

Study on the Etiological Factors of Female Infertility and To Evaluate the Effect of Pharmacist-Led Patient Counseling In Improving Pregnancy Rate among Infertile Patients

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ABSTRACT

AIM: The aim of this Study is to study the etiological factors of female infertility and to evaluate the effect of pharmacist--led patient counselling in improving pregnancy rate & medication adherence among infertile patients.

METHODOLOGY: Participants were randomly assigned to either the 'pharmacist-led intervention' or 'usual care' group. In addition to the usual care, the intervention group also received the pharmacist-led intervention involving a single face-to-face counselling and education with patient information leaflet. The Morisky Medication Adherence Scale –8 (MMAS-8) score was used to measure the adherence to medication.

RESULT: Of 142 cases of infertility, etiological factors like PCOS (66.2%), Irregular menstrual cycle (60.6%), overweight (46.5%) were more prominent. Counselling regarding lifestyle changes appears to improve etiological factors and pregnancy rate in infertile women. Patient education on medication adherence provided by pharmacist resulted in increasing medication adherence at the end of the study.

CONCLUSION: This study makes important contributions to knowledge the etiological factors associated with infertility. On the basis the results, counselling is beneficial for infertile patients, but more effective studies are needed.

Key words: Infertility; Etiological factor; Medication adherence; Patient counselling; MMAS-8

I.INTRODUCTION

Infertility (clinical definition): a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse.

(ICMART and WHO revised glossary of ART terminology, 2009*)^[1].

Infertility is a special reproductive health defect that is different from other diseases. It is not life threatening, but the detrimental influence of infertility to patients, their families and the whole society should not be underestimated^[2].

Abnormal menstrual cycle patterns are expected to be an important predictor of reduced fertility.

Menstrual cycle patterns were related to a reduced conception rate and to survival of the pregnancy indicate that the mechanisms probably are female functional disturbances in ovulation, conception, implantation, or sustained pregnancy, linked with abnormal menstrual cycle patterns. Thus, identification of medical and environmental causes of abnormal menstrual cycle patterns may provide clues to the causes of infertility³

I.1POLYCYSTIC OVARIAN SYNDROME

Polycystic ovarian syndrome is a common hormonal disorder affecting an increasing number of women and it is also known as 'polycystic ovary disease', 'Steineventhalsyndrome' or 'hyperandrogen anovulation syndrome. PCOS is characterized by increased androgens (male hormones), such as testosterone as shown by excess hair growth, acne or raised blood testosterone levels, lack of regular ovulation (irregular menstrual periods) or failure to release an egg from the ovary. In PCOS follicles in ovary stop growing at about halfway to maturity and ovulation does not proceed. The follicles become cysts, which are usually less than 1 cm and are arranged around the ovary, just below the surface. On an ultrasound, the diagnosis of polycystic ovaries is confirmed if there are more than 12 follicles visible on one ovary. Women with PCOS

may have reduced fertility due to the associated endocrine and gynecologic abnormalities that impact ovarian quality and function.

1.2 TUBAL FACTORS

Tubal factors, as well as factors affecting the peritoneum (lining of the pelvis and abdomen), account for about 35% of all infertility problems. The fallopian tube is the passage way for the egg to enter the uterus. Tubal factor infertility is mainly caused by sexually transmitted infections, abdominal surgery or diseases such as endometriosis. Pelvic inflammatory disease (PID) can also cause the inner lining of the tubes to become permanently scarred.

1.3 ENDOMETRIOSIS

Endometriosis is a complex disease defined by the presence of endometrial glands and stroma outside the uterine cavity, and can manifest as peritoneal or visceral lesions, adhesions, fibrosis, endometrioses or any combination of the above. Endometriosis has been associated with infertility; several mechanisms have been proposed for the association of endometriosis and infertility however, the exact cause of infertility is not definitively known^[9].

1.4 THYROID DISORDERS

Thyroid disorders refer to a group of disorders that cause deregulated functioning of the thyroid gland, resulting in the overproduction (hyperthyroidism) or underproduction (hypothyroidism) of thyroid hormones. Thyroid dysfunction can affect fertility in various ways resulting in anovulatory cycles, luteal phase defect, high prolactin (PRL) levels, and sex hormone imbalances. Therefore, normal thyroid function is necessary for fertility, pregnancy, and to sustain a healthy pregnancy, even in the earliest days after conception.

1.5 AGE OF FEMALE

Women are born with all the eggs that they will ever have in their ovaries, unlike men who continue to produce sperm their entire lives. Even though they have over a million eggs in their ovaries at birth, only about 300,000 eggs left by the time they reach puberty. Of the eggs remaining at puberty, only about 300 will be ovulated during entire reproductive years and the rest will undergo atresia^[11]. Fertility begins to decline significantly in mid 30s and accelerates in late 30s, Some women even begin to experience a decline in their fertility in their late 20s and early 30s.

1.6 CONTRACEPTIVE USE

Wide ranges of effective and safe reversible modern contraceptives are available in

the contemporary world. Despite the advancement in contraceptive technologies and organized international effort over the last few decades; the concern of women who use reversible contraception related to time to return of fertility still remained un answered It is also important to know the effect of contraception use on the subsequent fertility. Delay of fertility after termination of contraception remains a big concern for women who are using contraception^[4].

