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Association of eating disorders, menstrual dysfunction and socio cultural attitudes towards appearance in Indian female athletes

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Abstract---Background: Eating disorder (ED) such as restrictive eating and menstrual dysfunction (MD) is a serious Health related problem which threatens the female athletes. Menstrual dysfunctions are Estimated to affect around 20% of female athletes. Social pressure to remain thin for various Sporting activities can lead to decreased self-esteem, negative effect, and unhealthy weight Control practice. Fewer studies have examined the relationship between eating disorder, menstrual dysfunction, and social cultural attitudes towards appearance in Indian Female Athletes. Objective: To examine the association among ED, MD, and Social cultural attitudes towards appearance and to estimate the risk associated with ED in Indian Female athletes. Methods: The study subjects consisted of 78 female athletes competing in various sports of 15-27 years of age. Athletes were administered Eating attitude Test- 26, Low energy availability in Females Questionnaire (LEAF-Q) and Sociocultural Attitudes towards appearance uestionnaire- 4 (SATAQ-4) after anthropometric testing. Results: Karl Pearson coefficient & Logistic Regression analysis was used to find the association between EAT- 26 and other variables. Statistically a positive correlation was found between EAT- 26 & Internalization of low body fat ($r = 0.520$; $p = < 0.001$), Family pressure ($r = 0.372$; $p = .001$), Peer Pressure ($r = 0.386$; $p = < 0.001$) and Media Pressure ($r = 0.307$; $p = .006$). We also found social pressures (OR=1.33; 95% CI: 1.10-1.61; $p = 0.003$) as significant risk factors of ED. Pressures like FP, PP, MP were independently also associated with ED. Conclusion: Findings of this study showed that Eating habits were significantly affected by Social Pressures (FP, PP, MP). Variation in Sports participation has led to insignificant association between Menstrual dysfunction, ED, and social pressures.

Keywords---Eating Disorders, Menstrual dysfunction, Social Pressures, Female Athletes, Body Composition

Introduction

Participation in sports is associated with psychological, sociologic, and physiologic health benefits, like cardiovascular fitness, mood, and self-esteem (Sticker et al, Kong P et al 2015). Participation of female athletes continues to grow throughout the world. This has many positive effects on health and well-being (improved physical fitness, enhanced self-esteem and better physical and mental health), but also has a unique set of health problems (George C 2016). Disordered Eating (DE) are the changes in the eating patterns which usually starts with appropriate eating and exercise behaviours, including healthy dieting (such as lowering energy intake and for gradual weight loss) or occasional use of more extreme weight-loss methods such as short term restrictive diets (Sundgot Borgen J et al 2013). DE shows a strong association with athletics and can lead to several negative mental and physical health effects. If left untreated, Disordered eating can progress to an eating disorder (ED) which is more difficult to treat such as Anorexia Nervosa (AN), Bulimia Nervosa (BN), Binge Eating Disorder (BED) or Otherwise Specified Feeding and Eating Disorder (OSFED) (Mancine RP et al 2020, Melin A et al 2014, Hidalgo et al 2013). Poor eating habits in athletes are considered to be a risk factor for the development of negative self-image regarding appearance and perception of the individual (Krentz et al 2011).

Athletes usually feel pressure to reduce weight due to the display of their bodies in tight and revealing clothes or costumes in sports such as swimming, diving, gymnastics, figure skating along with other sports. These sports are also considered as lean sports/aesthetic sports (Krentz et al 2011). This pressure to reduce weight makes an athlete vulnerable to body image dissatisfaction as well as DE/ EDs. Also, athletes in these sports are reported to have an increased risk of developing restricted eating behavior and Low Energy Availability (LEA) (Sharma et al 2019, Ravi S et al 2019). DE frequently occurs due to the desire to achieve a sport-specific body ideal and alleviate sport-specific body dissatisfaction (Mancine RP et al 2020).

