

# A STUDY ON PCOD AND ASSOCIATED CAUSATIVE RISK FACTORS

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## **Abstract:-**

**Introduction:-** Polycystic Ovarian Disease (PCOD) is nowadays referred as the 'Syndrome O' i.e. overnourishment, overproduction of Insulin, ovarian confusion and ovulatory disruption. So PCOD is called as Polysctic Ovarian Syndrome (PCOS). Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder, mainly due to hormonal imbalances. There can be more than one predisposing factor/s that can contribute towards the development of PCOS.

**Aim:-**This research was conducted to study the associated causative risk factors for the development of PCOD.

**Methodology:-** A cross sectional study was conducted among 80(females) in the age group of 16-22 years from Mumbai city and were divided into two groups, 40 adolescent subjects (16-17 years) and 40 adult subjects (18-22 years)(ICMR,2010). A questionnaire was adopted to collect the data regarding risk factors. The data was analyzed by using SPSS 22.0 software. Data was presented using one sample T test and chi –square test. Findings were considered to be significant when  $p < 0.05$ .

**Results:-**In the adolescent age group, it was observed that 40% subjects had family history of Diabetes ( $p < 0.05$ ), 72.5% consumed junk food ( $p = 0.004$ ), 67.5% had irregular eating pattern ( $p = 0.022$ ), 47.5% ate only 3 meals a day ( $p < 0.05$ ), 37.5% had highest frequency of eating 1-2 times a week outside ( $p = 0.003$ ), majority had sedentary lifestyle, 70% were suffering from stress ( $p = 0.010$ ), 90% did not work out in gym i.e. had no physical activity ( $p < 0.05$ ), 35% of the subject's had normal BMI ( $p < 0.05$ ). While in the adult group, 80% of the subjects consumed junk food ( $p < 0.05$ ), 72.5% had irregular eating pattern ( $p = 0.004$ ), 52.5% ate 3 meals in a day ( $p < 0.05$ ), maximum subjects had sedentary lifestyle, 82.5% subjects were not involved in any sports ( $p < 0.05$ ) and 85% did not workout in a gym ( $p < 0.05$ ) indicating no physical activity, 68% had normal waist to hip ratio i.e. less than 0.85( $p = 0.041$ ), 47.5% subjects had normal BMI ( $p < 0.05$ ).

**Conclusion:-**It can be concluded from the study, that the common risk factors in both the groups were consumption of junk food, irregular eating pattern, 3 meals a day, sedentary lifestyle, lack of physical activity. Hence careful monitoring and proper management of identified predisposing factors can not only delay, but also helps in the adequate management of PCOD.

**Keywords:-**PCOD, PCOS, hormonal imbalance, lifestyle disorder, risk factors.

## **1. Introduction:-**

Young adults are the building blocks of the country's economy, as well as the country's health. It is very important to ensure their proper health status for a productive population. Young adults are at increasing risk of developing Polycystic Ovarian Syndrome (PCOS). The term PCOS was originally described in 1935 by Stein