1.7 OBESITY

Obesity, which is an important health issue, is a common problem among women of reproductive age. Obesity and overweight involve an abnormal and excessive fat accumulation that negatively affects the health of the body. Obesity causes infertility through various pathways, including impaired ovarian follicular development, qualitative and quantitative development of the oocyte, fertilization, embryo development, and implantation^[10]

Because of the huge impact of infertility on human reproductive health, such risk factors have attracted much concern^[27]

1.8 INFERTILITY COUNSELLING

Women with infertility are a population challenged by physical, psychological, emotional, and financial demands which accompany treatment, and some women report incorrect fertility medication-taking. The current study aimed to determine the rates of medication adherence in women undergoing Infertility treatment. The management of infertility may require lifestyle modifications and drug therapy for a long period. Patient understanding regarding the condition plays a very important role in management of infertility. Effective patient counselling makes the patient understand his/her status, necessary lifestyle modifications and pharmacotherapy in a better way and thus enhance patient compliance. The aims of counselling are to understand and resolve issues arising from infertility and infertility treatment and to clarify ways of dealing with the problem more effectively.

1.9 MEDICATION ADHERENCE

Adherence can be defined as “the extent to which a person’s behaviour (i.e., taking medication, following a diet, and/or executing lifestyle changes) corresponds with the agreed recommendations from a health care provider”. With respect to Infertility treatment, adherence is referred to the continuation of treatment cycles

including medication adherence recommended by the infertility provider until pregnancy is attained or there are provider suggestions to discontinue the treatment⁸.

Medication adherence has 3 distinct components including initiation, implementation, and discontinuation. Initiation is when a patient receives the first dose of a prescribed medication. when a patient receives the first dose of a prescribed medication. Furthermore, Implementation refers to the degree to which the patient's actual medication usage corresponds to the prescribed medication regimen. Finally, discontinuation occurs when the next scheduled dose is omitted and no more medication is taken after this point. Thus, non-adherence occurs with late or no initiation of the prescribed medication, suboptimal implementation of the prescribed regimen, or early discontinuation^[8].

I.9.1 METHODS TO MEASURE ADHERENCE

Various methods have been reported and are in use to measure adherence. The methods available for measuring adherence can be broken down into direct and indirect methods of measurement.

Direct methods include direct observed therapy, measurement of the level of a drug or its metabolite in blood or urine and detection or measurement of a biological marker added to the drug formulation, in the blood^[13]

Indirect methods include patient questionnaires, patient self-reports, pill counts, rates of prescription refills, assessment of patient's clinical response, electronic medication monitors, measurement of physiologic markers, as well as patient diaries.

MORISKY MEDICATION ADHERENCE SCALE

One of the most commonly used questionnaires to assess medication adherence is the Morisky Medication Adherence Scale. The Morisky Medication Adherence Scale, otherwise known as the Morisky Scale (MMAS-8), has proved to be a valuable resource to address adherence concerns, such as forgetting to take medications or discontinuing medications without guidance. If a patient scores higher on the scale, they are evaluated as more adherent. If they score lower on the scale, they are presumed to be struggling with nonadherence. By understanding how the patient scored on the scale, clinicians and health organizations can identify underlying issues that prevent patients from taking their medications correctly, if at all^[54]

The tool uses a series of short behavioral questions geared in such a way to avoid "yes-saying" bias commonly seen with chronic care patients. More specifically, the wording of the questions is rearranged to prevent answers that tend to follow certain behavioral patterns. This allows the patient to respond to questions about non-adherence in a spirit of full disclosure for the clinician.

Items 1 through 7 have response choices "yes" or "no" whereas item 8 has 5-point Likert response choices. Each "no" response is rated as "1" and each "yes" is rated as "0" except for item 5, in which each response "yes" is rated as "1" and each "no" is rated as "0". For item 8, if a patient chooses response "0", the score is "1" and if they choose response "4", the score is "0". Responses "1, 2, 3" are respectively rated as "0.25, 0.75, 0.75". Total MMAS-8 scores can range from 0 to 8 and have been categorized into three levels of adherence: high adherence (score = 8), medium adherence (score of 6 to < 8), and low adherence (score < 6)^[53]

II. MATERIALS AND METHODS

II.a STUDY DURATION

The study was carried out between October 2020 to October 2021

II.b STUDY DESIGN

A prospective observational study

II.c SAMPLE SIZE

About 142 patients; Group 1=72 & Group 2= 70

II.d STUDY SITE

This study was conducted at Department of Gynecology, Valluvanad Hospital, Ottapalam, Kerala. The study was approved by the Institutional Ethics Committee of Nehru College of Pharmacy, Pampady. Approval number: IEC/NOV/20/009

II.e STUDY POPULATION

In total 150 patients were screened; 142 patients were included in this study as per the inclusion exclusion criteria. And they were divided into 2 groups: group 1 include 72 patients and group 2 include 70 patients.

II.f STUDY MATERIALS

Informed Consent

Data Collection Form

MMAS-8 Questionnaire

Patient information leaflets

II.g INCLUSION CRITERIA

- Non menopausal women
- Age between 18 – 49
- At least one year of infertility

II.h EXCLUSION CRITERIA

- Unmarried women
- Post-menopausal women
- Mentally retarded patients
- Women with less than one-year time from their pregnancy willingness
- Women taking any other alternative system medicine or treatment.

II.METHODOLOGY

More than 150 participants were screened, of whom 146 gave consent for further study. Of these 145 patients passed all the eligibility criteria. Following informed consents and collection of baseline measurements, participants were randomly assigned to either the ‘pharmacist-led intervention’ or ‘usual care’ group. In addition to the usual care, the intervention group also received the pharmacist-led intervention involving a single face-to-face counseling (30-min session) and education with patient information leaflet. The Morisky Medication Adherence Scale –8 (MMAS-8) score was used to measure the adherence to medication. The counseling component focused on life style modification in improving risk factors, personal barriers to taking medication and is aimed at helping participants understand their medication-taking behaviors while addressing the actions needed to maintain a high level of adherence. Re-assessment of the etiological causes of infertility and the medication adherence were done at the time of follow-up.

