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A STUDY ON RELATION BETWEEN PCOS AND HEATH RELATED PHYSICAL FITNESS

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ABSTRACT

The purpose of the study was to analyse the relation between PCOS and health related physical fitness. 346 female students in the age group 18 -.21yrs (Under graduate students) from different colleges across the state were randomly selected and administered with a clinical tool to assess PCOS. The clinical tool to identify PCOD developed to Sue. D Pederson. M.D et.al. was used. After administering the clinical tool they were tested for health related physical fitness using the same battery as used in the TPFP program where 16,28,943 students in 2007 and 23,34,739 students in 2009 were tested. The scores of the TPFP variables were used as fitness scores, that of clinical tool to categorize PCOD and non PCOD groups were chosen and used as seven independent variables and treated with MANOVA, Descriptive analysis, univariate analysis and pair wise comparison statistical analysis and interpretations were made using MANOVA and analysis of variance. The results of the study shows that irrespective of development PCOS is prevalent among females of reproductive age in large numbers and as studies put forward the importance of early detection and management awareness campaigns may be began as a community health program.

Keywords: Polycystic Ovary Syndrome

1. INTRODUCTION

PCOS is a female sex related problem which is affected in one third of the menstruating population in the world. The ovary is characterized with multiple cysts on its walls and many Psycho physiological complications associating with it. The socio cultural factors are a limitation in assessing the exact number affected by this complication, which could be even higher than the estimates assessed. Anyhow one thing can be inferred, that PCOS is on the rise the world over. Genesis and life style compliments in the occurrence of this syndrome. Early diagnosis could make the management of this complication easy. A healthy diet and proper exercise could reverse the syndromes in PCOS. Irregular and painful periods or no periods, hirsutism, obesity, higher level of male sex hormones and infertility are some of the symptoms associated with it. In addition to these discomforts it also causes many psychological problems like depression, anxiety etc. Many sociological implications are also a demerit in having PCOS. Kerala is a state in India situated to its southernmost tip with a very high development index among the states in the country. Despite these high indices a comprehensive testing of fitness done among the school students in classes five to ten in 2007 (1) and 2009(2) under the program TPFP has shown a very low percentage 19.61in 2007 and 14% in 2009.Under this light it was found worthy in testing the relation between PCOS and health related physical fitness.

2. METHOD AND PROCEDURE

346 female students in the age group 18 -.21yrs (Under graduate students) from different colleges across the state were randomly selected and administered with a clinical tool to assess PCOS. The clinical tool to identify PCOD developed to Sue. D Pederson. M.D et.al. was used (3). After administering the clinical tool they were tested for health related physical fitness using the same battery as used in the TPFP program where 16,28,943 students in 2007 and 23,34,739 students in 2009 were tested. The test had the following items

1) one mile run / walk to measure aerobic capacity
2) Body mass index to measure body composition
3) Bent Knee Sit ups (60secs) to measure Abdominal strength and endurance
4) Modified pull ups to measure upper body strength and endurance
5) Sit and reach test to measure flexibility

2.1. DESCRIPTION

One mile run/ walk test

This is an internationally used test battery to measure cardio vascular fitness. The equipment's used are, a stop watch and a 400 m or 200m track. One mile is 1.609 m, and the objective is to cover the distance in the shortest time. To the subjects after a short warm up, instructions and motivation to complete the test were given. Coaches in athletics who were experienced in operating stop watches recorded the time.

2.2. BODY COMPOSITION

Body composition was measured using the Body mass Index. The height was measured in centimeters using a stadiometer and body weight in kilograms was measured using a calibrated weighing machine. The BMI was then calculated using the formula.

$$BMI = \frac{\text{Weight in Kilograms}}{\text{Height in meters X Height in meters}}$$

The result thus got is used for comparing with the standard norms.

2.3. ABDOMINAL STRENGTH AND ENDURANCE

Abdominal strength and endurance was measured using a one-minute sit ups test. The equipment required is a stopwatch. The subject lies prone on a mat with knees bent and legs held closer to the buttocks with the feet flat on ground. A second person is permitted to hold the legs. On the command 'go' the subject raises the upper body up to touch the thighs with the elbows of the hands held back of the head and returning back till the shoulder blades touches back the ground. The total number of touches up the thighs after complete back touch with the ground within the one-minute time is the score.

3. UPPER BODY STRENGTH AND ENDURANCE

Upper body strength and endurance is measured using a modified pull ups test. The equipment required is an adjustable horizontal bar. After proper instructions the subject was asked to lie prone on the floor. The horizontal bar is set across the subject in a height position 1 to 2 inches above the subjects with fully extended arms. An elastic band is placed 7 to 8 inches below the bar to position the chin to cross, on body raise. The subject then with an over hand grip and straight body at hips and heels alone touching the floor flexes the elbows to raise the body up till the chin crosses the elastic band. The score is then recorded as the number of correctly performed pull ups.