& Leventhal, as a syndrome manifested by amenorrhea, hirsutism & obesity associated with enlarged Polycystic ovaries. This heterogeneous disorder is characterized by excessive androgen production mainly by the ovaries, which interfere with the reproductive, endocrine and metabolic functions' in a multi-factorial and polygenic condition. (D.C.Dutta, 2009). Nowadays it is also referred to as the 'Syndrome O' i.e. overnourishment, overproduction of Insulin, ovarian confusion and ovulatory disruption. So PCOD is called as Polysctic Ovarian Syndrome (PCOS). It is also known as the 'Stein Leventhal Syndrome' or 'Hyper androgenic Anovulation' and is the most common endocrine ovarian disorder affecting approximately 2-8 % women of reproductive age, worldwide. It is a lifestyle disorder affecting 2.2-26% of young girls in their reproductive age in India (Nivetha.M&et al, 2016). It has a global prevalence with 6.3% young women in their 20's in Sri Lanka, 2 % in South China, 5% in Thailand, 8% in UK, around 4% in USA, 6.5% in Greece and Spain and 11% in Australia (Chandrika &et al, 2013). Its etiology remains unknown, but it is thought to be multi-factorial, mostly due to hormonal imbalance, genetic cause, environmental and lifestyle cause (D.C. Dutta, 2009). Obesity, Low-grade inflammation, heredity is potential factor leading to PCOS. Even conditions before birth in the mother's womb can be a factor contributing to PCOS, excessive exposure to male hormones (androgens) in fetal life may permanently prevent genes from working normally and these androgens can promote a male pattern of abdominal fat distribution, which increases the risk of insulin resistance and low-grade inflammation. Because many factors can lead to the development of excess androgens, which is related to the development of PCOS, it is impossible to name a single, exact cause of this condition (Ruksana Seikh,2015). Excessive consumption of fast food, irregular eating habits lead to large fluctuations in blood glucose levels, thereby causing hormonal imbalance, posing higher risk for development of PCOS (Gulam B and et al,2017). Lack of physical activity may also be a reason for development of PCOS, as lack of exercise leads to uneven distribution of body fat, which is a risk factor of centripetal obesity (Samer Hayek and et al,2016). Sedentary lifestyle has also resulted in increased incidences of PCOS. Clinical features of PCOS are menstrual abnormalities in the form of oligomenorrhea, amenorrhea or DUB and infertility, acne, hirsutism. Patient may or may not always be obese. Virilism is rare. Acanthosis nigricans may also be present which is characterized by specific skin changes due to insulin resistance, the places which are commonly affected are nape of the neck, inner thighs, and axilla. (D.C.Dutta,2009). PCOS is related to long-term health problems, which include an elevated risk of impaired glucose tolerance (IGT), type 2 Diabetes Mellitus, hypertension, cardio vascular diseases, breast cancer, endometrial cancer and Dyslipidemia. (D.C.Dutta,2009, Roshan dadachangi &et al,2017). Prevalence of PCOS is increasing gradually in India and might be major health concern in India. (Dr Kalavathi &et al, 2015). Management and treatment of PCOD includes a range of things, such as healthy approach to diet and physical activity, medications and complementary therapies (<https://jeanhailes.org.au/health-a-z/pcos/management-treatment>).

#### **METHODOLOGY:-**

A cross sectional study was conducted among 80(females), in the age group of 16-22 years, who were selected from Mumbai city and were divided into two groups i.e. 40 adolescent subjects (16-17 years) and 40 adult subjects(18-22 years)(ICMR 2010). Purposive sampling technique was used. A questionnaire was administrated, which included general information, anthropometric measurement (weight, body mass index [BMI] and waist to hip ratio). Questions related to medical history, eating and lifestyle pattern/s, physical activity, were taken through an interview. The data was analyzed by using Stastical Package of Social Sciences (SPSS 22.0). Frequencies, percentage, measures of centre and measures of variability were computed. Advanced stastics was done by chi square test, which was used to analyze the representation of cases across the values of a single variable and one sample T test was used for comparing with reference standards. Finding were considered to be significant when  $p < 0.05$ .

**RESULTS AND DISCUSSION:-**

A total of 80 females (40 adolescent & 40 adults) participated in the study. The mean age of participants was 18.35 years. The study was done to know the associated causative risk factors for development of PCOD. The results of the study are discussed below.

**Table no 1 Waist to hip ratio and body mass index:-**

Group		Adolescent			Adult		
Variables	Categories	Percent (%)	Chi square	P value	Percent (%)	Chi square	P value
WHR	Normal (less than 0.85)	55	17	.068	68	10.4	.041
	Abdominal obesity (more than 0.85)	45			33		
BMI	Normal	35.0	0.95	.000*	47.5	5	.000*
	Obese	20.0			12.5		
	Overweight	25.0			25.0		
	Underweight	20.0			15.0		

\*( $P \leq 0.05$ ) findings considered to be significant

From table 1, it was observed that majority of the subjects in both the groups, had normal (less than 0.85) waist to hip ratio, but it was also seen that some of the subjects in both the groups had waist to hip ratio more than 0.85, which indicates abdominal obesity {( $p=0.068$ )( $p=0.041$ ) respectively}. The observation of the above table 1 also reveals, that the BMI of most of the subjects, in both the age groups fall under normal category ( $p < 0.05$ ). Hence it was indicated that the participants had a normal BMI.

