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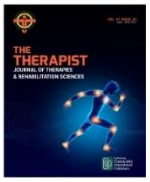

Original Article

The Impact of Polycystic Ovary Syndrome on the Sporting Performance of Female Players

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ABSTRACT

Polycystic Ovary Syndrome (PCOS) is perhaps the most widely recognized endocrine issues in females of reproductive age, influencing up to 20% of individuals of this populace. Many recent studies indicate that testosterone, which can increase muscle mass and strength, stimulates erythropoiesis, promotes competitive behavior, and enhances sporting performance of female athletes. **Methods:** The comparative study was designed and conducted in which a sample of female athletes (n=40) who had been diagnosed with PCOS by a qualified gynecologist based on clinical features and lab tests. At the same time, a healthy group of female athletes (n=40) was selected from participants of the same population and having regular menses and showing no clinical features of PCOS. The main objectives of the study included: 1) to compare both the groups of female athletes on clinical features of PCOS, and 2) to compare both the groups on self-perceived sports performance. Data was collected from The University of Central Punjab, The University of Lahore, and The University of Lahore College for Women. Data collection was done using two different instruments involving "Polycystic Ovary Syndrome Questionnaire (PCOSQ)" and "Athlete's Subjective Performance Scale (ASPS)". Data analyses involved descriptive analysis followed by "Independent Sample t test' to compare the physical and psychological impact of PCOS and ANOVA was applied to analyze the impact of PCOS on sports performance. **Results:** There were significant differences between female athletes with PCOS and those with Non-PCOS on physical and psychological conditions. Weight issues t (78) =15.104, (p= .000), Body Hair t (78) =25.108, (p= .000), Menstrual Problems t (78) =20.976, (p= .000), Helplessness t (78) =17.775, (p= .000), and Low mood t (78) =8.449, (p= .000). Significance value (p = .000), which is below 0.05 and, therefore, there is a statistically significant difference in the mean sporting performance. **Conclusion:** Based on the results, it can be concluded that female athletes with PCOS were more concerned about their physical and psychological conditions. Moreover, their sporting performance was statistically significantly higher than Non-PCOS athletes, which is attributed to higher energy level caused by PCOS itself. Future research must focus on measuring energy level of female athletes with PCOS and Non-PCOS.

INTRODUCTION

Polycystic Ovarian Syndrome (PCOS) is the most common female endocrine disorder and has multiple etiology [1,2]. Many studies have suggested that there is an increased risk of PCOS in young females with a family history of PCOS. It is observed that many young females with low birth weight and those with a family history of diabetes or premature cardiovascular disease are at increased risk of developing PCOS. Metabolic disturbances begin early in adolescence and also exist in adolescent relatives of females with PCOS, even before clinical signs of PCOS become apparent [3,4]. Excess fetal exposure to maternal androgens is believed to contribute to inducing the PCOS phenotype [5,6] in children based on experimental data from animal studies [7], as well as clinical material from pathological conditions in humans and higher levels of T have been observed, which they were elevated to male levels found in the umbilical vein in girls born to mothers with PCOS [8].

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However, the only prospective study of the relationship between prenatal androgen exposure and the development of PCOS during female adolescence did not confirm any association between these variables [9].

In PCOS, the degrees of luteinizing hormone (LH) and T are raised. LH and follicle stimulating hormones (FSH) are associated chemicals of the pituitary and assume a part in the ovulation cycle concerning incitement and development of the follicle [10]. The presence of androgens is essential for typical follicle improvement and estradiol combination. In any case, on account of PCOS and expanded androgen levels, there is restricted follicular development and surprisingly follicular demise. An expanded proportion of LH and FSH is normal in PCOS [11] compared to controls. Metabolic irregularities, for example, hyperinsulinemia and insulin opposition, are addressed in 75% of youthful females with PCOS [12]. It has been recognized in the writing that insulin affectability is diminished in these females paying little mind to BMI and other metabolic irregularities. Hyperinsulinemia has been found to increment endogenous androgen levels, just as ovulatory brokenness and richness issues [13].

In these females, hyperandrogenism is accepted to be integral to ovulatory brokenness. Antral follicles, which have been captured being developed, are the "pimples" depicted in the condition, which are accepted to be available because of hyperandrogenism that diminishes estradiol amalgamation and stops follicular development. The biochemical and metabolic components of PCOS drive and worsen one another, demonstrating the need to zero in on how best to deal with the manifestations related to these elements [14].

