

## ORIGINAL ARTICLE

# Effect of Fenugreek seed extract on PCOS women – a pilot analysis

Jnaneswari. K <sup>1\*</sup>, Hephzibah Kirubamani N<sup>2\*</sup>, Manjubala Dash<sup>3</sup>, Jayavani R.L<sup>4</sup>

1. Assistant Lecturer (Dept. of OBG), College of Nursing, MTPG&RIHS, Puducherry.
  2. Professor, Department of OBG, Saveetha Medical College Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai,
  3. Professor cum HOD, Dept. of OBG, College of Nursing, MTPG&RIHS, Puducherry.
  4. Assistant Professor, Indira Gandhi Medical College and Research Institute, Kadirkamam, Puducherry.
- \*Corresponding Author's E-mail ID: hephsi1002@yahoo.co.in

### ABSTRACT

The aim is to evaluate the effectiveness of Fenugreek seed extract on PCOS women at selected fertility centers, Puducherry. To evaluate the effectiveness of Fenugreek seed extract biochemical and hormonal parameters among PCOS women in the experimental and control group. Quantitative approach with Experimental, pre-test post-test control group design was used. The 5 samples in each group were selected by lottery method. The experimental group were given fresh fenugreek extract along with metformin for continuous 3-month period, whereas the control group received only the metformin. The Pre and post-test were conducted on the both groups. The result depicts that, BMI scores in the E1 and E2 group, shows significant difference between pre-test and post-test 3 ( $p < 0.05$ ) when compared to the control group. The haemoglobin levels show significant difference in the in E1 group between pre-test and post-test 3 ( $p < 0.05$ ) than other groups. The significant decrease level was observed in the Fasting blood glucose levels, LH hormone, FSH hormone and LH/FSH ratio, OGTT and Hirsutism score in E1 and E2 group which was statistically significant at  $p < 0.05$  level than the control group. On completion of the treatment, all the study participant attained regular menstrual cycle in the E1 group, and 80% in the E2 and 40 percentage in control group. This study reveals that, the fenugreek seed extract was found to be effective by regulating the hormones and the menstrual cycle in experimental group when compared to the control group

**Keywords:** Polycystic Ovarian Syndrome, Fenugreek, Biochemical and hormonal parameters.

Received 23.05.2023

Revised 21.06.2023

Accepted 18.08.2023

### How to cite this article:

Jnaneswari. K, Hephzibah Kirubamani N, Manjubala D, Jayavani R.L. Effect of Fenugreek seed extract on PCOS women – a pilot analysis. Adv. Biores., Vol 14 (5) September 2023: 134-141.

## INTRODUCTION

PCOS is a condition that affects many women worldwide and is one of the most common metabolic, endocrine, and reproductive disorders affecting women of reproductive age. It is one of the most common causes of infertility [1]. Even though PCOS appears during the reproductive age, the complications associated with the condition can last the entire life of the affected woman, from conception to death. As a result, numerous health complications can arise, increasing the morbidity rates and lowering quality of life [2]. It is recognized as a polygenic disorder with multiple causative factors classified as endocrine, metabolic, environmental, and genetic. It manifests differently depending on how this genetic "predisposition" interacts with other environmental and lifestyle factors [3].

PCOS affects 90 to 95 percent of women who visit infertility clinics. Furthermore, 42-73 percent of spontaneous abortions are associated with PCOS. It has been reported that in PCOS, disturbances and disorientation of the components involved in the normal development of follicles occur, resulting in arrested follicular growth, with follicles reaching only 4-8mm in diameter. As a result, despite having a normal number of primordial follicles, women with PCOS have significantly increased primary and secondary follicles [4].

Obesity and polycystic ovaries are positively associated. With the prevalence of obesity on the rise, this is cause for concern, and the implications of PCOS are also on the rise [5]. Obesity, T2DM and metabolic disorders were identified as the most significant long-term PCOS-related distress [6].

Normally, testosterone and androstenedione are converted to estradiol and estrone by the aromatase enzyme, which plays an important role in ovarian hormonal balance. Reduced activity of this aromatase, on the other hand, results in increased ovarian testosterone production, leading to PCOS manifestations. In PCOS, hyperandrogenism impairs gonadotropin-induced oestrogen and progesterone synthesis. The luteinizing hormone (LH) imbalance causes the follicle reserve to expand and become cystic. As a result, increased LH and insulin levels stimulate the derangement of the steroidogenesis process [7].

