Research Article

ASSESSMENT OF CLINICAL PHARMACIST ROLE TO REDUCE THE RISK FACTORS AND IMPACT OF COUNSELLING ABOUT LIFESTYLE CHANGES IN PCOS PATIENTS

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ARTICLE INFO	ABSTRACT

Polycystic Ovary Syndrome (PCOS) is most common endocrine disorder during reproductive years. It is estimated that PCOS affects vary widely from 2 to 26 in every 100 women. The present study was intended to assess the clinical pharmacist role to reduce the risk factors and impact of counselling on lifestyle modification. Study design was Prospective observational study, study site at Department of Gynaecology and Obstetrics, Government General Hospital, Guntur and Study period was 6 months. Study results shows that, a total of 190 subjects were recruited into the study population based on inclusion and exclusion criteria the mean age of subjects was 24.33, and mean BMI was 37.27, most of the subjects were urban background. The mean age of menarche of the subjects was 12.43, the mean length of menstrual cycle was 32.01 and no of days bleeding during menstruation mean was 5.01. Regarding risk factors 100(52.62%) subjects complaining about stress, 68 subjects have the positive family history of PCOS, 76 subjects were obese. regarding sign and symptoms 163 complaining of irregular bleeding, 91 subjects with hirsutism and only 5 with Acanthosis, 109 complaining of weight gain after diagnosed with PCOS. After counselling about exercise and dietary modifications most of them changes their habits, impact of counseling on exercise and dietary modifications were calculated by chi-square test which gives the significant value p<0.0001**** for exercise and p<0.0001*** for dietary habits. Finally our study concluded that most of the risk factors were modifiable so, proper counselling by clinical pharmacist about risk factors and lifestyle modifications show the positive impact on disease outcome.

INTRODUCTION

Polycystic ovary syndrome (PCOS), also known as the Stein-Leventhal syndrome, It is defined as a multifaced disorder characterized by ovulatory dysfunction, hyperandrogenism and gonadotropin abnormality with cystic changes in the ovary. It is a common endocrine disorder with a global prevalence of 5-10%. PCOS can be a worst experience for women, for clinicians it is a complex syndrome and for scientist it is a challenging syndrome for research [1]. PCOS is idiopathic in nature exact cause is unknown but it is thought to be multifactorial. Mostly due to imbalances in hormonal that is elevated luteinizing hormone (LH) and normal or suppression of follicle stimulating hormone (FSH) resulting in altered LH/FSH ratio[2]. Pathophysiology of PCOS is unknown but different hypothesis were proposed. Symptoms include irregular bleeding, hirsutism, anovulation etc. not all the patients exhibit the symptom of irregular bleeding, Hirsutism is the excessive growth of facial or body hair on women.

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Hirsutism can be seen as coarse, dark hair that may appear on the face, chest, abdomen, back, upper arms, or upper legs. Hirsutism is a symptom of medical disorders associated with the hormones called androgens. Polycystic ovary syndrome (PCOS), in which the ovaries produce excessive amounts of androgens, is the most common cause of hirsutism and may affect up to 10% of women [3]. Anovulation (infertility) is the major risk for the PCOS in women with reproductive age. Anovulation is the cause of infertility in about a one-third of couples attending infertility clinics, and polycystic ovary syndrome accounts for 90% of such cases. Symptoms, signs, and biochemical features vary greatly among affected women and may change over time in individual women.

The Rotterdam criteria (2003) are the most widely used and relevant criteria for the diagnosis of PCOS. The disorder is diagnosed if 2 of the 3 specified conditions are: (1) Hyperandrogenism (detected by clinical and/or biochemical testing), (2) Ovulation abnormalities, and/or, (3) 12 or more cysts on one ovary and/or ovarian volume > 10 ml [4]. There are also 2 other definitions of the syndrome in addition to the Rotterdam criteria. According to the criteria proposed by the National Institutes of Health (NIH, 2009), a diagnosis of

PCOS involves detection of clinical or biochemical hyperandrogenism and chronic ovulation disorders.