Physical activity (PA) is important for maintaining good health and promotes the maintenance of lean muscle mass, improves sleep habits, improves mental health, and helps reduce the risk of chronic diseases. Teen participation in sports can contribute to general PA needs. Additionally, there is a potential benefit of elevated androgens in female athletes when it comes to explosive power, lean mass, and cardiovascular fitness. Since PCOS can be a reason for an athlete to have amenorrhea, it is necessary for the sports dietitian to be familiar with the clinical features and treatment modalities of PCOS. Very little is known about sports participation of female athletes with PCOS considering that PA is an important part of the disease and weight control. An examination of female athletes with PCOS and non-PCOS may help to better understand which athletes should be most frequently screened for PCOS and how characteristics of the syndrome may influence sports selection.

METHODS

The comparative study was designed and conducted in which a sample of female athletes (n=40) who had been diagnosed with PCOS by a qualified gynecologist based on clinical features and lab tests. At the same time, a healthy group of female athletes (n=40) was selected from participants of the same population, who had regular menses, and showed no clinical features of PCOS. The main objectives of the study included: 1) to compare both the groups of female athletes on clinical features of PCOS, and 2) to compare both the groups on self-perceived sports performance. Data was collected from The University of Central Punjab, The University of Lahore, and The University of Lahore College for Women. Data collection was done using two different instruments involving “Polycystic Ovary Syndrome Questionnaire (PCOSQ)” and “Athlete’s Subjective Performance Scale (ASPS)”. Data analyses involved descriptive analysis followed by “Independent Sample t-test’ to compare the physical and psychological impact of PCOS and ANOVA was applied to analyze the impact of PCOS on sports performance.

RESULTS

The mean age of female athletes with PCOS was (M=24.27, SD=1.86) and Non-PCOS female athletes was (M=24.22 SD=1.84); BMI of female athletes with PCOS was (M=31.45, SD=1.13) and Non-PCOS female athletes was (M=25.02, SD=0.919); the experience of playing team sports of female athletes with PCOS was (M=2.60, SD=0.590) and Non-PCOS female athletes was (M=2.65, SD=0.53) as shown in Table: 1.

Condition		Age	BMI	Experience
PCOS	Mean	24.2750	31.4500	2.6000
	N	40	40	40
	SD	1.86723	1.13114	.59052
Non-PCOS	Mean	24.2250	25.0250	2.6500
	N	40	40	40
	SD	1.84651	.91952	.53349
Total	Mean	24.2500	28.2375	2.6250
	N	80	80	80
	SD	1.84528	3.39114	.55972

Table 1: Descriptive Analysis

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Table: 2 indicates that there were significant differences between female athletes with PCOS and those with Non-PCOS on physical and psychological conditions. Weight issues t (78) =15.104, (p= .000), Body Hair t (78) =25.108, (p= .000), Menstrual Problems t (78) =20.976, (p= .000), Helplessness t (78) =17.775, (p= .000), and Low mood t (78) =8.449, (p= .000).

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	SE Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Weight Issues	Equal variances assumed	.024	.877	15.104	78	.000	1.82500	.12083	1.58445	2.0655
Body Hair	Equal variances assumed	9.267	.003	25.108	78	.000	2.72500	.10853	2.50893	2.9410
Menstrual Problems	Equal variances assumed	9.513	.003	20.976	78	.000	2.25000	.10727	2.03645	2.4635
Helplessness	Equal variances assumed	4.356	.040	17.775	78	.000	2.05000	.11533	1.82039	2.2796
Low Mood	Equal variances assumed	27.739	.000	8.449	78	.000	1.42500	.16866	1.08923	1.7607

Table 2: Physical and psychological conditions of female athletes with PCOS and Non-PCOS