Considering the treatments methods, the Fenugreek seeds, a dietary fibre, which is included in the daily consumption of diet preparation in the southern India, found to be more effective in increasing the insulin receptor sites, regulating the blood glucose levels and hormonal levels thereby reducing the severity of PCOS in women [7].

## MATERIAL AND METHODS

This pilot study used quantitative approach with experimental design and the women was used All women with PCOS diagnosed through Biochemical/Hormonal markers and Ultrasonography, BMI less than 42, adequate hepatic, renal and haematological functions, were included. Post menopausal women, women with thyroid problems, any acute or chronic medical illness, pregnant and lactating women were excluded. 15 samples were selected according to the inclusion criteria and were randomly assigned to Experimental (E1, E2) and Control group (E1 n=05, E2 n=05 control group n=05).

The validity of the tool was obtained from various experts from HOD and Professor of Obstetrics and Gynaecology Nursing and Obstetricians. The reliability of the tool was assessed by inter-rater reliability method ( $r=0.89$ ) and found to be reliable.

After obtaining ethical permission, the women based on inclusion criteria were selected and baseline data was obtained on the first day. The E1 group was given Fenugreek seeds aqueous extract with a dosage of  $2 \times 100$  mg/kg body weight (5-7 gms of Fenugreek seeds boiled in 100 ml of water for 10 to 15 min) along with metformin, E2 were given only the Fenugreek seed extract and Control group with metformin for continuous 3 months and post-test were conducted on 4<sup>th</sup>, 8<sup>th</sup> and 12<sup>th</sup> week respectively.

## RESULTS

Descriptive analysis was performed for the demographic variables. Inferential statistics were done with 't' test, two-way RM ANOVA with Bonferroni 't' test and Chi-square test.

According to the pilot study samples N= 15 (E1 n=05, E2 n=05, Control n=30) the percentage and distribution and association of the samples of the demographic variables of E1, E2 and Control group is given (Table 1).

### BODY MASS INDEX (BMI)

The table 2 shows that, in the control group the pretest mean score of BMI was  $29.60 \pm 3.28$ , post-test 1 ( $29.52 \pm 3.31$ ), Post test 2 ( $25.78 \pm 7.78$ ) and post-test 3 ( $29.28 \pm 3.27$ ). In Experimental group E1, the pretest mean score of BMI was  $25.60 \pm 3.15$ , post-test 1 ( $24.36 \pm 3.80$ ), Post test 2 ( $23.64 \pm 3.72$ ) and post-test 3 ( $23.08 \pm 3.70$ ), where as in Experimental group E2, the pretest mean score of BMI was  $29.26 \pm 3.44$ , post test 1 ( $29.50 \pm 3.54$ ), Post test 2 ( $29.12 \pm 3.70$ ) and post-test 3 ( $28.34 \pm 3.53$ ) respectively.

There is no significant difference in the BMI scores between the overall groups, tests and group x test. Within the control group, significant difference was observed between pre-test and post-test 3 with "t" value of  $t = 4.824$  ( $p < 0.05$ ). In the E1 group, significant difference was observed in the BMI scores between post-test 1 and post-test 2, post-test 2 and post-test 3 and pre-test and post-test 3 with "t" value of  $t = 4.000$ ,  $t = 10.983$  and  $t = 3.142$  ( $p < 0.05$ ). In the E2 group, significant difference was observed in the BMI scores between post-test 1 and post-test 2 and post-test 2 and post-test 3 with "t" value of  $t = 3.413$  and  $t = 5.913$  which was statistically significant at  $p < 0.05$  level. (Table 3)

### HIP WAIST RATIO

The pretest score Hip Waist ratio in the control group was  $0.86 \pm 0.01$ , post-test 1 ( $0.86 \pm 0.01$ ), Post test 2 ( $0.86 \pm 0.01$ ) and post-test 3 ( $0.86 \pm 0.01$ ). In the Experimental group 1, the pretest mean score was  $0.84 \pm 0.06$ , post-test 1 ( $0.85 \pm 0.08$ ), Post test 2 ( $0.86 \pm 0.09$ ) and post-test 3 ( $0.85 \pm 0.09$ ) and in E2, the pretest mean score was  $0.87 \pm 0.07$ , post-test 1 ( $0.88 \pm 0.07$ ), Post test 2 ( $0.89 \pm 0.06$ ) and post-test 3 ( $0.90 \pm 0.05$ ). (Table 2)

Within the control group, significant difference was not observed between pre-test, post-test1, post-test 2 and post-test 3 at  $p < 0.05$  level, in the E1 group, significant difference was not observed in the Hip Waist Ratio scores between pre-test, post-test 1, post-test 2 and post-test 3 with "t" value of  $t = 0.975$ ,  $t = 0.535$ ,

$t=2.449$  and  $t=0.605$  which was not statistically significant at  $p<0.05$  level. In the E2 group, significant difference was observed in the Hip Waist Ratio scores between pre-test and post-test 3 with “t” value of  $t=3.882$  which was statistically significant at  $p<0.05$  level. (Table 3).