Menstrual dysfunction (MD) is reported to be common among female athletes but is often ignored and regarded as a normal consequence of intense training, despite the negative health consequences (Nattiv A et al 2007, Gibbs JC et al 2013). Restricted eating behaviour and MD have been associated with an increased risk of injury, impaired performance, and may also potentially increase cardiovascular risk factors, gastrointestinal problems, and metabolic alterations (Gibbs JC et al 2013). MD includes luteal phase defects, anovulation, oligomenorrhea and Functional Hypothalamic Amenorrhea (FHA) (Nattiv A et al 2007, Gibbs JC et al 2013, Melin A et al 2015, Roupas ND et al 2011, Nazem TG et al 2012). Athletes with very low body weight and/or body fat, frequent weight fluctuation, EDs, and insufficient bone density are often found in weight-sensitive sports, with a high prevalence of menstrual dysfunction in women (Sundgot Borgen J et al 2013).

Body weight and body composition are considered as crucial performance variables in different sports. Body composition is one of the major health-related components of fitness like menstrual function, eating attitude, bone health, and performance in sporting events (Sundgot Borgen J et al 2013, Wagner DR et al 1999). In some sports, comments by coaches on an athlete's body composition are associated with psychological pressure to diet and it is believed that judges are influenced by the body composition of the athlete which in turn may affect the bone mineral density, availability of energy and menstrual functioning in an athlete (Sundgot Borgen J et al 2013). There is emerging evidence on influence of socio-cultural factors like peer, media and family pressure on body image perception of an athlete leading to eating disorders. It has also been established that women place more importance on their appearance and are also affected by it in performance in sporting events. Media in the West has tended to over-represent underweight women and present unattainable ideals for females and males. Exposure to media ideals of beauty has been found to possess several negative results. These include increased body dissatisfaction and eating disorder symptoms (Dhillon MD et al 2017). Even in previous Indian studies, students showed abnormal body image perception, abnormal eating attitudes according to their Eating Attitude Test (EAT) scores, were influenced by models and accepted media as the source of information regarding standards of attractiveness and were pressured to be attractive according to Sociocultural Attitudes Towards Appearance Questionnaire – 3 (SATAQ – 3) scores. Their SATAQ scores assessed the social and interpersonal aspects of appearance ideals along with Sociocultural Risk factors for body dissatisfaction and eating pathology. Limited studies have been done in India to understand the relationship between menstrual dysfunction, disordered eating and the influence of media, family and peers over one another. So, the aims and objectives of this study was to study the association of eating disorders, menstrual dysfunction and socio-cultural attitudes towards appearance in Indian female athletes and to estimate the risk associated with eating disorders in Indian female athletes.

Materials and Methods

The present study was observational and correlational. Ethical clearance was obtained from Institutional Ethical committee of Guru Nanak Dev University, Amritsar. The variables of the study were Body Mass Index (BMI), Body Fat Percentage (BFP), Lean Body Mass (LBM), Waist to Hip Ratio (WHR), Eating Attitudes Test – 26 Questionnaire (EAT – 26), Low Energy Availability in Females – Questionnaire (LEAF-Q), Sociocultural Attitudes Towards Appearance Questionnaire – 4 (SATAQ-4). A total of 80 subjects (female athletes) of 15-27 years of age were included in the study, having training experience of 1 year or more in sports, not on oral contraceptives and who were comprehensive in speaking and understanding English. Pregnant female subjects and Subjects having any injury at the time of data collection were excluded. Subjects were of different sports viz basketball (n=12), cricket (=8), high jump (n=5), javelin throw (n=5), judo (n=2), kho – kho (n=6), running – middle and long distance (n=15), softball (n=14), sprint (n=10), triple jump (n=1), weightlifting (n=1) and wrestling (n=1). Body composition was measured by performing anthropometric testing which was done by measuring the height, weight, circumference of waist and hip and Body fat percentage was measured by 4 site skinfold measurement method

(biceps, triceps, subscapular, suprailiac), with the help of Harpenden Calliper. Skinfold thickness was measured to the nearest mm, except for low values (usually 5 mm or less) when it was taken to the nearest 0.5 mm. The subjects were then administered EAT – 26, LEAF – Q, SATAQ – 4 Questionnaires.