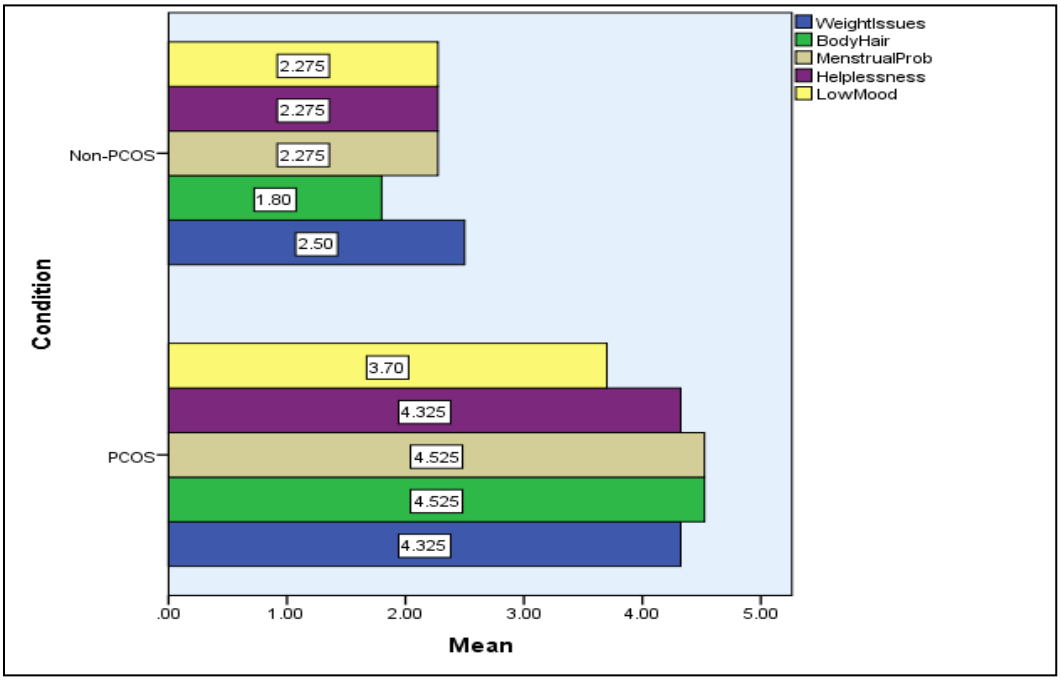

Figure 1: Mean comparisons of physical and psychological conditions of female athletes with PCOS and Non-PCOS

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	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	27.612	1	27.612	58.566	.000
Within Groups	36.775	78	.471		
Total	64.387	79			

Table 3: Impact of Polycystic Ovary Syndrome on Sporting Performance

Table-3 indicates that the significance value (p = .000), which is below 0.05, and therefore, there is a statistically significant difference in the mean sporting performance.

DISCUSSION

The findings of this study indicated a significant effect of PCOS on sporting performance. A few studies had shown that T levels in the blood may not accurately predict enhanced sports performance in female athletes showing levels within the normal female range, there are grounds to claim that very high levels of blood T increase sporting performance in females with androgen sensitivity [17]. The hormonal status of an athlete impacts health and performance. While amenorrhea associated with low energy availability has been demonstrated to decrease performance, the hormonal profile in PCOS where androgens are higher may show improved sporting performance. Androgens have been found to be integral in the preservation of bone and muscle tissue [18]. While it represents pharmacological intervention, research on exogenous androgenic-anabolic steroid use shows improvement in sporting performance through decreased fatigue, increased power, and lean body mass [19].

Skeletal muscle is highly responsive to T level, and aids in increases of skeletal muscle mass, which can in turn increase power performance and affect body composition on T level indicated that supplementation benefited body composition in men by increasing lean mass and decreasing fat mass [20]. Body composition data on females with PCOS who exhibit endogenous androgenic profiles highlights an increase in fat mass compared to non-PCOS controls, in addition to an increase in lean mass. Endogenous androgens in females have been less studied related to sporting performance; however, the prevalence of female athletes with PCOS may reflect an advantage to sporting performance [16].

Naturally present androgen metabolites and precursors, such as T levels, Androstenediol and Etiocholanolone glucuronide, have all been associated with performance outcomes in female athletes. Wood in 2012 revealed that there is a positive correlation involving the presence of increased T level and explosive performance in female athletes [21]. Similarly, serum was strongly linked to both explosive power and lean mass- two critical components of sporting performance in female athletes. Arngrímsson in 2004 found higher maximal oxygen uptake (VO2 max) exhibited in hyperandrogenism or amenorrheic athletes compared to non-PCOS athletes [22]. These findings suggest athletes with PCOS potentially being at a competitive strength advantage; however, more research is needed.

CONCLUSIONS

It is concluded that female athletes with PCOS were more concerned about their physical and psychological conditions. Moreover, their sporting performance was statistically significantly higher than Non-PCOS athletes, which is attributed to higher energy levels caused by PCOS itself. Future research must focus on measuring the energy level of female athletes with PCOS and Non-PCOS so as to confirm that the higher energy level among female athletes is due to naturally occurring T levels.

REFERENCES

1. Hossein KJ, Leila KJ, Ebrahim TK, Nazanin SJ, Farzad P and Elham R *et al*. The Effect of Pomegranate Juice Extract on Hormonal Changes of Female Wistar Rats Caused by Polycystic Ovarian Syndrome. Biomed Pharmacol J. 2015;8(2). doi.org/10.13005/bpj/849.
2. Unluturk U, Harmanci A, Kocaefe C and Yildiz BO. The Genetic Basis of the Polycystic Ovary Syndrome: A Literature Review Including Discussion of PPAR-gamma. PPAR Res. 2007;2007:49109. doi: 10.1155/2007/49109.
3. Mutharasan P, Galdones E, Peñalver Bernabé B, Garcia OA, Jafari N and Shea LD *et al*. Evidence for chromosome 2p16.3 polycystic ovary syndrome susceptibility locus in affected women of European ancestry. J Clin Endocrinol Metab. 2013;98(1):E185-90. doi: 10.1210/jc.2012-2471.
4. Melin AK, Heikura IA, Tenforde A and Mountjoy M. Energy Availability in Athletics: Health, Performance, and Physique. Int J Sport Nutr Exerc Metab. 2019;29(2):152-164. doi: 10.1123/ijsnem.2018-0201.