#### HAEMOGLOBIN

The pretest mean score of haemoglobin was  $9.56\pm0.37$  and post-test 3 ( $9.72\pm0.33$ ) in the control group and it was  $10.04\pm1.07$  pretest score and post-test 3 ( $10.36\pm0.92$ ) in the E1 group. The E2 group shows the pretest mean score of  $10.20\pm0.29$  and post-test 3 ( $10.60\pm0.28$ ). (Figure 1)

In (table 3), significant difference was not observed between pre-test and post-test 3 at  $p<0.05$  level within the control group and in E2 group for Haemoglobin, and significant difference was observed in E1 group between pre-test and post-test 3 with “t” value of  $t = 3.301$  ( $p<0.05$ ).

#### FASTING BLOOD SUGAR

The pretest mean score of fasting blood sugar was  $83.20\pm5.76$  and post-test 3 ( $78.0\pm2.82$ ) in the control group,  $81.20\pm5.21$  and post-test 3 ( $71.20\pm5.01$ ) in the E1 group and  $88.0\pm6.16$  and post-test 3 ( $80.0\pm5.76$ ) in the E2 group respectively. (Figure 2)

The (Table 4) shows, there is a significant difference in E1 and E2 such as “t” value of  $t = 7.071$  and “t” value of  $t = 5.657$  which was significant at  $p<0.05$  level and not statistically significant between pre-test and post-test 3 at  $p<0.05$  level within the control group.

#### OGTT

The OGTT pretest mean score in the control group was  $129.20\pm4.38$  and post-test 3 ( $128.40\pm3.28$ ), in E1 group was  $124.80\pm8.78$  and  $110.80\pm5.01$  and in E2 group was  $125.60\pm7.92$  and  $120.80\pm7.29$ . In the E1 and E2 group, significant difference between pre-test and post-test 3 with “t” value of  $t = 7.826$  and  $t = 4.707$  which was statistically significant at  $p<0.05$  level when compared to the control group  $p>0.05$  level. (Table 5)

#### LH HORMONE

The pretest mean score of LH Hormone was  $17.22\pm0.83$  and post-test 3 ( $16.08\pm0.97$ ) in the control group, where as in E1 and E2 it was  $15.80\pm0.83$  and post-test 3 ( $11.70\pm1.14$ ) and  $15.54\pm1.18$  and post test 3 ( $13.78\pm1.26$ ). (Table 6)

The (Table 6) displays a significant difference between pre-test and post-test 3 in all the three group with “t” value of  $t = 4.974$  in control group, “t” value of  $t = 6.833$  in the E1 group and “t” value of  $t = 7.532$  in the E2 group which was statistically significant at  $p<0.05$  level

#### FSH HORMONE

The FSH hormone pretest mean score in the control group was  $4.98\pm0.53$  and post-test 3 ( $5.74\pm1.31$ ). The E1 group shows the pretest mean score of  $4.90\pm0.91$  and post-test 3 ( $7.48\pm0.75$ ). the E2 group shows the pretest mean score of  $5.62\pm0.51$  and post-test 3 ( $7.30\pm0.44$ ). on assessing the t value, significant difference was observed only in E1 group and E2 group with “t” value of  $t = 7.730$  and “t” value of  $t = 6.471$  which was statistically significant at  $p<0.05$  level and not in the control group. (Table 6)

#### LH/FSH RATIO

The (table 7) states that, the pretest mean score of LH and FSH ratio hormone in the control group was  $3.49\pm0.44$  and post-test 3 ( $2.97\pm0.95$ ), in the E1 group was  $3.32\pm0.68$  and post-test 3 ( $1.49\pm0.11$ ) and in the E2 group was  $2.85\pm0.24$  and post-test 3 ( $1.92\pm0.22$ ) respectively.

On observing the t value in the LH and FSH Hormone Ratio scores between pre-test and post-test 3, E1 group and E2 group shows significant difference with “t” value of  $t = 5.619$  and “t” value of  $t = 8.095$  which was statistically significant at  $p<0.05$  level where as in the control group it is non-significant. (Table 7).