DATA COLLECTION: Demographic details of subjects were collected by data collection forms during their visit at OP department. From patients the information related to Age, BMI, infertility history, PCOS, Hirsutism, Thyroid, Menstrual cycle, has been documented through questioning. General examination has been done by physician as part of routine checkup. The ovulation was evaluated using ultrasonography and also the openness of tubes was examined using X-ray of uterus and fallopian tubes.

II.J PLAN OF THE STUDY

III.STATISTICAL ANALYSIS

Data was entered in Microsoft Excel. Frequency and percentages of study parameters were calculated by using descriptive statistics. The obtained data was analyzed by using SPSS software. Paired t-test and chi square test was performed to find out the effectiveness of intervention. For all statistical analysis, p<0.05 was considered statistically significant.

IV.RESULT

Infertility is defined as a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12months or more of regular unprotected sexual intercourse. This was a prospective study was including 142 infertile women visited to Gynecological department of Valluvanad Hospital, Ottapalam. The aim was to Study the etiological factors of female infertility and to evaluate the effect pharmacist--led patient counseling in improving pregnancy rate& medication adherence among infertile patients.

More than 150 participants were screened, of whom 146 gave consent for further study. Of these 145 patients passed all the eligibility criteria. Participating patients had at least one year of infertility, with duration of at least 12 months of marriage. Follow-up was completed for 142 cases.

IV.1aETIOLOGICAL FACTOR: AGE OF FEMALE

Of 142 cases of infertility, the females were 18 to 49 years of age, with 4 patients (2.81%) over 35 years of age in this study population, 65 patients (45.77%) were females under 25 years of age and 73 patients (51.40%) were between 26-35 years of age.

Table: 1 Distribution Based on Age Group

AGE GROUP	NO: SUBJECTS (N=142)	PERCENTAGE (%)
<25	65	45.8 %
26-35	73	51.4 %
>35	4	2.8 %

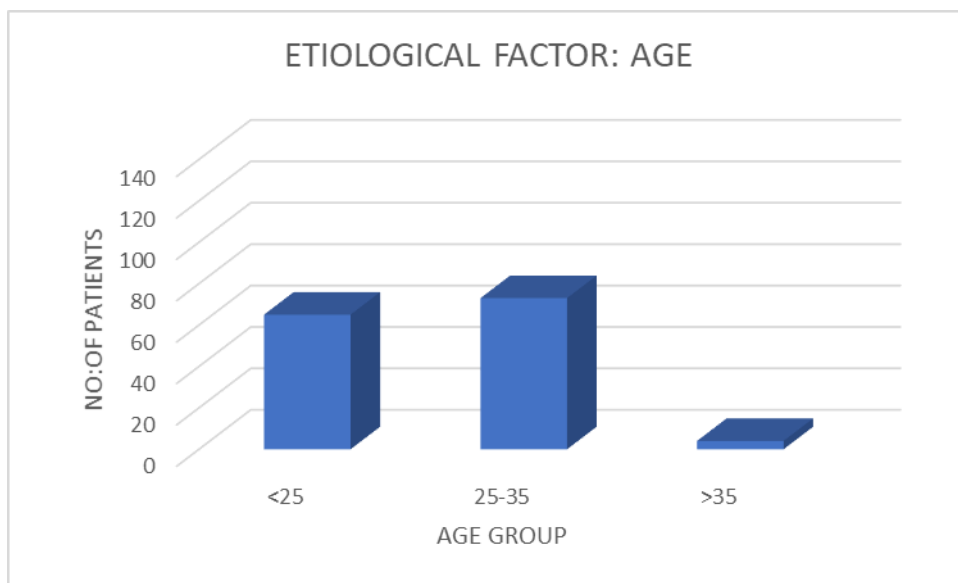


Fig:1 Distribution Based on Age Group

IV.1b.ETIOLOGICAL FACTOR: BMI

The median BMI was 25 kg/m². A BMI range between 18 - 25 kg/m² was taken as normal weight. Below 18 kg/m² was considered as underweight, 25 - 30 kg/m² was considered as

overweight and above 30 was considered as obese. A BMI below 18 kg/m² was found in 29 (20.42%) women, BMI 18-25 kg/m² in 35 (24.64%) women, BMI 25 – 30 kg/m² in 66 (46.47%) women and >30 in 12 (5.5%) women.