It is not clear what are the factors that may predispose a woman for development of PCOS, however it was observed in some cases that PCOS is genetic in nature [5] and obesity was found to contribute for hyperinsulinemia there by predisposing individuals for PCOS. The polycystic ovary syndrome (PCOS) has an important genetic background. Family studies have shown that mothers of women with PCOS have a 35% chance of being affected by the syndrome, and sisters have a 40-50% chance of developing it [6], which is definitely higher than the prevalence in the general female population of 6-10%. Brothers of women with PCOS are also more likely to be affected by insulin resistance. Despite this evident genetic background, PCOS is probably not caused by a single gene defect and, as is the case for many other metabolic conditions, is highly influenced by environmental factors. Overweight has been linked to PCOS since its very first description by Stein and Leventhal, who noticed the association of obesity, hirsutism, anovulation, and infertility in women. In fact, approximately 50% of women affected by PCOS are overweight or obese, and usually the obesity is characterized by a central distribution [7].

There are few published studies of the influence of diet on PCOS. Investigated the difference in lipid content of the diet between women with PCOS and a control group of eumenorrheic women of similar age, as well as other lifestyle habits. Women with PCOS were heavier than controls, had a diet characterized by more saturated fat and less fiber, and were more sedentary. They did not find any difference in alcohol consumption and smoking habits, which is consistent with other observations [8]. Psychological stress has been associated with PCOS in a few studies and some studies showed that women with PCOS had higher scores on the Life Events Inventory questionnaire and had higher numbers of major life events. They also demonstrated that women with PCOS had higher urinary levels of norepinephrine metabolites, which is a reflection of norepinephrine turnover and, according to the authors, a surrogate of psychological stress [9].

PCOD & life style changes

Change in lifestyle is an important management choice for overweight women with PCOS; this includes dietary energy restriction and exercise in an attempt to restore ovulation and reproductive functions.

Exercise and its impact on polycystic ovarian syndrome

Weight reduction may lead to a decrease in glucose intolerance which in turn may lead to improvement in reproductive and metabolic derangements in PCOS. Exercise training has shown significant improvement in irregularity of menstrual cycles and ovulation in about 50% women diagnosed with PCOS which improves body composition. Further weight loss may reduce pulse amplitude of luteinizing hormone (LH) in turn reducing androgen production. The key factor responsible for these effects is the reduction of hyperinsulinemia and IR [10].

Exercise has shown to modulate insulin sensitivity and lipid metabolism in skeletal muscle. Exercise improves insulin sensitivity by increasing intramyocellular triacylglycerol concentration. Improvement in insulin sensitivity could be due to more efficient lipid turnover resulting in increased muscle lipid uptake, transport, utilization, and oxidation. The literature states the efficacy of exercise training in combating metabolic syndrome in PCOS patients by markingimprovements in apolipoprotein, adiponectin in the process of lipid turnover, and uptake in skeletal muscles. Endurance exercise also increases capillary density, mitochondrial density, number, hyperplasia of musclefibers, neural sensitization, motor learning, and adaptations there by increasing exercise capacity and reducing exercise intolerance in PCOS individual. Improved blood flow to skeletal muscles, mitochondrial proliferation, and sensitivity to activity enhance the stability of essential protein involved in insulin signal transduction in PCOS patients.

Promoting Healthy Weight Loss

- Exercise regularly. Aim for at least 30 min of physical activity per day such as walking, hiking, fitness classes, participating in sports, or gardening.
- Cutting about 300-500 calories from your day by eating less and burning calories through exercise may help you to lose about one pound per week.

Nutrition Goals for Improving PCOS

- Eat a diet rich in fruits, vegetables, whole grains, low-fat dairy, and beans.
- Eat protein-containing foods such as lean meats, poultry, and eggs, with meals and snacks to add fullness and help manage blood sugar levels.
- Select foods high in omega-3 fatty acids. Examples include fatty fish (salmon, mackerel, herring, sardines, and albacore tuna), seeds (flax seeds, chia seeds), oils (canola, olive, peanut) and nuts (walnuts).
- Limit simple sugars and refined carbohydrates such as white breads, pasta, rice, and sugar in beverages and desserts.
- Avoid mindless eating. Listen to your body's signals to decide when you are truly hungry and when you are satisfied.
- Drink at least 8 glasses of water daily.
- Choose calorie free beverages to limit extra calories.
- Keep a consistent eating schedule and aim to eat at least 3 meals around the same time very day. Skipping meals leads to overeating later.
- Monitor your portions sizes by using measuring cups or following the serving size on the food label.
- Try keeping a food journal to monitor your food choices [11].

MATERIALS & METHODOLOGY

Study design: Prospective observational study

Study site: Department of Obstetrics and Gynaecology, Government general hospital, Guntur.