#### QUALITY OF CYCLE

The (figure 3) depicts that, in the pretest and post-test 1 of experimental group 1, 4(80%) had irregular menstrual cycle and 1(20%) had prolonged menstrual cycle. In post-test 2, 4(80%) had regular menstrual cycle and 1(20%) had prolonged menstrual cycle and in post test 3 all had regular cycles. In the pretest of experimental group 2, 3(60%) had irregular menstrual cycle and 2(40%) had prolonged menstrual cycle. In post test 2, 3(60%) had regular menstrual cycle and 1(20%) had irregular and prolonged menstrual cycle and in post test 3 1(20%) had irregular cycle and 4(80%) had regular cycles respectively. In the pretest of control group, pretest and, post-test 1 3(60%) had irregular menstrual cycle and 2(40%) had prolonged menstrual cycle. In post test 2, 3(60%) had irregular menstrual cycle and 1(20%) had irregular and prolonged menstrual cycle respectively. In post-test 3, 3(60%) had irregular cycle and 3(40%) had regular cycles.

#### HIRSUTISM SCORE

The Hirsutism pretest mean score was  $14.0\pm1.58$  and post-test 3 ( $13.20\pm1.30$ ). in the control group,  $11.40\pm2.40$  and post test 3 ( $8.60\pm1.81$ ) in the E1 group and  $14.0\pm1.58$  and post test 3 ( $12.20\pm1.64$ ) in the E2 group. (Table 6)

The t value displays a significant difference between pre-test and post-test 3 with “t” value of t = 7.483 in the E1 group and “t” value of t = 4.811 in the E2 group respectively which was statistically significant at p<0.05 level. But within the control group, significant difference was not observed between pre-test and post-test 3 at p<0.05 level. (Table 6)

The association between biochemical, hormonal parameters and demographic variables showed that  $\chi^2$  value was (P > 0.05) which was not statistically significant and depicts that there is no association among the variables. (Table 1).

**Table 1: Frequency and percentage distribution of demographic variables [N = 15 (5+5+5)]**

Demographic Variables	Experimental Group I (E1)		Experimental Group II (E2)		Control Group		Chi-Square Test
	F	%	F	%	F	%	
<b>Age</b>							
18 – 20 yrs	2	40.0	1	20.0	3	60.0	$\chi^2=3.250$ P=0.517 N.S
21 – 25 yrs	3	60.0	3	60.0	2	40.0	
26 – 30 yrs	0	0	1	20.0	0	0	
<b>Educational qualification</b>							
Non formal education	1	20.0	0	0	0	0	$\chi^2=2.250$ P=0.690 N.S
Primary education	-	-	-	-	-	-	
Secondary education	2	40.0	3	60.0	3	60.0	
Collegiate / Professional	2	40.0	2	40.0	2	40.0	
<b>Occupation</b>							
Homemaker	5	100.0	2	40.0	4	80.0	$\chi^2=4.773$ P=0.092 N.S
Labourer	0	0	3	60.0	1	20.0	
Business	-	-	-	-	-	-	
Professional	-	-	-	-	-	-	
<b>Type of family</b>							
Joint family	1	20.0	2	40.0	3	60.0	$\chi^2=1.667$ P=0.435 N.S
Nuclear family	4	80.0	3	60.0	2	40.0	
<b>Family income</b>							
<10,000	1	20.0	0	0	0	0	$\chi^2=3.500$ P=0.478 N.S
10,001-30,000	3	60.0	4	80.0	5	100.0	
30,001-50,000	1	20.0	1	20.0	0	0	
>50,000	-	-	-	-	-	-	
<b>Bread winner of the family</b>							
Husband	4	80.0	1	20.0	3	60.0	$\chi^2=7.750$ P=0.101 N.S
Wife	-	-	-	-	-	-	
Both	0	0	4	80.0	2	40.0	
In-laws	1	20.0	0	0	0	0	
<b>Religion</b>							
Hindu	4	80.0	5	100.0	5	100.0	$\chi^2=2.143$ P=0.343 N.S
Christian	1	20.0	0	0	0	0	
Muslim	-	-	-	-	-	-	
Others	-	-	-	-	-	-	
<b>Locality</b>							
Urban	3	60.0	2	40.0	2	40.0	$\chi^2=4.286$ P=0.638 N.S
Urban slum	0	0	2	40.0	2	40.0	
Suburban	1	20.0	0	0	1	20.0	
Rural	1	20.0	1	20.0	0	0	