3.1. FLEXIBILITY

Flexibility is measured using the 'sit and reach test'. The procedure of the presidents' challenge version was used with the level of feet measuring at 23 cms or 9 inches in the box. The equipment used is a box with a ruler attached and the level of feet measuring 23 cms and the upper part of the box extending towards the body. After proper instructions the subjects were tested. The subject sitting on the floor with legs out straight ahead and soles placed flat against the box. The knees shoulder width apart and held flat on the floor. With hands on top of each other and palms facing down the subject reaches forward along the measuring line. After three practices the fourth is held for at least 2 seconds while the score is measured.

3.2. COMPETENCY OF THE TESTER

All the measurements in the fitness tests were made by the investigator with the support and assistance of the coaches of the University of Kerala. To ensure that the investigator and his assistants are well versed with the techniques of conducting the test, several practice sessions in conducting the test were held and the test – retest method was used to establish tester's reliability.

3.3. COLLECTION OF DATA

The collection of data was done by the investigator assisted by coaches of the University of Kerala, who were experienced in conducting tests. They visited the colleges and conducted the tests by using the testing equipment and the physical infrastructure of the colleges.

3.4. TESTING SCHEDULE

All tests were conducted in the afternoon where the objectives and description of tests were administered, and the socio-economic survey and clinical tests were applied. After which the TPFP batteries were administered. The data collected were then sorted and classified for applying statistical techniques.

3.5. STATISTICAL TECHNIQUE

The scores of the TPFP variables were used as fitness scores, that of clinical tool to categorize PCOD and non PCOD groups were chosen and used as seven independent variables and treated with MANOVA, Descriptive analysis, univariate analysis and pair wise comparison statistical analysis and interpretations were made using MANOVA and analysis of variance.

Table I

Descriptive statistics in case of students having PCOs compared to those without PCOS

PCOD	Statistics	Height (cm)	Weight (kg)	BMI	Flexibility (cm)	Muscular Endurance	Muscular Strength	Cardio Vascular Endurance (mm:ss)
NO	Mean	155.86	52.92	21.66	26.00	15.25	2.76	12.22
	N	260	260	260	260	260	260	260
	S.D	7.10	10.92	3.57	7.55	11.00	4.35	1.79
	Minimum	142.00	33.00	14.43	15.00	1.00	0.00	8.12
	Maximum	178.00	86.60	33.83	44.00	49.00	17.00	17.33
YES	Mean	157.75	56.64	22.56	25.36	14.87	1.91	13.93
	N	86	86	86	86	86	86	86
	S.D	8.30	14.52	4.61	6.68	11.40	2.76	2.35
	Minimum	141.00	34.00	14.82	15.00	2.00	0.00	9.12
	Maximum	177.00	92.20	36.47	43.00	46.00	10.00	18.36

Of the 346 students 260 were found to be not having PCOS and 86 were having PCOS. The mean height was 155.86 cm and 157.75 cm respectively for college students with PCOS and those without sPCOS. Those with PCOS weighed heavier than those without PCOS. With respect to BMI the subjects with and without PCOS were found to be in the normal category of between 18.5 and 24.5, even though the highest mean score was for those with PCOS. Flexibility was more for those without PCOS. Muscular endurance, muscular strength and cardio vascular endurance were all better in students without PCOS than those without PCOS.

Table II

Univariate statistics in case of students having PCOS compared to those without PCOS

Dependent Variable		Sum of Squares	df	Mean Square	F	Sig.
Height	Contrast	227.480	1	227.480	10.304	.002
	Error	5232.280	237	22.077		
Weight	Contrast	704.918	1	704.918	9.715	.002
	Error	17197.489	237	72.563		
BMI	Contrast	38.022	1	38.022	4.230	.041
	Error	2130.118	237	8.988		
Flexibility	Contrast	41.846	1	41.846	1.335	.249
	Error	7429.218	237	31.347		
Muscular Endurance	Contrast	13.546	1	13.546	.175	.676
	Error	18311.540	237	77.264		
Muscular Strength	Contrast	126.170	1	126.170	17.525	.000
	Error	1706.290	237	7.200		
Cardio Vascular Endurance	Contrast	128.028	1	128.028	74.619	.000
	Error	406.630	237	1.716		

The above table showcased that all the dependent variables except flexibility and muscular endurance (Height, Weight, BMI, Muscular strength and Cardio Vascular Endurance) differ significantly between those with PCOD and those without PCOD ($p < 0.05$). The result of pair wise comparison is detailed below in the below laid table. For flexibility and muscular endurance the significance was above p value.