Table 2: Distributions Based On BMI

BMI GROUP	NO: OF SUBJECTS(N=142)	PERCENTAGE (%)
UNDERWEIGHT	29	20.4 %
NORMALWEIGHT	35	24.6 %
OVERWEIGHT	66	46.5 %
OBESITY	12	5.5 %

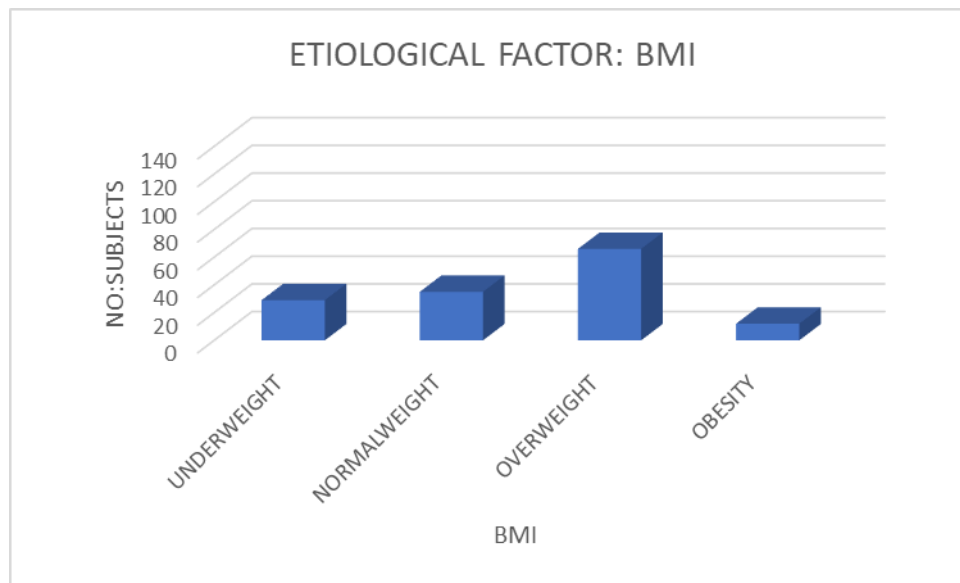


Fig: 2 Distributions Based On BMI

IV.1c.ETIOLOGICAL FACTOR: MENSTRUAL CYCLE

Menstrual cycles were evaluated in all subjects in which 86 patients suffered from irregular menstruation (60.56%) of the total and the

FACTOR:

remaining 56(39.43%) patients were found to have normal menstrual cycles. This result suggests a positive relationship of irregular menstrual cycles with infertility as many of the patients are having irregular menstrual cycles (TABLE 3, FIGURE 3)

Table3: Distribution Based on Etiological Factors: Irregular menstrual cycle

ETIOLOGICAL FACTOR	NO: SUBJECTS (N=142)	PERCENTAGE (%)
IRREGULAR CYCLE	86	60.6 %
REGULAR CYCLE	56	39.43 %

IV.1d.ETIOLOGICAL FACTOR: HISTORY OF CONTRACEPTION

In the 142 enrolled patients, 106 patients were not having history of contraception (74.64%) and only

HISTORY

small proportion of subjects were having a history of contraception compared to total population and all of them had discontinued contraception before 12 months (TABLE 4) & (FIGURE 3).

Table4; Distribution Based on Etiological Factors: H/O Contraception

ETIOLOGICAL FACTOR	NO: SUBJECTS (N=142)	PERCENTAGE (%)
H/O CONTRACEPTION	36	25.4 %
NO H/O CONTRACEPTION	106	74.64 %

IV.1e.ETIOLOGICAL FACTOR: POLYCYSTIC OVARY SYNDROME

Of the total 142 patients, 94 women were having PCOS (66.2%) of the total population and 48 women were not having PCOS (33.80%) (TABLE 5) & (FIGURE 3)

Table5; Distribution Based on Etiological Factors: PCOS

ETIOLOGICAL FACTOR	NO: SUBJECTS (N=142)	PERCENTAGE (%)
PCOS	94	66.2 %
WITHOUT PCOS	48	33.80 %

IV.1f.ETIOLOGICAL FACTOR: ENDOMETRIOSIS

In the total study population endometriosis was reported by 5(3.5%) women and 137(96.47%) of the total population were not having endometriosis (TABLE 6 & FIGURE 3).

Table6; Distribution Based on Etiological Factors: Endometriosis

ETIOLOGICAL FACTOR	NO: SUBJECTS (N=142)	PERCENTAGE (%)
ENDOMETRIOSIS	5	3.5 %
WITHOUT ENDOMETRIOSIS	137	96.47 %

IV.1g.ETIOLOGICAL FACTOR: THYROID

A total of 35(24.6%) patients were having thyroid abnormalities detected by assessing TSH levels in blood, rest of the study population 107(75.35%) were not having abnormalities in TSH levels (TABLE7& FIGURE 3).

Table7; Distribution Based on Etiological Factors: Thyroid

ETIOLOGICAL FACTOR	NO: SUBJECTS (N=142)	PERCENTAGE (%)
THYROID	35	24.6 %
WITHOUT THYROID	107	75.35 %

IV.1i.ETIOLOGICAL FACTOR: HIRSUTISM

Among the 142 subjects, 16 women with infertility presented with hirsutism (TABLE 8& FIGURE 3). All of these patients were also having PCOS.