**Table no 2 Family history of study group:-**

Group		Adolescent			Adults		
Variables	Categories	Percent (%)	Chi square	P value	Percent (%)	Chi square	P value
Family history	None	32.5	60.350	.000*	32.5	37.850	.000*
	PCOD	5			7.5		
	Diabetes	40			27.5		
	Obesity, PCOD	2.5			0		
	Obesity	5			5		
	Thyroid	7.5			5		
	Hypo Thyroid & B.P	2.5			0		

	Diabetes, PCOD	2.5			0		
	Obesity, Diabetes, BP	2.5			0		
	Diabetes, Obesity	0			15		
	Hypo Thyroid	0			2.5		
	Hyper Tension	0			2.5		
	Diabetes, Obesity, PCOD	0			2.5		
Family member suffering from any above health condition	None	32.5	22.400	.000*	32.5	20.600	.000*
	Father	32.5			25		
	Mother	27.5			27.5		
	Brother	2.5			0		
	Sister	5			5		
	Father, Mother	7.5			7.5		
	Father, Brother	0			2.5		

It was observed from table 2, that most of the subjects in the adolescent group (40%) had a family history of diabetes, whereas most of the subjects in the adult group (32.5%) had no family history ( $p < 0.05$ ). In the adolescent group, it was observed that equal number of subjects i.e. 32.5% had no family member suffering from any health condition, whereas the same number of subjects had father suffering from health condition, while in the adult group, 32.5% subjects had no family member suffering from any health condition ( $p < 0.05$ ).

A study reported that the risk factors of PCOS included menstrual cycle disorder (OR=5.824), bad mood (OR=2.852), family history of diabetes (OR=7.008) and infertility (OR=11.953), menstrual irregularity of mother (OR=2.557) and lack of physical exercises (OR=1.866). The study concluded that menstrual cycle disorder, family history of diabetes and infertility, bad mood, lack of physical exercises are the risk factors for developing PCOS ( Bao shan & et al,2015)

**Table no3 eating pattern of the study group:-**

Group		Adolescent			Adult		
Variables	Categories	Percent (%)	Chi square	P value	Percent (%)	Chi square	P value
Consumption of Junk food.	Yes	72.5	8.100	.004	80	14.400	.000*
	No	27.5			20		
Irregular eating pattern	Yes	67.5	4.900	.022	72.5	8.100	.004
	No	32.5			27.5		



Number of meals in a day.	3	<b>47.5</b>	12.050	.000*	<b>52.5</b>	12.950	.000*
	4	45			40		
	6	7.5			7.5		
	8	0			0		
Frequency of eat outside.	Daily	7.5	9.750	.003	15	4.250	.052
	3-4 times in a week	15			25		
	1-2 times a week	<b>37.5</b>			<b>30</b>		
	Once in 15 days	20			12.5		
	Once in a month	20			17.5		

It was observed from the table 3, that 72.5% in the adolescent group ( $p=0.004$ ) and 80% in the adult group ( $p<0.05$ ) consumed junk food, while remaining subjects in both the groups did not consume junk food. 67.5% of subjects in the adolescent group ( $p=0.022$ ) and 72.5% of subjects in the adult group ( $p=0.004$ ) had irregular eating patterns. It was seen from the data that most of the subjects in both the groups were having only 3 meals a day ( $p<0.05$ ), followed by 4 meals and 6 meals. 37.5% of subjects in the adolescent group ( $p=0.003$ ) and 30% in the adult group ( $p=0.052$ ) had a frequency of eating 1-2 times a week outside.

A study reported that the etiology of PCOS is now found to be both genetic and environmental. Women with PCOS often have a diabetic parent and PCOS are frequently seen among siblings suggesting a genetic basis. The sedentary lifestyle, excessive intake of junk food and increasing prevalence of obesity in children has resulted in an increase in the incidences of PCOS in the present time (Deepti J & et al, 2016).

**Table no 4 Time spent in college by the study group:-**

Group		Adolescent			Adult		
Variables	Categories	Percent (%)	Chi square	P value	Percent (%)	Chi square	P value
Hours spent at college.	4 Hrs	27.5	12.25	.001	7.5	6.75	.018
	5 Hrs	5			15		
	6 Hrs	<b>35</b>			20		
	7 Hrs	10			<b>30</b>		
	8 Hrs	22.5			27.5		
Hours spent in the classroom.	Less than 1 hour	0	6.800	.007	2.5	43.5	.000*
	1 hr	7.5			2.5		
	2 hrs	27.5			10		
	3-5 hrs	<b>32.5</b>			<b>57.5</b>		
	More than 5 hrs	<b>32.5</b>			27.5		