N.S – Not Significant

**Table 2: Mean and SD for BMI and Hip Waist Ratio [N = 15(5+5+5)]**

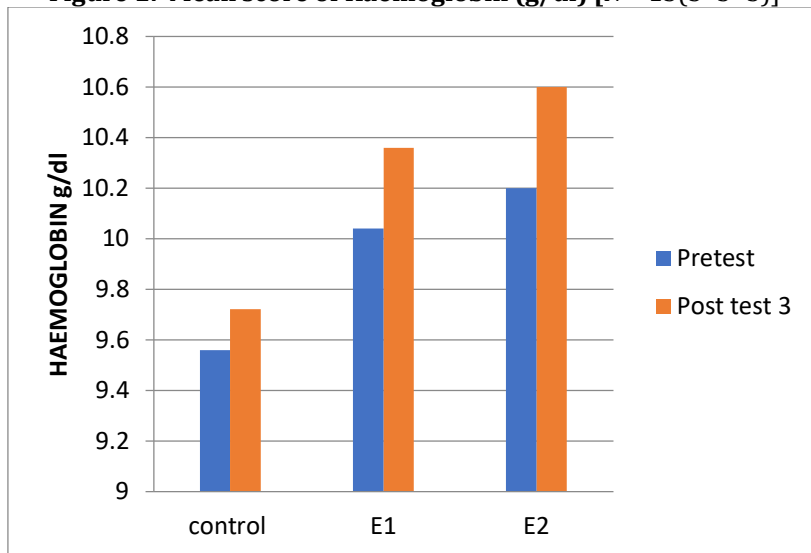
Groups	BMI		HIP WAIST RATIO	
	Mean	S.D	Mean	S.D
Con-Pre-Test	29.60	3.28	0.86	0.01
Con-Post-Test 1	29.52	3.31	0.86	0.01
Con-Post-Test 2	25.78	7.78	0.86	0.01
Con-Post-Test 3	29.28	3.27	0.86	0.02
Exp 1-Pre-Test	25.60	3.15	0.84	0.06
Exp 1-Post-Test 1	24.36	3.80	0.85	0.08
Exp 1-Post-Test 2	23.64	3.72	0.86	0.09
Exp 1-Post-Test 3	23.08	3.70	0.85	0.09
Exp 2-Pre-Test	29.26	3.44	0.87	0.07
Exp 2-Post-Test 1	29.50	3.54	0.88	0.07
Exp 2-Post-Test 2	29.12	3.70	0.89	0.06
Exp 2-Post-Test 3	28.34	3.53	0.90	0.05

**Table 3: Comparison of pretest and post test score of BMI & HIP WAIST ratio within the Groups:**

S.No.	Groups	BMI		HIP WAIST RATIO	
		t value	p-value	t value	p-value
1	<b>Within Control group</b>				
	Pre-test and Post-Test1	t = 1.089	P>0.05	t = 1.633	p>0.05
	Post-Test1 and Post-Test2	t = 1.042	p>0.05	t = 1.000	p>0.05
	Pre-Test2 and Post-Test3	t = 0.979	p>0.05	t = 0.535	p>0.05
	Pre-Test and Post-Test3	t = 4.824	<b>P&lt;0.05*</b>	t = 1.633	p>0.05
2	<b>Within F &amp; M Group</b>				
	Pre-test and Post-Test1	t = 1.364	p>0.05	t = 0.975	p>0.05
	Post-Test1 and Post-Test2	t = 4.000	<b>P&lt;0.05*</b>	t = 0.535	p>0.05
	Pre-Test2 and Post-Test3	t = 10.983	<b>P&lt;0.05*</b>	t = 2.449	p>0.05
	Pre-Test and Post-Test3	t = 3.142	<b>P&lt;0.05*</b>	t = 0.605	p>0.05
3	<b>Within F Group</b>				
	Pre-test and Post-Test1	t = 0.438	p>0.05	t = 1.510	p>0.05
	Post-Test1 and Post-Test2	t = 3.413	<b>P&lt;0.05*</b>	t = 1.500	p>0.05
	Pre-Test2 and Post-Test3	t = 5.913	<b>P&lt;0.05*</b>	t = 1.581	p>0.05
	Pre-Test and Post-Test3	t = 1.738	p>0.05	t = 3.882	<b>P&lt;0.05*</b>