Table8; Distribution Based on Etiological Factors: Hirsutism

ETIOLOGICAL FACTOR	NO: SUBJECTS (N=142)	PERCENTAGE (%)
HIRSUTISM	16	11.3 %
WITHOUT HIRSUTISM	126	88.73 %

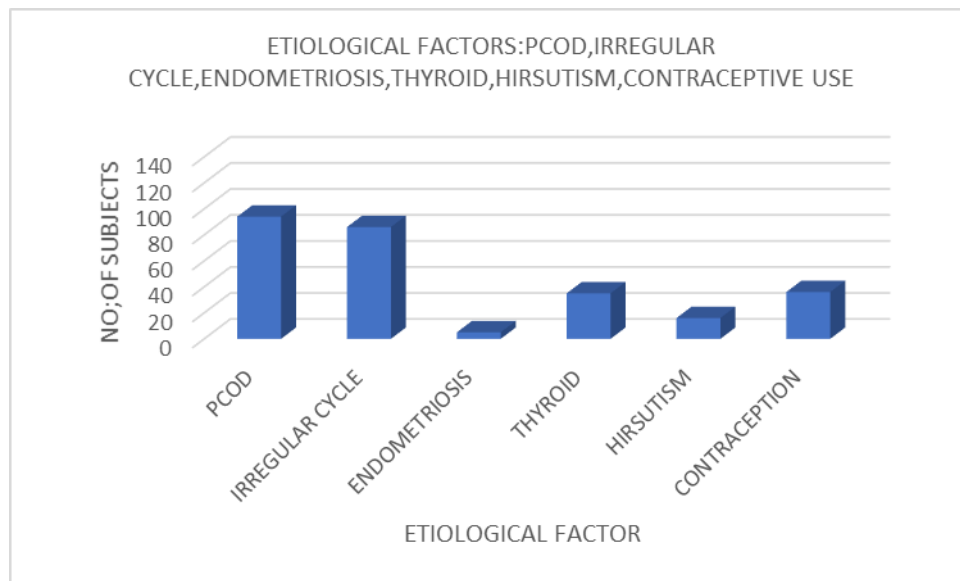


Fig: 3 Distribution Based Etiological Factors

IV.2.EFFECT OF COUNSELLING ON ETIOLOGICAL FACTORS

PCOS was found to be improved (higher) in women in lifestyle intervention vs usual care groups, with (P=0.001). Irregular menstruation was also found to be improved in women in the

interventional group but not significantly different for women in lifestyle intervention vs usual care groups, with a (P=0.130). Moreover, Improvement in BMI was also not significantly different for women in interventional vs usual care groups.

Table:9 Comparison of Intervention and Non-Intervention Group Based on Improvement in Etiological Factors

ETIOLOGICAL FACTOR	IMPROVEMENT	INTERVENTIONAL GROUP{N=72}	NON-INTERVENTIONAL GROUP{N=70}	P VALUE
PCOD	REDUCED FOLLICLE SIZE	41	17	0.001*
IRREGULAR CYCLE	REGULAR CYCLE	36	29	0.168
THYROID	NORMAL TSH	17	6	0.020
HIRSUTISM	REDUCED HAIR GROWTH	4	1	0.106
UNDERWEIGHT	NORMAL WEIGHT	12	9	0.793