Hours spent in the practical lab.	Less than 1 hr	20	7.000	.015	27.5	7.000	.015
	1 hr	35			12.5		
	2 hrs	20			27.5		
	3-5 hrs	15			25		
	More than 5 hrs	10			7.5		

It was seen from the table 4, that most of the subjects in the adolescent group ( $p=0.001$ ) spent 6 hours in the college, followed by 4 hrs and 8 hrs, while most of the subjects in the adult group ( $p=0.018$ ) spent 7 hours in college, followed by 8 hrs and 6 hrs. In the adolescent group, it was observed that equal percentage of subjects i.e. 32.5% spent 3-5 hours in the classroom, whereas the same percentage of subjects spent more than 5 hours in the classroom ( $p=0.007$ ), followed by 2 hours and 1 hours, while in adult group 57.5% of the subjects spent 3-5 hours in the classroom ( $p<0.05$ ), followed by more than 5 hours and 2 hours. 35% of subjects in the adolescent group spent 1 hour in practical lab ( $p=0.015$ ), while in adult group it was observed that equal percentage of the subjects i.e. 27.5% of the subjects spent less than 1 hour, whereas the same percentage of the subjects spent 2 hours in practical lab ( $p=0.015$ ).

A study reported that mean BMI was higher in women with PCOS compared with non PCOS. Women with PCOS had a better dietary intake (elevated diet quality and micronutrient intake, and lower saturated fat and glycaemic index intake), but increased energy intake, increased sitting time and no difference in total physical activity as compared to non PCOS(L.J moran & et al,2013).

**Table no 5 Stress pattern of the study group:-**

Group		Adolescent			Adult		
Variables	Categories	Percent (%)	Chi square	P value	Percent (%)	Chi square	P value
Feel stress	Yes	70	6.400	.010	62.5	2.500	.073
	No	30			37.5		
Feel stress a lot.	Everyday	35	.200	.055	32.5	12.600	.001
	During Exams	35			47.5		
	Once in a week	30			20		

It was seen from table 5, that majority of the subjects in the adolescent group ( $p=0.010$ ) and the adult group ( $p=0.073$ ) often felt stress and remaining 30% of the subjects in the adolescent group and 37.5% of the subjects in the adult group did not feel stress. In the adolescent group it was observed that equal number of subjects i.e. 35% felt lot of stress every day, whereas the same number of subjects felt stress during exams ( $p=0.055$ ), and in the adult group 47.5% of the subjects felt lot of stress during exams ( $p=0.001$ ).

A study reported that that PCOS is an X linked dominant condition and has diverse clinical implication, such as psychological features (anxiety, depression), reproductive features (HIRSUTISM and hyperandrogenism) and

impaired glucose tolerance. It is widely dependent on environmental, genetic, ethnicity factors including lifestyle and body weight. PCOS is a result of genetic and environmental factor and stress may be one of the main causes of PCOS (Shaiba & et al, 2015).

**Table no 6 Physical Activities done by the study group:-**

Age Group		Adolescent			Adult		
Variables	Categories	Percent (%)	Chi square	P value	Percent (%)	Chi square	P value
Indulgence in any sport.	Yes	37.5	2.500	.073	17.5	16.900	.000*
	No	<b>62.5</b>			<b>82.5</b>		
Games played.	None	<b>62.5</b>	32.400	.000*	<b>82.5</b>	71.000	.000*
	Indoor	7.5			2.5		
	Outdoor	7.5			10		
	Both	22.5			5		
Hours spent for sports.	None	<b>62.5</b>	48.750	.000*	<b>82.5</b>	97.750	.000*
	20 mins	10			5		
	30 mins	20			2.5		
	45 mins	5			5		
	1 hour	2.5			5		
Exercise.	Yes	37.5	2.500	.073	42.5	.900	.161
	No	<b>62.5</b>			<b>57.5</b>		
Exercise done.	None	<b>62.5</b>	31.400	.000*	<b>57.5</b>	10.550 <sup>d</sup>	.001
	Aerobic	7.5			20		
	Anaerobic	10			0		
	Yoga	20			22.5		
Frequency of exercise.	None	<b>62.5</b>	30.800	.000*	<b>57.5</b>	37.000	.000*
	Daily	17.5			12.5		
	3-4 times in a week	7.5			12.5		
	1-2 times a week	12.5			15		
	once in 15 days	0			0		
	once a month	0			2.5		
Duration of exercise.	None	<b>62.5</b>	45.500	.000*	<b>57.5</b>	35.750	.000*
	20 min	7.5			10		
	30 min	10			15		