Materials

Disordered eating characteristics were measured by Eating Attitude Test – 26 (EAT-26). The EAT is a reliable and valid measure for athletes (Cronbach's $\alpha = .90$) which is widely used as a screening instrument for eating disorders. The items were rated on a 6-point Likert scale from 1 (never) to 6 (always). Individuals who score 20 or greater (EAT-26 ≥ 20) are considered to be at risk of having an eating disorder. Menstrual dysfunction patterns were assessed by Low Energy Availability in Females – Questionnaire (LEAF-Q). It is a screening tool used to detect persistent low energy availability and/or menstrual dysfunction and/or bone health (Female Athlete Triad conditions with or without disordered eating/eating disorder). The LEAF – Q has an acceptable sensitivity of 78% and a specificity of 90% as well as internal consistency for correctly classifying the current energy availability and/or reproductive function and/or bone health of an individual. Sociocultural Attitudes Towards Appearance were assessed by the SATAQ-4 questionnaire. The SATAQ – 4 consists of measures designed to assess the societal and interpersonal aspects of appearance ideals and the Sociocultural risk factors for body dissatisfaction and eating pathology. It is used to assess internalization of appearance ideals attributes associated with the thin-ideal, such as thinness and low body fat, and the muscular-ideal, peer pressure, media pressure and family pressure in both women and men. SATAQ-4 scale scores demonstrate excellent reliability and good convergent validity with measures of body image, eating disturbances, and self-esteem.

Results and Discussion

Karl Pearson's product-moment correlation was used to understand the association of EAT-26 and other variables. Then, Logistic Regression was done to find the risk factors for leading to Eating Disorders by finding out Odds Ratio. Independent t-test was done to test the difference of Risk factors between At Risk and Not at Risk participants. Analysis was done on 78 participants as 2 of them didn't complete questionnaires.

Table 1: Demographics

The Present study showed that Family pressure, Low body Fat, Media pressure and Peer pressure were found to be significantly associated with eating disorders and had high influence on the occurrence of eating disorder among Indian female athletes.

Table 1 Shows the Demographics & mean values and standard deviation of various parameters of 78 subjects included in this study.

	Mean	Standard Deviation
Age (Years)	19.00	3.38
Experience (Years)	4.77	3.23
Height (cm)	159.43	6.06

Weight (kg)	54.12	8.46
BMI (kg/m ²)	21.27	2.80
Biceps Skin Fold (mm)	9.20	5.51
Triceps Skin fold (mm)	18.08	7.48
Sub scapular skin fold (mm)	11.80	4.11
Suprailiac skin fold (mm)	12.06	5.78
Body Fat Percentage	26.21	5.02
Lean Body Mass	39.63	4.52
Waist Circumference (cm)	73.31	7.95
Hip Circumference (cm)	92.49	6.29
Waist Hip Ratio	0.79	0.06
EAT_26	17.86	8.84
LEAF_Q	5.99	3.43
Internalization – Thin/Low Body Fat	2.84	0.95
Internalization- Muscular/Athletic	3.74	.90
Family Pressure	2.78	1.12
Peer Pressure	2.58	1.11
Media Pressure	2.43	1.16

This can be seen in Table 2 which shows Significant Positive correlation of EAT-26 with internalization- thin/ LBF ($r = .520$; $p < .001$), FP ($r = 0.372$; $p < .001$), PP ($r = 0.386$; $p < 0.001$) and MP ($r = 0.307$; $p = 0.003$).