OVERWEIGHT	NORMAL WEIGHT	24	18	0.170
OBESE	NORMAL WEIGHT	2	1	0.364

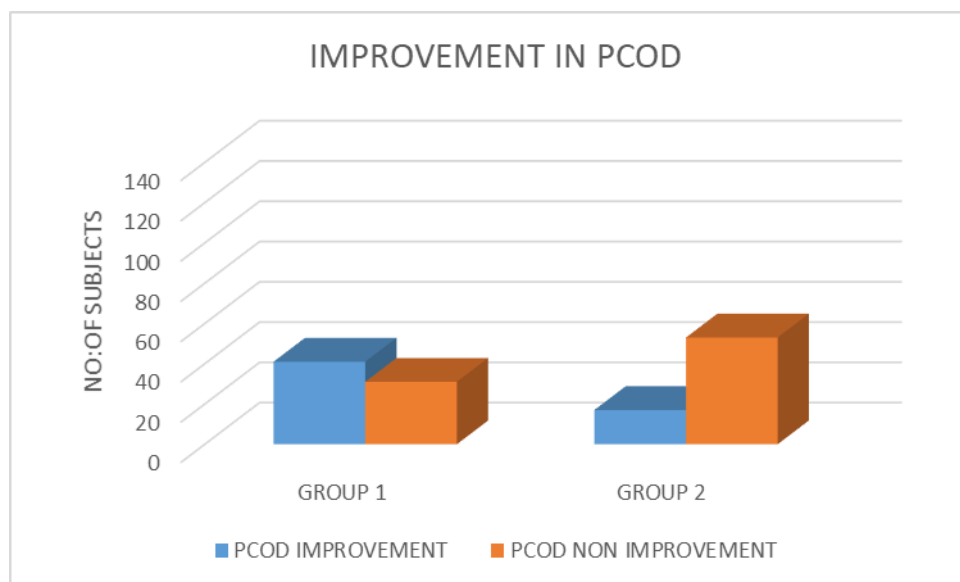


Fig: 4 Comparison of Intervention and Non-Intervention Group: PCOS

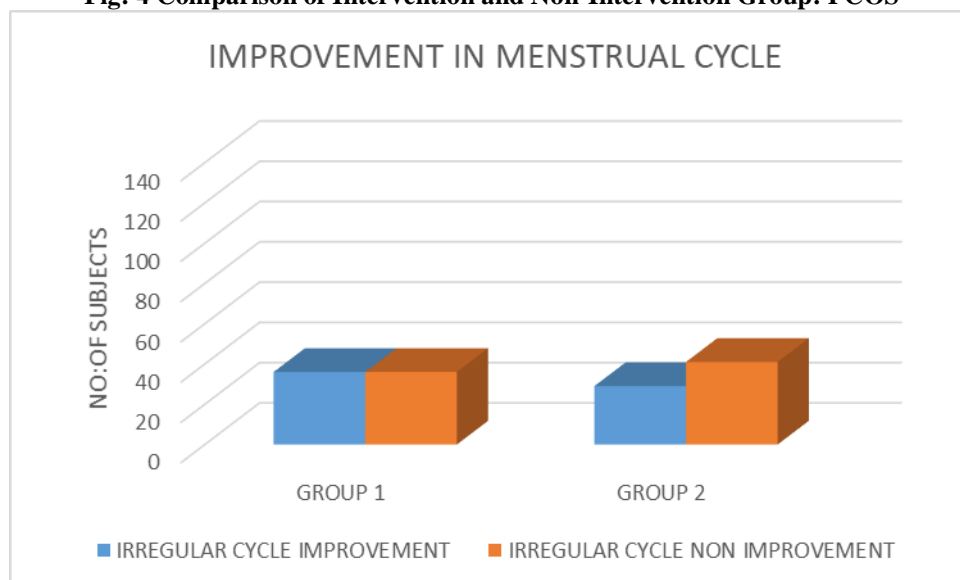


Fig: 5 Comparison of Intervention and Non-Intervention Group: MENSTRUAL CYCLE

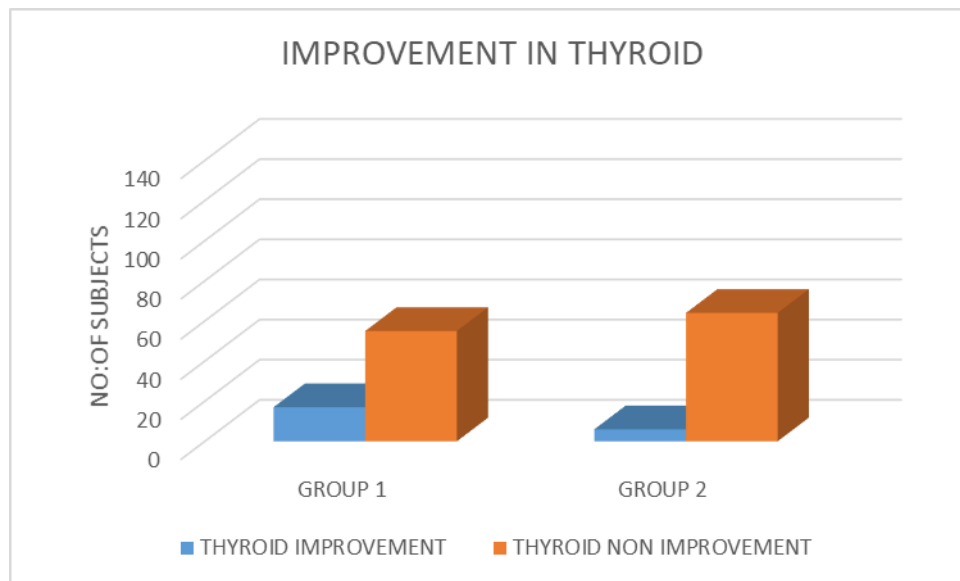


Fig :6 Comparison of Intervention and Non-Intervention Group: THYROID

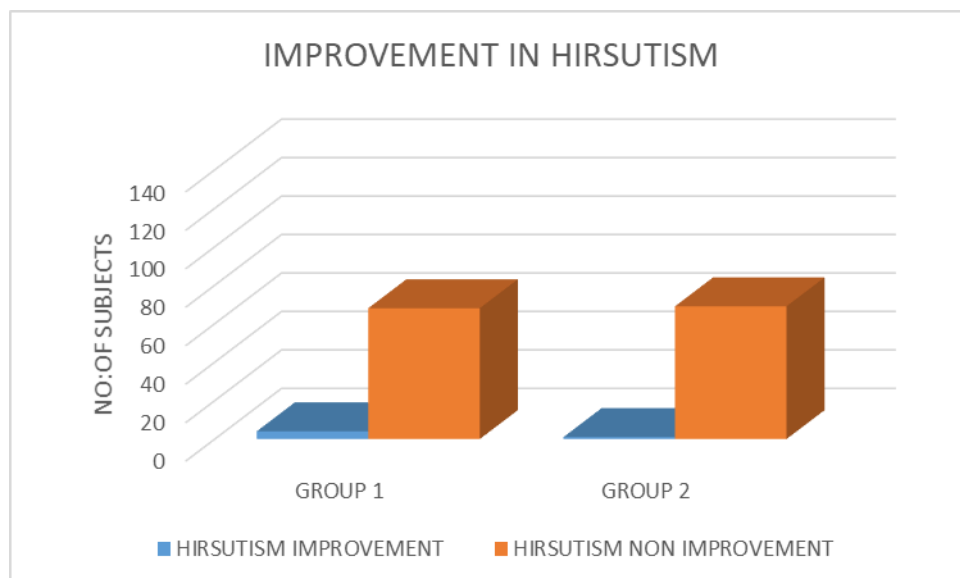


Fig : 7 Comparison of Intervention and Non-Intervention Group: HIRSTISM



Fig: 8 Comparison of Intervention and Non-Intervention Group: BMI

IV.3.EFFECT OF COUNSELLING ON PREGNANCY RATE

A comparison of pregnancy outcomes in usual care and the interventional group is presented in Table;10 and figure; 9, In the total study population 20 participants in the intervention group

and 11 participants in the control group had positive pregnancy outcomes. However, there was no significant difference between the two groups concerning positive pregnancy outcomes (P = 0.062)

Table:10 Comparison of Interventional and Non- Interventional Group Based on Pregnancy Outcome

OUTCOME	INTERVENTIONAL GROUP (N= 72)	NON-INTERVENTIONALGROUP (N=70)	P value
POSITIVE PREGNANCY OUTCOME	20	11	0.082
NO OUTCOME	52	59	