Table III

Table showing pair wise comparison of dependent variables with students having PCOS and those without PCOS

Height	NO	YES	-2.161*,b,c	673	.002
	YES	NO	2.161*,b,c	673	.002
Weight	NO	YES	-3.804*,b,c	1.220	.002
	YES	NO	3.804*,b,c	1.220	002
BMI	NO	YES	-.883*,b,c	.430	.041
	YES	NO	.883*,b,c	.430	.041
Flexibility	NO	YES	.927b,c	.802	.249
	YES	NO	-.927b,c	.802	.249
Muscular Endurance	NO	YES	.527b,c	1.259	.676
	YES	NO	-.527b,c	1.259	.676
Muscular Strength	NO	YES	1.609*,b,c	384	.000
	YES	NO	-1.609*,b,c	384	.000
Cardio Vascular Endurance	NO	YES	-1.621*,b,c	188	.000
	YES	NO	1.621*,b,c	188	.000

The pair wise comparison on the dependent variable height revealed that there existed a significant difference between the college students with PCOD and those without PCOD ($p < 0.05$). The pair wise comparison on the dependent variable weight revealed that there existed a significant difference between the college students with PCOD and those without PCOD ($p < 0.05$). The pair wise comparison on the dependent variable BMI revealed that there existed a significant difference between the college students with PCOD and those without PCOD ($p < 0.05$). The pair wise comparison on the dependent variable flexibility revealed that the difference among the college students with PCOD and those without PCOD is not significant ($p > 0.05$). The pair wise comparison on the dependent variable muscular endurance revealed that the difference among the college students with PCOD and those without PCOD is not significant ($p > 0.05$). The pair wise comparison on the dependent variable muscular strength revealed that there existed a significant difference between the college students with PCOD and those without PCOD ($p < 0.05$). The pair wise comparison on the dependent variable cardio vascular endurance revealed that there existed a significant difference between the college students with PCOD and those without PCOD ($p < 0.05$).

4. RESULTS

The study has shown that 24.5% of the population is affected with PCOS. This is an alarming fact that Kerala, even after being the most developed state in the country with a human development index of 0.784 and a literacy rate of 94% which are the highest among Indian states, is having such a high rate of PCOS cases. The comparison of the physical characteristics has shown that those with PCOS were taller, heavier and had a higher BMI compared to those with no PCOS. It is often studied that majority of women with PCOS are either over weighed or obese. A study by Sara L Rosenberg on Relationship between PCOS and Obesity states that in women who are having PCOS, metabolic and hormonal issues such as insulin resistance and hyper androgenism are present and this can lead to weight gain and eventually obesity(4). In a study on Obesity and Polycystic Ovary Syndrome Susan Sam MD has concluded that it is common in PCOS to have obesity and to aggravate the reproductive and metabolic features (5)

Further A study by Julie Aarestrup et. al. on birth weight, childhood BMI, height and growth, on the risk of PCOS has found that the risk of PCOS has a positive association with overweight and tall stature in childhood (6). BMI in both groups remained in normal range though there was a significant difference in those with PCOS having higher value. The relation of PCOS with obesity is stated in references above (4&5) and this could be a reason for higher values in BMI.

Of the health related physical fitness components studied it was noted that the fitness of students in the selected age group is very low in all components when compared with the TPFP minimum standards. Of the components flexibility and muscular endurance showed no significant difference between those having PCOS and those not having PCOS. But muscular strength and cardio vascular endurance had a significant difference between the groups and those having PCOS with a significantly lower muscular strength and cardio vascular endurance.

A study by Rhiannon K Patten on exercise interventions in PCOS has reviewed 33 articles and has concluded that a minimum of 120 minutes of rigorous exercise per week is needed to provide positive health results in women with PCOS. Vigorous exercise has the best results for cardio respiratory fitness also (7).The association of high intensity exercise is associated with muscular strength and so strength training is often considered a rigorous training.

A pilot study conducted by Ida Almenning, et. al. on the effects of high intensity interval training and strength training on metabolic, cardiovascular and hormonal outcomes in women with PCOS has found that a ten weeks of high intensity interval training improved insulin resistance in women with PCOS. There was also an improvement in cardio respiratory fitness when the intensity was high (8).

For beginning a rigorous training where the intensity is high need a careful approach and the chances of injury need to be taken care of. The need for basic fitness and a buildup of muscular strength and cardio vascular endurance can reap positive results on women with PCOS in containing or even preventing it. Anyhow it must be assumed that PCOS has a very positive association with fitness in general and muscular strength and cardio vascular endurance in particulars.

5. CONCLUSION

The results of the study shows that irrespective of development PCOS is prevalent among females of reproductive age in large numbers and as studies put forward the importance of early detection and management awareness

campaigns may be began as a community health program. Fitness is a key to managing this issue and fitness programs maybe included in the management of PCOS with due importance. Muscular strength and cardiovascular endurance are found to be the components of fitness that needs to be concentrated on and vigorous training with high intensity and intervals could reap good results

CONFLICT OF INTERESTS

None.

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