Table 2: Correlation of EAT 26 & other parameters

	LEAF_Q	IT_LBF	IM_A	FP	PP	MP
r	.19	.520**	.16	.372**	.386**	.307**
p	.10	.00	.17	.00	.00	.01

This is in accordance with two well supported social culture theories like Tripartite Influence Model and Dual Pathway Model which also stated that thinness pressures and thin ideal internalisation may have negative effects on eating disorders and body image. Our study results suggested that peer pressure and media pressure may play an important role in development of disordered eating. This is similar to previous study who found Media influence can lead adolescents to internalize the ideals imposed by society as desirable for them, increasing the probability that they will suffer body image dissatisfaction and present disordered eating behaviors. Also to achieve the ideal body figures, sociocultural influences have been considered a predictor of disordered eating due to acceptance of the (thin ideal) by adolescents as well. In other previous studies also (Krentz et al 2011, Jaeger MB et al 2015, Nataniel F et al 2019, if athletes perceived social pressures(peer pressure, family pressure, media pressure) from the sports environment to remain lean, it turned out to be an important factor for their performance and hence engage in unhealthy dieting behaviours. (Krent et al 2011, Nazem TZ et al 2012, Syjo J et al 2018). Also, there was no significant relation found between LEAF-Q (menstrual Dysfunction) and EAT- 26 (Eating

Disorders) ($r = .19$; $p = .10$) as our study had included female athletes among which females playing non lean sports were found to be in dominance as compared to lean sports.

The comparison between the at risk ($n = 27$) and not at risk ($n = 51$) subjects of disordered eating showed highly significant differences among the Body Mass Index ($p = 0.01$), Body Fat Percentage ($p = 0.04$), Lean Body Mass ($p = 0.02$), Internalisation – Thin/Low Body Fat ($p = 0.00$), Family Pressure ($p = 0.01$), Peer Pressure ($p = 0.00$), Media Pressure ($p = 0.03$) (Table 3).

Table 3: Comparison between at risk & not at-risk athletes

Parameters	Not at risk N=51		At Risk N=27		t	p	CI	
	Mean	SD	Mean	SD			Lower	Upper
Age	19.08	3.33	18.85	3.54	.27	.78	-1.39	1.84
BMI	20.60	2.57	22.39	2.77	-2.77	.01	-3.08	-.49
BSK	8.50	5.02	10.67	6.34	-1.54	.13	-5.01	.67
TSK	17.07	7.16	20.18	7.80	-1.72	.09	-6.73	.52
SISK	11.19	5.41	13.74	6.21	-1.80	.08	-5.40	.29
SSSK	10.97	3.45	13.30	4.80	-2.23	.03	-4.44	-.22
BFP	25.32	4.83	27.89	5.07	-2.16	.04	-4.95	-.18
LBM	38.68	4.12	41.22	4.37	-2.49	.02	-4.59	-.49
WC	72.55	8.02	74.30	6.85	-1.01	.32	-5.21	1.72
HC	91.80	5.89	93.59	6.31	-1.22	.23	-4.74	1.16
WHR	0.79	0.06	0.79	0.05	-.31	.76	-.03	.02
LEAF_Q	5.59	2.98	6.58	3.79	-1.16	.25	-2.71	.73
IT_LBF	2.49	0.71	3.47	1.00	-4.56	.00	-1.43	-.55
IM_A	3.65	0.82	3.84	1.02	-.83	.41	-.65	.27
FP	2.50	1.04	3.21	1.08	-2.79	.01	-1.22	-.20
PP	2.25	0.84	3.09	1.30	-3.07	.00	-1.41	-.29
MP	2.15	0.91	2.81	1.36	-2.25	.03	-1.24	-.07