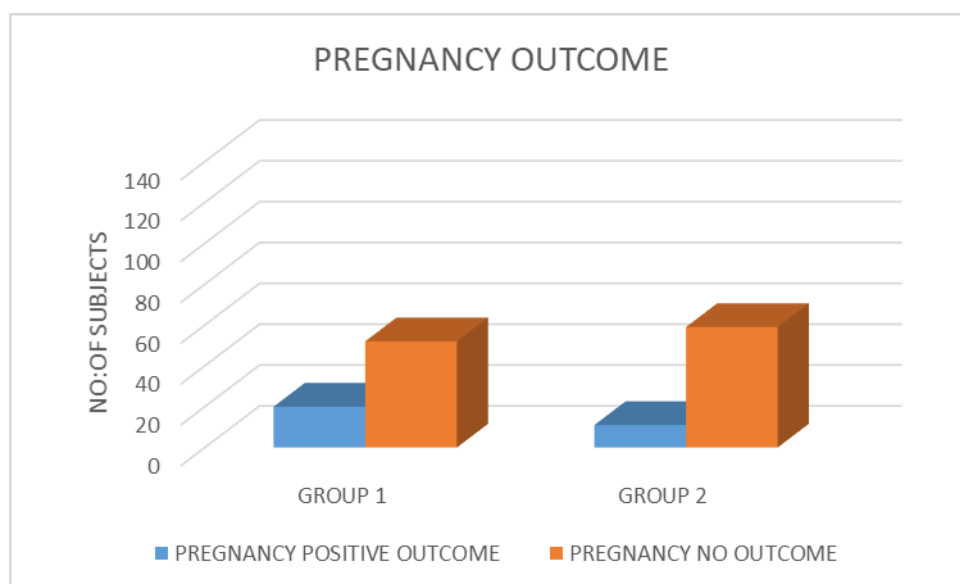


Fig: 9: Comparison of Control and Interventional Group Based on Pregnancy Outcome

IV.4.IMPACT OF PHARMACIST INTERVENTION ON MEDICATION ADHERENCE

At baseline 26 patients in the interventional group were in low adherence, 44 patients in medium-range and 2 patients in high adherence range. After follow-up 9 patients were in the low adherence range, 27 were in the medium-range, 36 patients were in the high adherence range.

In the control group at baseline 17 patients were in the low adherence range, 52 in the medium range, 1 in the high adherence range. After follow-up 30 patients were in the high adherence range, 27 in the medium-range and 13 were in the low adherence range.

Statistical analysis of this data shows a significant improvement in medication adherence in both groups ($p=0.001$) but the difference in both groups is not statistically significant.

TABLE: 11 Comparisons of Pre and Post Medication Adherence Scores in Interventional and Non-Interventional Group

MMAS-8	Adherence range	Interventional group (n=72)	t	df	P value	Control group (n=70)	t	df	P value
MMAS -8 (BEFORE)	LOW ADHERENCE	26	10.313	71	0.001	17	7.297	69	0.001
	MEDIUM ADHERENCE	44				52			
	HIGH ADHERENCE	2				1			
MMAS-8 (AFTER)	LOW ADHERENCE	9				13			
	MEDIUM ADHERENCE	27				27			
	HIGH	36				30			

	ADHERENCE							
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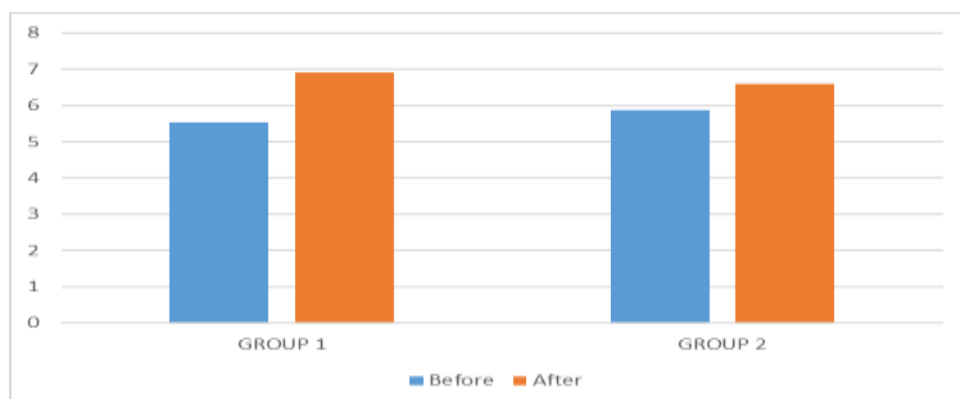


Fig: 10 Comparisons of Pre and Post Medication Adherence Scores Interventional and Non-Interventional Group

V.DISCUSSION

This prospective study involving 142 infertile women aimed at Studying the etiological factors of female infertility and to evaluate the effect of pharmacist--led patient counselling in improving pregnancy rate and medication adherence among infertile couple.

In this present study it is found that PCOS (66.2%) is most common etiological factor among women with infertility. In the study population 60.6% women experience irregular menstruation which is the second most important etiological cause for infertility in this population. In study population 51.4% women were between the age 25 – 35 years. Overweight being an important etiology of infertility accounts for about 46.5% population of this study. Other etiological factors studied include history of use of contraceptives (25.4%), Thyroid abnormalities (24.6%), Underweight (20.94%), Hirsutism (11.3%), obesity (8.95%) and endometriosis (3.5%).

In a previous study by **FatemehPeyromusavi** et al., “**Factors Affecting Response to Infertility Treatment**” (2016) [14] showed that (7.63%) having irregular menstrual cycles, (27.7%) were positive for hirsutism, (23.18%) patients were having a history of contraception. These findings have a greater difference when compared with our study.