DOI: https://doi.org/10.54393/tt.v1i2.22
5. Costello JT, Bieuzen F and Bleakley CM. Where are all the female participants in Sports and Exercise Medicine research? Eur J Sport Sci. 2014;14(8):847-51. doi: 10.1080/17461391.2014.911354.
6. Gur EB, Karadeniz M and Turan GA. Fetal programming of polycystic ovary syndrome. World J Diabetes. 2015;6(7):936-942. doi:10.4239/wjd.v6.i7.936.
7. Makieva S, Saunders PT and Norman JE. Androgens in pregnancy: roles in parturition. Human Reproduction Update. 2014;20(4):542-559. doi.org/10.1093/humupd/dmu008.
8. Lindholm C, Hirschberg AL, Carlström K and von Schoultz B. Altered adrenal steroid metabolism underlying hypercortisolism in female endurance athletes. Fertil Steril. 1995;63(6):1190-4.
9. Witchel SF, Oberfield SE and Peña AS. Polycystic Ovary Syndrome: Pathophysiology, Presentation, and Treatment With Emphasis on Adolescent Girls. J Endocr Soc. 2019;3(8):1545-1573. Published 2019 Jun 14. doi:10.1210/js.2019-00078.
10. Loucks AB, Verdun M and Heath EM. Low energy availability, not stress of exercise, alters LH pulsatility in exercising women. J Appl Physiol (1985). 1998;84(1):37-46. doi: 10.1152/jappl.1998.84.1.37.
11. Saadia Z. Follicle Stimulating Hormone (LH: FSH) Ratio in Polycystic Ovary Syndrome (PCOS) - Obese vs. Non-Obese Women. Med Arch. 2020;74(4):289-293. doi: 10.5455/medarh.2020.74.289-293.
12. Hajimonfarednejad M, Nimrouzi M, Heydari M, Zarshenas MM, Raee MJ and Jahromi BN. Insulin resistance improvement by cinnamon powder in polycystic ovary syndrome: A randomized double-blind placebo controlled clinical trial. Phytother Res. 2018;32(2):276-283. doi: 10.1002/ptr.5970.
13. Arena B, Maffulli N, Maffulli F and Morleo MA. Reproductive hormones and menstrual changes with exercise in female athletes. Sports Med. 1995;19(4):278-87. doi: 10.2165/00007256-199519040-00005.
14. Najem Fi, Elmehdawi Rafik and Swalem Am. Clinical and Biochemical Characteristics of Polycystic Ovary Syndrome in Benghazi- Libya: A Retrospective Study. The Libyan journal of medicine. 2008;3:71-4. DOI:10.4176/080122.
15. Banfi G and Dolci A. Free Testosterone/cortisol Ratio in Soccer: Usefulness of a Categorization of Values. J Sports Med Phys Fitness. 2006;46(4):611–16.
16. Hardy T, De Sousa S and Norman RJ. Polycystic ovary syndrome: prognosis and risk of comorbidity. In Novel insights into the pathophysiology and treatment of PCOS. 2013:122-134. doi.org/10.2217/ebo.12.214.
17. Mario FM, do Amarante F, Toscani MK and Spritzer PM. Lean muscle mass in classic or ovulatory PCOS: association with central obesity and insulin resistance. Exp Clin Endocrinol Diabetes. 2012;120(9):511-6. doi: 10.1055/s-0032-1309006.
18. Carmina E, Guastella E, Longo RA, Rini GB and Lobo RA. Correlates of increased lean muscle mass in women with polycystic ovary syndrome. Eur J Endocrinol. 2009;161(4):583-9. doi: 10.1530/EJE-09-0398.
19. Wood RI and Stanton SJ. Testosterone and sport: current perspectives. Horm Behav. 2012;61(1):147-155. doi:10.1016/j.yhbeh.2011.09.010.
20. Arngrímsson SA, Petitt DS, Borrani F, Skinner KA and Cureton KJ. Hyperthermia and maximal oxygen uptake in men and women. Eur J Appl Physiol. 2004;92(4-5):524-32. doi: 10.1007/s00421-004-1053-1.
21. Handelsman DJ, Hirschberg AL and Bermon S. Circulating Testosterone as the Hormonal Basis of Sex Differences in Athletic Performance. Endocr Rev. 2018;39(5):803-829. doi: 10.1210/er.2018-00020.