Study period: 1st September, 2018 to 28th February, 2019 (6 months)

Sample size: Out of 325 subjects, randomization was done and 190 subjects were included in our study based on study criteria.

Materials: Data collection form, prescriptions, case records, patient information leaflets.

Inclusion criteria

- Females with more than 14yrs of age and those who attained the age of menarche

- Females diagnosed with PCOS.
- Subjects who are concerned to participate in the study and willing to give informed consent.
- Those who can understand local language

Exclusion criteria

- Women with other menstrual irregularities like fibroids, Abnormal Uterine Bleeding (AUB), Pelvic Inflammatory Diseases (PID)
- Women with other co-morbidities like CVS problems, Hypertension (HTN), Diabetes Mellitus (DM) and any other respiratory problems.
- Those who are < 14 years of age.
- Those who cannot understand local language.
- Those who are not willing to participate in the study.

Procedure: The methodology of our study done under different phases

Phase-1

1. Under phase-1 identification of scope of work was done before the initiation of the study, after that literature review was collected and analyzed.
2. Protocol was prepared which contains complete information about the study inclusion criteria, exclusion criteria, sampling technique, study site, study period, statistical methods etc.
3. Data collection form was prepared based on the data required for the study. Patient consent form was prepared in two languages Telugu and English.
4. Patient information leaf lets about PCOS was prepared for to create awareness and educate the subjects.
5. Protocol, data collection form, patient consent form, perceived stress scale and leaf lets were evaluated.
6. Ethical committee approval was obtained from ethical committee of Guntur General Hospital (GGH), Guntur, AP, India.

Phase-2

1. Under phase-2, selection of subjects based on inclusion and exclusion criteria of the study. Before administration of data collection form to subjects, informed consent was taken from subjects and their informants.
2. Subject's socio-demographic details like age, BMI, menstrual history, marital status, obstetric history, present and past medical history and medication history were collected using evaluated data collection form and provide counselling about life style and dietary habits.

Phase-3

Under phase-3, three follow ups of subject were done

1. First follow up was done at end of the 2nd month of study, collected the details about dietary and life style changes and symptoms improvement of PCOS.
2. Second follow up done at end of the 4th month of the study collected the details about dietary and life style changes and symptoms improvement of PCOS.

3. Final follow up was done at the end of the study collected the details about dietary and life style changes and symptoms improvement of PCOS.

At the end of the study all the data obtained was analyzed by using statistical method chi-square, mean, standard deviation of the data was calculated and reported.

RESULTS AND DISCUSSION

The results of present study include demographic distribution of patients, distribution of subjects based on risk factors, subject's distribution according to sign and symptoms, role of clinical pharmacist in life style modifications and disease outcome. Statistical analysis was also done and proved the influence of clinical pharmacist role on disease outcome and to reduce risk factors.
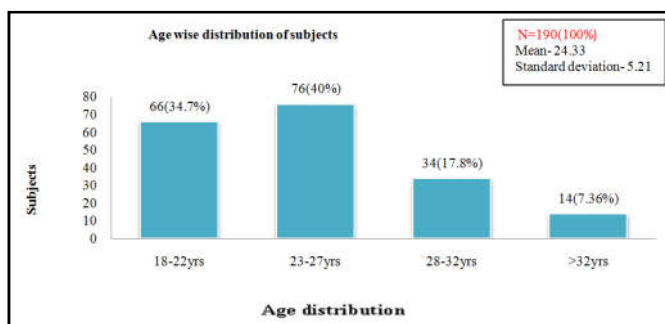

Fig 1 Age wise distribution of subjects

Above figure shows that most of the sample falls in to the age group between 23-27 yrs with the number of 76 subjects, followed by the age group between 18-22 yrs with the number of 66 subjects, and then the age group between 28-32 includes 34 subjects and 14 subjects in >32 age group, the mean age of subjects was 24.33 (fig 1).
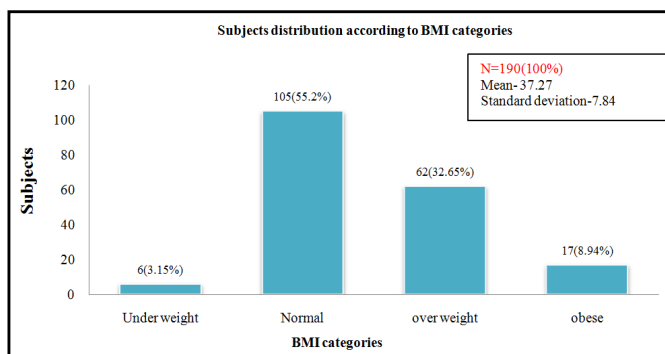