In another study by **Seyedeh Zahra Masoumi** et al., “**An epidemiologic survey on the causes of infertility in patients referred to infertility center in Fatemeh Hospital in Hamadan**” (2015)[21] showed majority of women (57.2%) in study population were in the age group

of 20-30 years, which is a similar findings of our study and also in this study 62.6% population were having menstrual disorders (disorders of cycle length and flow), 58.7% are having disease such as diseases (obesity, thyroid diseases, diabetes) etc.

Seyedeh Zahra Masoumi et al., “**An epidemiologic survey on the causes of infertility in patients referred to infertility center in Fatemeh Hospital in Hamadan**” (2015) [21] also showed that there was statistically significant relationship obesity with increasing duration of infertility. But in our study, most of the women were overweight.

Jan Willem van der Steeg et al., “**Obesity affects spontaneous pregnancy chances in subfertile, ovulatory women**” (2008) [24] in a study showed that the probability of a spontaneous pregnancy declined linearly with a body mass index (BMI) over 29 kg/m. A BMI below 18.5 kg/m² was found in 3.7% of the women, between 18.5 and 25 in 67%, between 25 and 30 in 19%, between 30 and 35 kg/m² in 6.7%, and 35 kg/m² in 3.8% this shows a similar finding when compared with our study as most of our study population were overweight.

Francisco Bolumar et al., “**Body Mass Index and Delayed Conception: A European Multicenter Study on Infertility and Subfecundity**” (2000) [55] in a study shown that Approximately 12 percent of all women were overweight (BMI > 25 kg/m²), and just over 3 percent were obese (BMI > 30 kg/m²).

BalamuthuKadalmani et al., “**cohort study of endometriosis in south Indian district**”(2016) [56] study showed that endometriosis has a negative impact on fertility

invariably of primary or secondary infertility. Among the 569 subjects, 195 (34.27%) women with infertility problems presented with endometriosis.

J. Prescott et al., "A prospective cohort study of endometriosis and subsequent risk of infertility"^[25] (2016) in his study showed that endometriosis remained significantly associated with a 78% greater risk of infertility. Laparoscopically confirmed endometriosis was reported by 751 (16%) infertile women. Women with a history of endometriosis had a 2-fold greater risk of infertility after adjusting for age. But in this study only a small population reported to have endometriosis.

This study examined the effects of lifestyle intervention through counselling on etiological factors of infertility. Our findings suggest that Etiological factors like Overweight, PCOS, Irregular cycle, Thyroid were found to be improved in response to lifestyle intervention. PCOS is having a significant improvement (0.001*) in interventional group when compared to control group who have not received any intervention. Etiological factors like irregular cycle (0.130), Thyroid (0.141), Hirsutism (0.025), overweight (0.568) etc were also have non-significant improvement in interventional group when compared to control group.

Lisa J Moran et al., "Lifestyle changes in women with polycystic ovary syndrome" (2011)^[60] in a study showed that Lifestyle intervention improves body composition, hyperandrogenism (high male hormones and clinical effects) and insulin resistance in women with PCOS. These included endpoint values for total testosterone (P = 0.004), hirsutism or excess hair growth by the Ferriman- Gallwey score (P = 0.04), weight (P< 0.00001).

Chan Hee Kim et al., in his study "Effects of lifestyle modification in polycystic ovary syndrome compared to metformin only or metformin addition: A systematic review and meta-analysis"^[57] showed that There was no significant difference in the improvement in menstrual frequency between the groups (lifestyle modification vs metformin+lifestyle modification in pcos patients) (p=0.50). There was no significant difference in the weight loss between the groups (p=0.73). In the present study improvement in PCOS is statistically significant between interventional and control group. Improvement in other etiological factors

were not statistically significant between two groups.

Chan Hee Kim et al., in his study "Effects of lifestyle modification in polycystic ovary syndrome compared to metformin only or metformin addition: A systematic review and meta-analysis" also showed that there was no significant difference in the pregnancy rate between the Lifestyle intervention and the metformin + lifestyle modification group (p=0.30, MD=1.44). Similarly, this study also showed a non-significant pregnancy rate improvement between groups.

The present study assessed the medication knowledge of infertility patients using MMAS-8 questionnaire at the baseline and at review after 2 months. There was a significant improvement in the medication adherence before and after education in both the interventional and control group and after patient education by the pharmacist (0.001).

Avinsaji et al., in a study "Impact of pharmacist intervention on medication knowledge and adherence in hemodialysis patients" done in hemodialysis patients showed that test group had significant improvement (p<0.05) in their medication adherence and knowledge whereas there was no change in control group.

VI. CONCLUSION

This study was conducted in a short time period and with a small sample size (N =142). This study makes important contributions to the knowledge of etiological factors associated with infertility. In this study it is shown that among infertile women etiological factors like PCOS, Irregular menstrual cycle, overweight is more prominent. Therefore, from these results we can suggest that women should pay more attention to factors such as BMI, menstrual cycles (irregular) and PCOS because disregarding any of the above can have a significant impact on fertility.

The findings of the present study provide some evidence in support of counseling with lifestyle changes appears to improve etiological factors and pregnancy rate in infertile women. On the basis the results, counselling is beneficial for infertile patients, but more effective studies are needed.

Patient education on medication adherence provided by pharmacist resulted in increasing medication adherence at the end of the study but both interventional group as well as control group were shown a significant improvement.

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