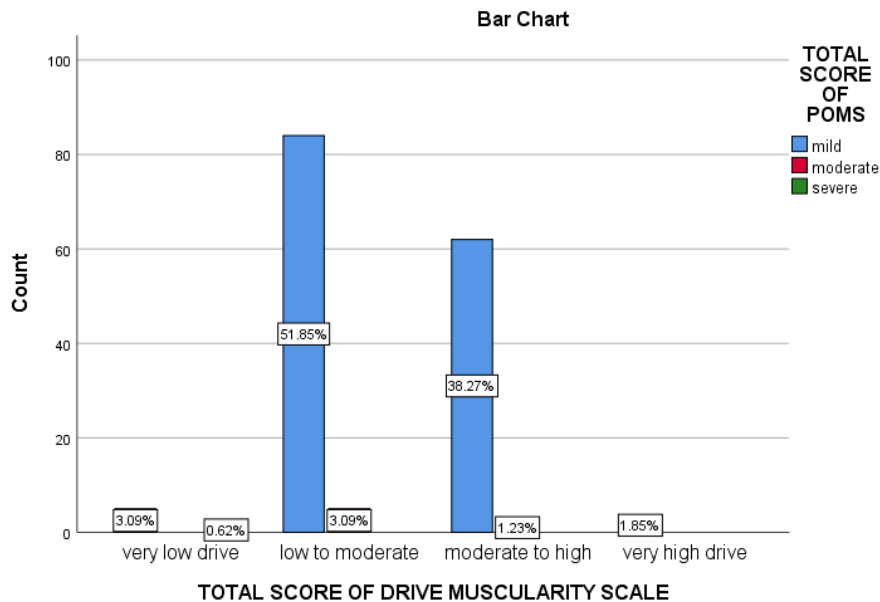


Figure 1 shows majority of participants 51.85% fell in low to moderate score of DMS, while 38.27% fell in moderate to high category.

Figure 2 Bar chat of Total POMS Score by Gender

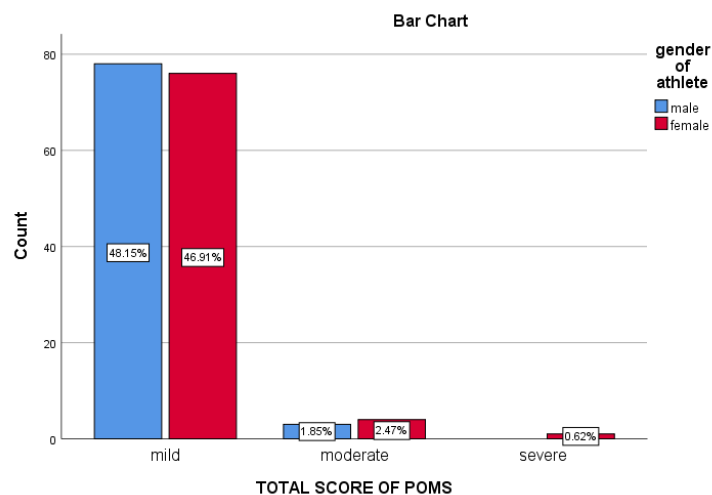


Figure 2 displays the distribution of total POMS score for male and female athletes. Majority of both males (48.15%) and females (46.91%) athletes scored in the mild range, few participants 0.62% female athletes, while no male athletes scored in the severe category.

Figure 3 Bar chat of Drive Muscularity Scale by Gender

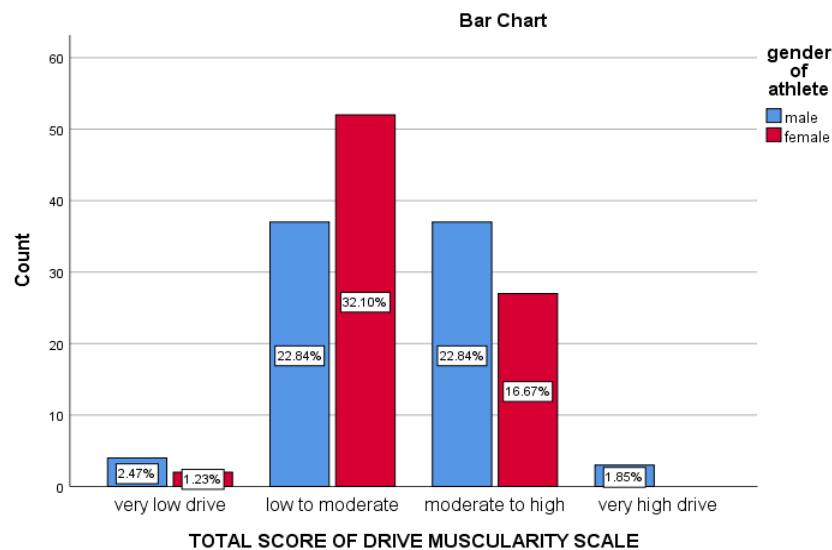


Figure 3 displays the distribution of scores on the Drive for Muscularity Scale for both male and female athletes. 22.8% males and 16.67% females fall in moderate to high category. Only 1.85% males, while no female athletes scored as very high drive for muscularity.

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