Fig 2 Subjects distribution according to BMI categories

Above figure shows that 105 subjects falls under normal BIM category, 62 subjects in over weight category, 17 subjects falls under obese category and only 6 subjects in underweight category, most of the subjects 105(55.2%) fell under normal weight category and mean BMI was 37.27**.**
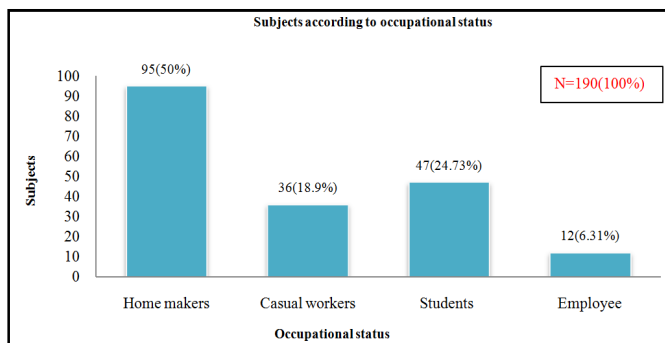
Fig 3 Subjects according to occupational status

Above figure shows that 95 subjects were homemakers, 47 subjects were students, 36 subjects falls under casual workers and employed subjects were 12, out of 190 sample half of the subjects were homemakers 95(50%).
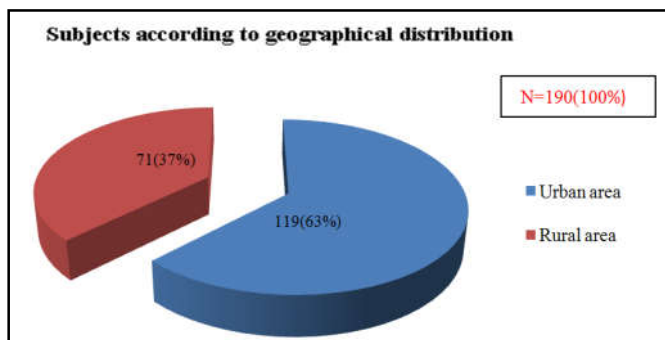

Fig 4 Subjects according to geographical distribution

From the above figure 4; shows that 119 subjects from urban area and 71 subjects from rural area, it states that most of the subjects (63%) from urban area.

Table 1 Menstrual characteristics of the subjects

Menstrual characteristics	No of subjects
Age of menarche	
(a)11yrs	25(13.15%)
(b)12yrs	50(26.31%)
(c) 13yrs	78(41.05%)
(d) 14yrs	25(13.15%)
(e) 15yrs	9(4.73%)
(f) 16yrs	3(1.57%)
Length of menstrual cycle	
(a) 25-28days	40(21.05%)
(b) 29-32days	110(57.89%)
(c) 33-36 days	17(8.94%)
(d) >36days	23(12.10%)
No of days bleed during menstruation	83(43.26%)
(a) 3-4days	86(45.26%)
(b) 5-6 days	10(5.26%)
(c) 7-8days	11(5.78%)
(d) >8days	
Menstrual flow	
(a) light	14(7.36%)
(b) moderate	123(64.73%)
(c) heavy	53(27.89%)
Pain and cramping	
(a) not at all	48(25.26%)
(b) slight	92(48.42%)
(c) great deal	50(26.31%)

From the above table-1; most of the subjects attained their menarche at the age of 13yrs and the mean age of menarche of the subjects is 12.43, 110 subjects have length of menarche 29-32days and the mean length of menstrual cycle is 32.01, 86 patient experienced 5-6days of bleeding during menstruation and no of days bleeding during menstruation mean is 5.01,

majority of subjects 123(64.73%) experienced moderate menstrual flow, heavy 53 subjects and light flow 14 subjects , 92 complaining of slight pain and cramping and 50 of great deal.