\*p<0.05 - Significant, p>0.05 - Not Significant

**Figure 1: Mean score of Haemoglobin (g/dl) [N = 15(5+5+5)]**



**Figure 2 : Mean score of Fasting Blood Sugar (mg/dl) [N = 15(5+5+5)]**

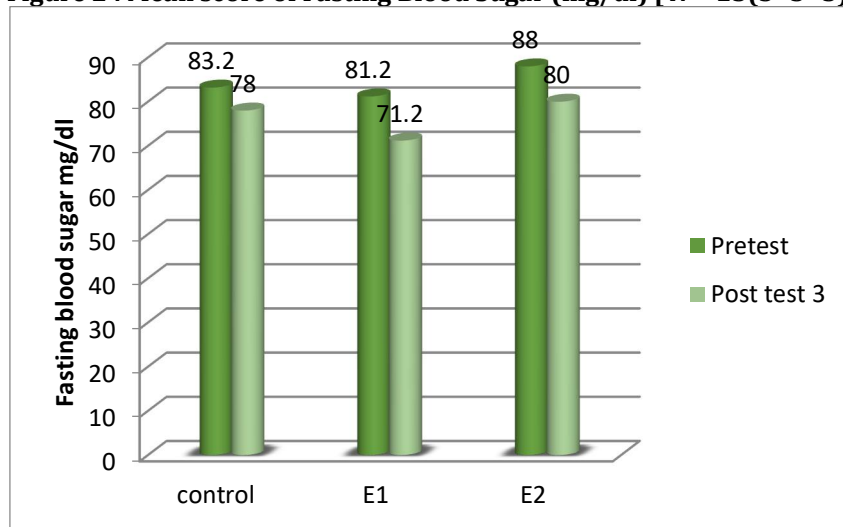


Figure 3: Frequency of quality of cycle in groups [N = 15(5+5+5)]

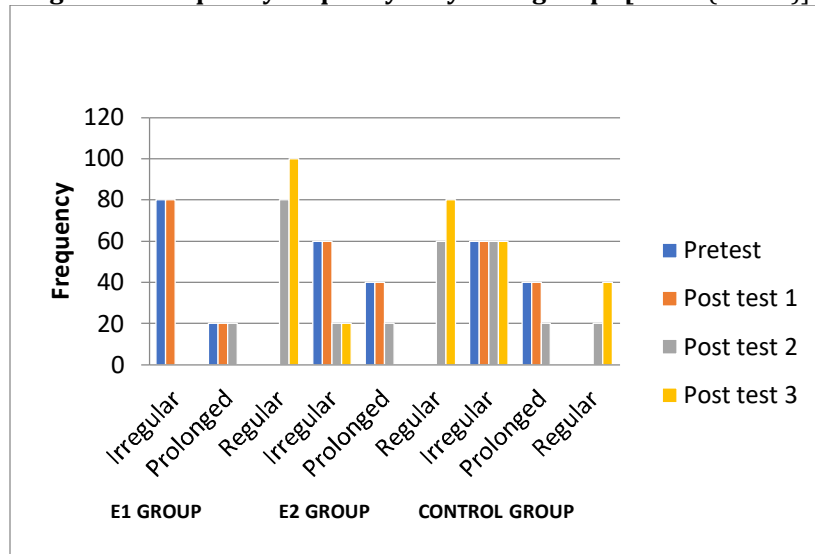


Table 4: Comparison of pretest and post test score of Haemoglobin and Fasting blood sugar within the group [N = 15(5+5+5)]

S.No.	Comparisons	Haemoglobin		Fasting blood sugar	
		t-value	p-value	t-value	p-value
1	<b>Within Control group</b>				
	Pre-Test and Post-Test3	t = 1.115	P>0.05	t = 3.833	P>0.05
2	<b>Within F &amp; M Group</b>				
	Pre-Test and Post-Test3	t = 3.301	<b>P&lt;0.05*</b>	t = 7.071	<b>P&lt;0.05*</b>
3	<b>Within F Group</b>				
	Pre-Test and Post-Test3	t = 2.080	P>0.05	t = 5.657	<b>P&lt;0.05*</b>

\*p<0.05 – Significant, p>0.05 – Not Significant

Table 5: Comparison of pretest and post test score OGTT within the group [N = 15(5+5+5)]

Groups	Mean	S.D	t-value	p-value
Con-Pre-Test	129.20	4.38	t = 1.000	P>0.05
Con-Post-Test 3	128.40	3.28		
Exp 1-Pre-Test	124.80	8.78	t = 7.826	<b>P&lt;0.05*</b>
Exp 1-Post-Test 3	110.80	5.01		
Exp 2-Pre-Test	125.60	7.92	t = 4.707	<b>P&lt;0.05*</b>
Exp 2-Post-Test 3	120.80	7.29		