In athletes, Disordered Eating frequently occurs due to the desire to achieve a sport specific body-ideal and alleviate sport-specific body dissatisfaction. Previous studies have reported that there were variations in prevalence of Disordered Eating behaviors depending on athlete type and there was a clear evidence that an emphasis on leanness played a role in the development of disordered eating which, if left unaddressed, can lead to eating disorders and increased incidence of mood, anxiety, and substance abuse disorders (Mancine RP et al 2020). In the current study, the sample size was small ($n = 78$) and female athletes of different sports were included. Most of the athletes were of non-lean sports and previously also, it was found that athletes in lean sports are more at risk of developing disordered eating patterns. (Kong P et al 2015, Mancine RP et al 2020). Since, the present study was conducted during the COVID -19 pandemic may be, the athletes were not following their rigorous training protocols which they used to follow before the pandemic. The lack of following proper training might have lead to changes in the dietary pattern of an athlete which could be the cause of the variation in results of the present study from the previous studies. Even though the comparison between the LEAF – Q scores (menstrual dysfunction) among the

at risk and not at risk subjects was found to be statistically non – significant, but the mean scores were still higher among the at risk subjects which leads to the inference that the at risk subjects for disordered eating were more prone or had a tendency for developing menstrual dysfunction as well (Table 3). It is also in accordance with a previous study which stated that menstrual dysfunction was found to be a common feature of eating disorders or disordered eating (Vyver E et al 2008). Other studies also found that menstrual irregularity was found more frequently among the athletes who were “at risk” for eating disorders (Beals KA et al 2002).

In the present study ,subjects with higher BMI (OR=1.28; 95% CI= 1.06-1.55; p=.01), SSSK (OR= 1.15; 95% CI=1.02-1.30; p=.02), IT_LBF (OR= 4.25; 95% CI= 1.77-10.19; p= .00), FP (OR= 1.87; 95% CI= 1.17- 3.01; p= . 01), PP (OR= 2.17; 95% CI = 1.32-3.56; p=.00) and MP (OR= 1.71; 95% CI= 1.10-2.65; p= .02) had higher odds of having eating disorders (Table 4). The possible reason is the heterogeneity of the sample with more non-lean athletes and with fewer adherences to proper training schedules due to COVID-19 situation.

Table 4: Risk factors associated with Eating Disorder

	Beta coefficient	Odds Ratio	95% C.I.		p
			Lower	Upper	
Age	-.02	.98	.85	1.13	.78
BMI	.25	1.28	1.06	1.55	.01
BSK	.07	1.07	.98	1.16	.11
TSK	.06	1.06	.99	1.13	.09
SISK	.08	1.08	.99	1.17	.07
SSSK	.14	1.15	1.02	1.30	.02
BFP	.10	1.11	1.01	1.22	.04
LBM	.14	1.15	1.02	1.30	.02
WC	.03	1.03	.97	1.10	.34
HC	.05	1.05	.97	1.14	.22
WHR	1.14	3.13	.00	9432.63	.78
LEAF_Q	.09	1.10	.95	1.27	.21
IT_LBF	1.45	4.25	1.77	10.19	.00
IM_A	.25	1.28	.74	2.22	.37
FP	.63	1.87	1.17	3.01	.01
PP	.77	2.17	1.32	3.56	.00
MP	.54	1.71	1.10	2.65	.02

Conclusion

Findings of this study showed that eating habits were significantly affected by Social Pressures (FP, PP, and MP). Variations in sports participation has led to insignificant association between menstrual dysfunction, ED and Social pressure. Body composition specially body mass index and Sociocultural attitudes towards appearance especially family pressure, media pressure and peer pressure turned out to be important risk factors of eating disorders and menstrual dysfunction. The study can be used to better understand the comparisons of eating disorders,

menstrual dysfunctions and Sociocultural attitudes towards appearance among at risk and not at risk subjects. The study can be useful to recognize unique health care needs of female athletes to maximize healthy and safe participation of women in sports.

Limitations Of The Study

More athletes were from non – lean sports. The study was conducted during COVID 19 period. The athletes were not continuing their vigorous training routines and maybe were also not able to meet their nutritional status properly. Elite athletes were not studied specifically. Level of play was not determined. Only female athletes were chosen for the study.

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