Table 2 promoting factor (risk factors) distribution of subjects

Parameters	Yes	No
Smoking	1(0.52%)	189(99.47%)
Alcohol	5(2.63%)	185(97.36%)
Stress	100(52.62%)	90(47.36%)
Family H/O PCOS	68(35.7%)	122(64.21%)
Obesity	76(40%)	114(60%)
Other diseases		
1. Thyroid	31(16.3%)	159(83.68%)
2. ovarian cyst	7(3.68%)	183(96.3%)
3. fibroids	---	---
4. AUB	---	---
5. uterine prolapsed	---	---
6. PID	---	---

From the above table-2; only 1 smoker and 5 alcoholic subjects, 100(52.62%) subjects complaining about stress which is more than the half of the population of subjects. 68 subjects have the positive family history of PCOS, 76 subjects were obese and 31 subjects have thyroid (hyper and hypothyroid) and only 7 suffering from ovarian cyst. Finally the risk factors like stress, family history and obesity shows the positive association for promoting PCOS.

Table 3 Subjects distribution according to sing and symptoms of PCOS

Signs and symptoms of PCOS	Before treatment and Counselling		After treatment and Counselling
	yes	no	Reduction rate
Irregular bleeding	163(85.7%)	27(6.31%)	92(48.42%)
Hirsutism	91(47.81%)	99(52.10%)	39
Acanthosis nigricans	5(2.63%)	185(97.36%)	Controlled for 2 subjects
Weight gain/reduction	109(57.36%) (gain after Dx)	81(42.63%)	49(25.78%) reduce after Tx and counselling

From the table-3; it shows that 163 complaining of irregular bleeding, 91 subjects with hirsutism and only 5 complaining of Acanthosis, 109 complaining of weight gain after diagnosed with PCOS. After treatment and counseling out of 163 subjects 92 subjects have regular menstrual bleeding, both hirsutism and Acanthosis were controlled and finally due to exercise counseling, out of 109 subjects 49 reduced weight its show that positive effect of counseling on weight reduction and for regular menstruation.
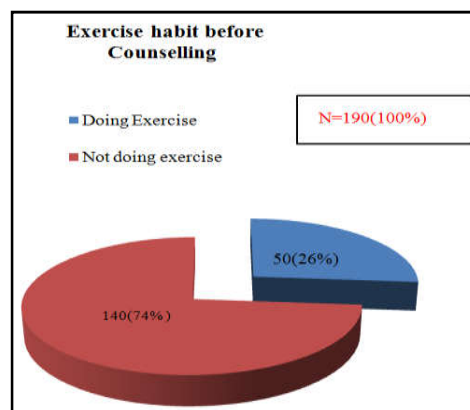

Fig 6 Exercise habit before counseling

From the above figure 5; shows that before counseling most of subjects 140 were not doing exercise in figure 6; after counseling by clinical pharmacist 0ut of 140 subjects 88 were doing exercise and their menstrual characteristics were regular, which show the positive impact of exercise on disease reduction.

Table 4 Dietary habits of the subjects before and after counseling

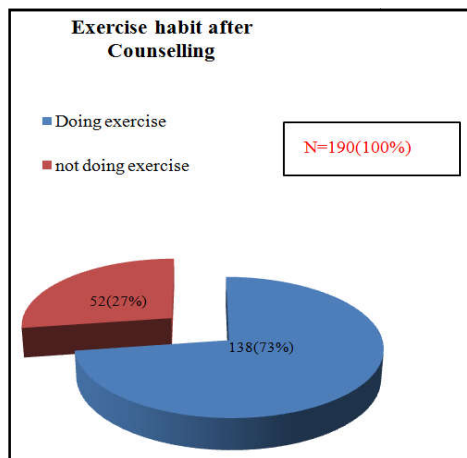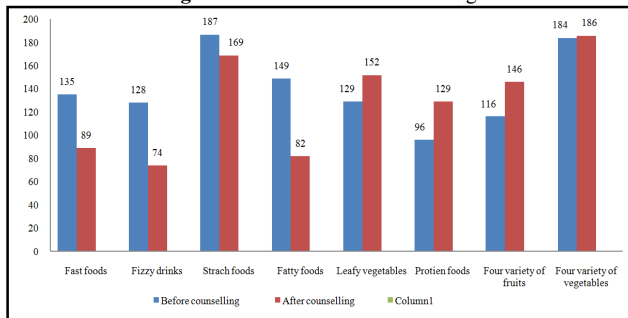| Dietary habits	Before counselling	After counselling
Fast foods	135	Reduced to 89
Fizzy drinks	128	Reduced to 74
Starch foods	187	Reduced to 169
Fatty foods	149	Reduced to 82
Leafy vegetables	129	Increased to 152
Proteins	96	Increased to 129
Four varieties of fruits	116	Increased to 146
Four varieties of vegetables	184	Increased to 186