\*p<0.05 – Significant, p>0.05 – Not Significant

Table 6: Comparison of pretest and post test score of LH Hormone and FSH hormone within the group [N = 15(5+5+5)]

Groups	LH HORMONE				FSH HORMONE			
	Mean	S.D	t-value	p-value	Mean	S.D	t-value	p-value
Con-Pre-Test	17.22	0.83	t = 4.924	<b>P&lt;0.05*</b>	4.98	0.53	t = 1.672	P>0.05
Con-Post-Test 3	16.08	0.97			5.74	1.31		
Exp 1-Pre-Test	15.80	0.83	t = 6.833	<b>P&lt;0.05*</b>	4.90	0.91	t = 7.730	<b>P&lt;0.05*</b>
Exp 1-Post-Test 3	11.70	1.14			7.48	0.75		
Exp 2-Pre-Test	15.54	1.18	t = 7.532	<b>P&lt;0.05*</b>	5.62	0.51	t = 6.471	<b>P&lt;0.05*</b>
Exp 2-Post-Test 3	13.78	1.26			7.30	0.44		

\*p<0.05 – Significant, p>0.05 – Not Significant

**Table 7: Comparison of pretest and post test score of on LH and FSH Ratio Hormone and Hirsutism score within the group [N = 15(5+5+5)]**

Groups	LH/FSH RATIO				HIRSUTISM SCORE			
	Mean	S.D	t-value	p-value	Mean	S.D	t-value	p-value
Con-Pre-Test	3.49	0.44	t = 1.743	P>0.05	14.00	1.58	t = 2.138	P>0.05
Con-Post-Test 3	2.97	0.95			13.20	1.30		
Exp 1-Pre-Test	3.32	0.68	t = 5.619	P<0.05*	11.40	2.40	t = 7.483	P<0.05*
Exp 1-Post-Test 3	1.49	0.11			8.60	1.81		
Exp 2-Pre-Test	2.85	0.24	t = 8.095	P<0.05*	14.00	1.58	t = 4.811	P<0.05
Exp 2-Post-Test 3	1.92	0.22			12.20	1.64		

\*p<0.05 – Significant, p>0.05 – Not Significant

## DISCUSSION

Polycystic Ovarian Syndrome is a complex disorder and may likely to develop type 2 Diabetes mellitus, depression, anxiety and Hypertension along with infertility, Obesity and unwanted hair growth at an estimated rate of 8-13 % in the reproductive age group; which may bring negative body image to the individual affecting their roles in the family, work life and in the community. The treatment options include life style modification along with few herbal remedies such as Mulethi, Flaxseeds, Cinnamon, Omega 3 supplements and Fenugreek seeds, etc are found to be effective.

Maryam Hassanzadeh Bashtian *et al* <sup>(9)</sup> study showed that, there is a significant difference in the menstrual disturbances and metabolic parameters after the treatment of 8 weeks of treatment with hydroalcoholic extract of fenugreek seeds among 58 oligo-anovulatory PCOS women. The group 1 showed significant decrease (p = 0/01) in the Ovarian size observed through ultrasonography.

R.D. Sharma [10] in his study stated that, fenugreek leaves and seeds have hypoglycemic effect and there is significant improvement in plasma glucose and insulin responses in the study participants.

Similarly, A Gupta *et al* [11] evaluated the effect of fenugreek seed extract seeds on glycemic control and insulin resistance among two groups G1 with fenugreek extract and G2 with dietary control and exercises. The results showed that, there is significantly lower (p < 0.001) in blood glucose and insulin resistance along with increase in HDL and decrease in triglycerides in group 1 as compared to group 2 (p < 0.05).

D Puri *et al* [12] studied the action of active hypoglycemic principle in the fenugreek seeds showed the hypoglycemic effect may be mediated through stimulating insulin synthesis and/or secretion from the beta pancreatic cells of Langerhans. This study also showed that, the prolonged administration of same amount of fenugreek seeds for 30 days shows significant decrease in fasting blood glucose without any risk of developing severe hypoglycaemia.

This pilot study aims to evaluate the effectiveness of the Fenugreek seeds extract on the biochemical and hormonal parameters among PCOS women. The results of the pilot provide further support to the existing studies on the intervention for PCOS.