	45 min	7.5			7.5		
	1 hr	12.5			10		
Workout in a GYM.	Yes	10	25.600	.000*	15	19.600	.000*
	No	<b>90</b>			<b>85</b>		
Frequency of gym workout.	None	<b>90</b>	90.200	.000*	<b>85</b>	77.000	.000*
	3-4 times in a week	5			7.5		
	1-2 times a week	2.5			5		
	once in 15 days	0			0		
	Once in a month	2.5			2.5		
Duration of workout in a gym.	None	<b>90</b>	90.200	.000*	<b>85</b>	48.200	.000*
	20 mins	2.5			0		
	30 mins	0			0		
	45 mins	2.5			5		
	1 hr	5			10		

It was seen from table 6, that majority of the subjects in the adolescent group ( $p=0.073$ ) and the adult group ( $p<0.05$ ) did not indulge in any sports, hence spent no time in sports, remaining subjects in the adolescent group played both the games, whereas in the adult group, remaining subjects played outdoor games. 20 % subjects in the adolescent group spent maximum 30 minutes, followed by 20 minutes, 45 minutes and 1 hour in sports, and in the adult group, 5% each spent 20 minutes, 45 minutes and 1 hour, followed by 30 minutes in sports. It was observed from table 6, that majority of the subjects in the adolescent group ( $p=0.073$ ) and adult group ( $p=0.161$ ) did not exercise. Remaining most of the subjects in the adolescent group performed yoga, followed by anaerobic and aerobic, whereas in the adult group, remaining subjects performed yoga, followed by aerobic exercise. The frequency of exercise was very low in both the groups ( $p<0.05$ ), remaining subjects in adolescent group had highest frequency of exercising daily, whereas in the adult group, remaining subjects had highest frequency of exercising 1-2 times a week. Majority of the subjects in both the groups did not spend any time on exercise ( $p<0.05$ ), remaining subjects in the adolescent group, spent maximum 1 hour, whereas in the adult group, remaining subjects spent maximum 30 minutes. Most of the subjects in both the group did not work out in a gym ( $p<0.05$ ), remaining of the subjects in both the groups worked out in a gym 3-4 times a week, followed by 1-2 times a week and once in a month and remaining subjects in both the groups spent maximum 1 hour, followed by 45 minutes.

A study was done to record the physical activity and sedentary habits of adolescent with PCOS, 81 girls (35 with PCOS and 46 healthy girls as control group) participated in the study. The study reported that girls with PCOS engaged in physical activities less than controls. The study concluded that healthy teenagers were involved in a sporting activity more often and more frequently than PCOS group. Athletic and sedentary habits of adolescents with PCOS may interact with other factors leading to obesity (M. Eleftheriadou & et al, 2012).



A study reported that the mean age was  $28.85 \pm 6.525$  and  $29.57 \pm 3.281$  kg.m<sup>2</sup> in the PCOS and healthy group. The BMI was  $24.02 \pm 3.48$  and  $23.47 \pm 3.281$  kg.m<sup>2</sup> in the PCOS and the healthy group. There was no significant difference in the BMI of the two groups. Also, there was no difference between the two groups in the terms of subject's education, their husband's education, subject's occupation, their husband's occupation, monthly income and marital status. There was no significant difference between the two groups, in terms of infertility, history of assisted fertility methods, age at menarche, and the number of miscarriages. There was a significant difference in terms of parity and number of pre term births. Also, there was a significant difference between the two groups in terms of diet and physical activities. It concluded that PCOS women had low physical activities and inappropriate diet as compared to controlled group (Sedighi & et al,2015).

**Conclusion:**-It can be concluded from the study that the common risk factors for the development of PCOD in the adolescent and the adult group were consumption of junk food, irregular eating pattern, 3 meals a day, sedentary lifestyle and lack of physical activity. It was also observed that family history of diabetes, stress and consuming outside food 1-2 times a week was found to be predisposing factor for PCOD in the adolescent group. Hence careful monitoring and proper management of identified predisposing factor can not only delay, but also helps in adequate management of PCOD.

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