Fig 7 Exercise habit after counseling

Fig 8 Dietary habits of the subjects before and after counseling

Above figure shows that dietary habits of the subjects before and after counselling, before counselling subjects taken more amount of fast foods, fizzy drinks, starch food and fatty foods. After counselling by clinical pharmacist the dietary habit of the subjects changed they consumed smaller amount of these foods. Before counselling subjects taken smaller amount of leafy vegetables, proteins, at least of four varieties of fruits and vegetables but after counselling by clinical pharmacist subjects taken moderate to high amount of these foods.

Table 5 Exercise, dietary habits and symptoms improvement of the subjects before and after counseling

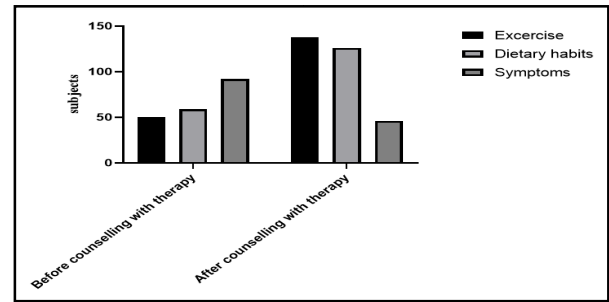| Counselling	Doing Exercise	Proper Dietary habits	Symptomatic reduction
Before counselling	50	84	92
After counselling	138	101	46

Fig 9 Exercise, dietary habits and symptoms improvement of the subjects before and after counseling

Above figure shows that exercise habits, dietary habits and symptoms improvement of the subjects before and after counselling. After counselling by clinical pharmacist the dietary pattern of the subjects changed, number of subjects doing exercise increased and symptoms were improved these shows the positive effect of counselling on diseases outcome.

Table 6 Calculation of chi-square test by using graph pad prism to determine the association between exercise and disease outcomes (by symptoms improvement)

Table Analyzed	Data 2		
P value and statistical significance			
Test	Chi-square		
Chi-square, df	51.98, 1		
z	7.209		
P value	<0.0001		
P value summary	****		
One- or two-sided	Two-sided		
Statistically significant (P < 0.05)?	Yes		
Data analyzed	Exercise	Symptoms	Total
Before counselling with therapy	50	92	142
After counselling with therapy	138	46	184
Total	188	138	326
Percentage of row total	Exercise	Symptoms	
Before counselling with therapy	35.21%	64.79%	
After counselling with therapy	75.00%	25.00%	
Percentage of column total	Exercise	Symptoms	
Before counselling with therapy	26.60%	66.67%	
After counselling with therapy	73.40%	33.33%	
Percentage of grand total	Exercise	Symptoms	
Before counselling with therapy	15.34%	28.22%	
After counselling with therapy	42.33%	14.11%	

From the above table-6; it shows that exercise impact on disease outcome, by calculating the chi-square test which gives the significance value P <0.0001****. This shows positive impact of exercise on disease outcome (table from graph pad prism).

Table 7 Calculation of chi-square test by using graph pad prism to determine the association between dietary habits and disease outcomes (by symptoms improvement)

Table Analyzed	Data 2		
P value and statistical significance			
Test	Chi-square		
Chi-square, df	14.41, 1		
z	3.796		
P value	0.0001		
P value summary	***		
One- or two-sided	Two-sided		
Statistically significant (P < 0.05)?	Yes		
Data analyzed	Symptoms	Dietary habits	Total
Before counselling with therapy	92	84	176
After counselling with therapy	46	101	147
Total	138	185	323
Percentage of row total	Symptoms	Dietary habits	
Before counselling with therapy	52.27%	47.73%	
After counselling with therapy	31.29%	68.71%	
Percentage of column total	Symptoms	Dietary habits	
Before counselling with therapy	66.67%	45.41%	
After counselling with therapy	33.33%	54.59%	
Percentage of grand total	Symptoms	Dietary habits	
Before counselling with therapy	28.48%	26.01%	
After counselling with therapy	14.24%	31.27%	

From the above table-7; it shows that dietary habits impact on disease outcome, by calculating the chi-square test which gives the significance value P <0.0001***. This shows positive impact of dietary modifications on disease outcome by symptomatic improvement (table from graph pad prism).