This study clearly depicts that, BMI scores in the E1 and E2 group, shows significant difference between pre-test and post-test 3 (p<0.05) when compared to the E2 and control group. The haemoglobin levels shows significant difference in the in E1 group between pre-test and post-test 3 (p<0.05) than other groups. There is noticeable changes in the Fasting blood glucose levels, LH hormone, FSH hormone and LH/FSH ratio, OGTT and Hirsutism score - in E1 and E2 group which was statistically significant at p<0.05 level than the control group.

On completion of the treatment, all the study participant attained regular menstrual cycle in the E1 group, and 80% in the E2 and 40 percentage in control group. This clearly depicts that; Fenugreek seed extract has a positive effect on the PCOS.

This study also reveals that, the observation in the biochemical and hormonal parameters from the baseline i.e. from pretest to the post-test 3, significant changes were observed gradually in all post-test in E1 group, where as in E2 the significant changes was observed only in the post- test 2 and post-test 3 when compared to the control group. Hence, Fenugreek has a positive effect and has an increased effect when administered along with metformin than administering Fenugreek or metformin alone. In this study, sample size was small hence generalization of the findings is limited, the same can be replicated in large number of samples for the consistency of the data.

## CONCLUSION

Fenugreek, a dietary herb has major potential health benefits including insulin sensitizing effects and delayed gastric emptying causing decrease in rise of blood glucose level after meal. Fenugreek seed extract

over a period of 3 months or more can cause significant changes in the BMI, Hipwaist ratio, Fasting glucose level, OGTT and hormonal values in PCOS women.

## REFERENCES

1. Shalini Gainer, Bharti Sharma, (2019). Update on Management of Polycystic Ovarian Syndrome for Dermatologists, Indian Dermatol Online Journal, ;10(2):97-105.
2. José Bellver et al, (2018). Polycystic ovary syndrome throughout a woman's life, Journal of Assisted Reproduction and Genetics. 35(1): 25–39. doi: 10.1007/s10815-017-1047-7
3. Pooja Sagvekar et al, (2018). Pathomechanisms of polycystic ovary syndrome: Multidimensional approaches, Frontiers In Bioscience, Elite, 10, 384-422.
4. Susan M Sirmans, Kristen A Pate, (2013). Epidemiology, diagnosis, and management of polycystic ovary syndrome, Clin Epidemiology, 18;6:1-13. doi: 10.2147/CLEP.S37559.
5. Darghams et al., (2017). The prevalence and metabolic characteristics of polycystic ovary syndrome in the Qatari population, PLoS One. 12(7): e0181467. doi: 10.1371/journal.pone.0181467
6. Saleem and Rizvi, (2017). New Therapeutic Approaches in Obesity and Metabolic Syndrome Associated with Polycystic Ovary Syndrome, Cureus. 13;9(11):e1844. doi: 10.7759/cureus.1844.
7. Rosenfield and Ehrmann, (2016). The Pathogenesis of Polycystic Ovary Syndrome (PCOS): The Hypothesis of PCOS as Functional Ovarian Hyperandrogenism Revisited, Endocrine Reviews, Volume 37, Issue 5, Pages 467–520, <https://doi.org/10.1210/er.2015-1104>.
8. Amrita Sarkari Jaipurkar et al., (2019). Efficacy Evaluation of Standardized Fenugreek seeds extract as Furostanolic Saponins & Myo-Inositol (Nutricyst-M) in Management of Insulin Resistance (IR) & Ovary Volume in PCOS Subjects, International Journal of Reproductive Medicine and Sexual Health, DOI Number : 10.36811/ijrmsh.2019.110004
9. Maryam Hassanzadeh Bashtian et al, (2013). Evaluation of Fenugreek (Trigonella foenum-graceum L.), Effects Seeds Extract on Insulin Resistance in Women with Polycystic Ovarian Syndrome, Iranian Journal of Pharmaceutical Research; 12 (2): 475-481.
10. Sharma RD. (1986). Effect of Fenugreek seeds and leaves on blood glucose and serum insulin response human subjects. Nutrition Res. 12:1353–1364. [Google Scholar]
11. Gupta A, Gupta R, Lal B. (2001). Effect of Trigonella Foenum-graecum (fenugreek) seeds on glycaemic control and insulin resistance in Type 2 diabetes mellitus: A double Blind Placebo controlled study. J. Assoc. Physicians of India. 45:1057–1061. [PubMed] [Google Scholar]
12. Puri D, Prabhy KM, Murthy PS. (2002). Mechanism of action of a hypoglycemic principle isolated from fenugreek seeds. Indian J. Physiol. Pharmacol. 46:457–62. [PubMed] [Google Scholar]

**Copyright: © 2023 Author.** This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.