CONCLUSION

Based on the findings of our prospective observational study we finally conclude that major risk factor for PCOS were stress, family history and obesity. Most of the risk factors were modifiable so, in the present study proper counselling by clinical pharmacist shows the great impact to reduce risk factors for PCOS. Proper lifestyle modifications by clinical pharmacist counselling show the impact on disease reduction of PCOS subjects. Finally life style changes through counselling shows positive impact on PCOS outcomes and risk factor reduction.

Acknowledgement

References

1. F Sohrabvand, M Shariat, F Haghollahi, B Bagheri. 2009. Effect of Metformin on Miscarriage in Pregnant Patients with Polycystic Ovary Syndrome.West Indian Med J., 58 (5): 433.
2. Gerry Wonggokusuma. CDK-2014. The Pathophysiology and Treatment of Polycystic Ovarian Syndrome: A Systematic Review., 41(6):no. 2.
3. Booklet on Hirsutism and Polycystic Ovary Syndrome (PCOS). 2016. American Society For Reproductive Medicine., 55(5):44.
4. Rotterdam EA-SPCWG. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. Fertil Steril., 81,(1):19-25.
5. Baillargeon JP, Carpentier A. 2005. Determination of insulin sensitivity in brothers of women with polycystic ovary syndrome-preliminary result. Program and Abstracts of the 87th Annual Scientific Meeting of The Endocrine Society., 17(5):55-67.
6. Kahsar-Miller MD, Nixon C, Boots LR, Go RC, Azziz R. 2001. Prevalence of polycystic ovary syndrome (PCOS) in first degree relatives of patients with PCOS. Fertil Steril., 75:53-58.
7. Marie-France Hivert and Jean-Patrice Baillargeon. 2007. Environmental Factors in the Polycystic Ovary Syndrome, Contemporary Endocrinology: Androgen Excess Disorders in Women: Polycystic Ovary Syndrome and Other Disorders., 55(7):466.
8. Morotti E, Battaglia B, Fabbri R, Paradisi R, Venturoli S, Battaglia C. 2014. Cigarette smoking and cardiovascular risk in young women with polycystic ovary syndrome. *Int J Fertil Steril.*, 7(4):301-312.
9. Joo Yeon Lee *et al*. 2010. Role of Oxidative Stress in Polycystic Ovary Syndrome. Current Women's Health Reviews., 6, 96-107.
10. Shetty D, Chandrasekaran B, Singh AW, Oliverraj J. 2017. Exercise in polycystic ovarian syndrome: An evidence-based review. Saudi J Sports Med., 17:123-8.
11. PCOS Nutrition Center. Grassi, Angela. Web. 22 Oct 2014; 55:226.http://www.pcosnutri.com.
12. Ibanez L, Ong K, de Zegher F, Marcos MV, del Rio L, Dunger DB. 2003. Fat distribution in non-obese girls with and without precocious pubarche: central adiposity related to insulinaemia and androgenaemia from prepuberty to postmenarche. Clin Endocrinol (Oxf)., 58:372-379.
13. Franks S. 2003. Polycystic ovary syndrome in adolescents. *International Journal of Obesity.*, 32(7):1035-41.
14. Gulam Saidunnisa Begum *et al*. 2017. Assessment of Risk Factors for development of Polycystic Ovarian Syndrome . *IJCMR.*, 4 , 1: 555.
15. Pothiraj Pitchai1 *et al*. 2016. Awareness of lifestyle modification in females diagnosed with polycystic ovarian syndrome in India: explorative study. *Int J Reprod Contracept Obstet Gynecol.*, 5(2):470-476.
16. Mohini Paliwal *et al*. 2016. Diet And Nutrition Management In Polycystic Ovary Syndrom. E-Issn 2320 -7876 www.ijfans.com., 5, 3.
17. Lisa J Moran *et al*. 2006. Effects of lifestyle modification in polycystic ovarian syndrome. Reproductive BioMedicine Online., 12(5): 569-578.
18. Somaya Ouda Abd Elmenim1& Afaf Mohamed Mohamed Emam. 2016. Effect of Lifestyle Changes on Symptoms of Polycystic Ovarian Syndrome in Obese. IOSR-JNHS., 5(3): 01-10.

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